CONSTRUCTING THE ASIA-PACIFIC REGIONAL COOPERATION AND INTEGRATION INDEX: A PANEL APPROACH

Cyn-Young Park and Racquel Claveria

NO. 544

May 2018

ADB ECONOMICS WORKING PAPER SERIES

ASIAN DEVELOPMENT BANK

ADB

ADB Economics Working Paper Series

Constructing the Asia-Pacific Regional Cooperation and Integration Index: A Panel Approach

Cyn-Young Park and Racquel Claveria

No. 544 | May 2018

Cyn-Young Park (cypark@adb.org) is a Director and Racquel Claveria (rclaveria.consultant@adb.org) is a Consultant of the Regional Cooperation and Integration Division in the Economic Research and Regional Cooperation Department of the Asian Development Bank.

The authors thank Mara Claire Tayag and the Asia Regional Integration Center staff (Clemence Fatima Cruz, Suzette Dagli, Pilar Dayag, Concepcion Latoja, Paul Mariano, and Dorothea Ramizo) for their devoted and timeless efforts in collecting and compiling data.

ASIAN DEVELOPMENT BANK

ADB

6 ADB Avenue, Mandaluyong City, 1550 Metro Manila, Philippines
Tel +63 2 632 4444; Fax +63 2 636 2444
www.adb.org

ISSN 2313-6537 (print), 2313-6545 (electronic)
Publication Stock No. WPS189334-2
DOI: http://dx.doi.org/10.22617/WPS189334-2

Notes:
In this publication, "$" refers to United States dollars.
Corrigenda to ADB publications may be found at http://www.adb.org/publications/corrigenda.

CONTENTS

TABLES AND FIGURES

TABLES

FIGURES

ABSTRACT

In this paper, we propose a panel approach in the construction of the Asia-Pacific Regional Cooperation and Integration Index (ARCII) to strengthen the index's ability to track the progress of economic integration in the region over time. Panel-based procedures are employed in imputing missing values, normalizing raw data, and deriving dimensional and subdimensional weights via principal components analysis. Findings suggest the pace of integration in Asia was broadly steady over the 11-year sample period (2006–2016). However, modest gains have been made as a majority of economies in the sample have moved up in their levels of regional integration from 2006 to 2016. Of the six dimensions featured in the ARCII, trade and investment and movement of people are the main drivers of regional integration, while the money and finance dimension was the weakest link. Based on global normalization, Asia comes second to the European Union (EU) in progress on regional integration, but in recent years a few Asian economies have broken through to the top tier dominated by the EU economies.

Keywords: Asia, composite index, regional integration

JEL codes: C38, C43, F15

I. INTRODUCTION

Regional integration is a dynamic process where a group or more than one neighboring countries cooperate to achieve common goals for mutual benefit. Regional cooperation and integration can take form in many different facets, such as promoting trade and investment, developing infrastructure, improving people's mobility, strengthening the provision of regional public goods, and providing the legal and institutional basis for international policy cooperation.

Depending on the goals and purposes, a multitude of regional integration initiatives have emerged around the world, and Asia is no exception (Huh and Park 2018). Indeed, the dynamic effects of regional cooperation and integration are often considered positive for the region's economic growth and development, particularly when driven by increased market size, exploitation of economies of scale, enhanced competition, increased investment, and technical transfers.

In 2017, the *Asia Economic Integration Report* of the Asian Development Bank unveiled a new composite index—the Asia-Pacific Regional Cooperation and Integration Index (ARCII)—to gauge the degree of regional cooperation and integration in Asia and the Pacific (ADB 2017). The ARCII aims to assess the extent to which each economy is integrated into the region, identify strengths and weaknesses of multiple regional integration drivers, and track progress in a comprehensive and systematic manner. Reflecting the multifaceted nature of regional integration, the ARCII combines 26 indicators categorized into six regional cooperation and integration dimensions: trade and investment, money and finance, regional value chains, infrastructure and connectivity, movement of people, and institutional and social integration.

Building on the methodology of Huh and Park (2017, 2018), the ARCII is compiled using weights obtained from a two-stage principal component analysis (PCA).[1] In the first stage, the PCA apportions a weight to each indicator to construct subindexes for the six dimensions. In the second stage, the PCA is applied again to weight the subindexes and to compile the overall index. However, in Huh and Park (2017, 2018) the ARCII was based on data from a single year (2013), partly because data from other years were limited and failed to cover many small island countries in the Pacific. The single-year ARCII was also a reflection of the difficulty of reaching a consensus on the best approach to create time-consistent weights for compiling indicators that may become suddenly available or missing over time. Nevertheless, the single-year ARCII lacked the capacity to capture the dynamic nature of regional integration.

In this paper, we extend the methodology of Huh and Park (2017, 2018) to enhance the ARCII's ability to track progress in regional cooperation and integration in Asia and the Pacific over time, and to improve the reliability and ease of interpreting the index. In particular, panel normalization and panel PCA are employed in building an ARCII that can better monitor the time evolution of the index and identify different drivers of regional integration over time. A methodological refinement—the percentile transformation of normalized indicator values—also generates more robust and reliable estimates of ARCII. Finally, to the extent that availability of data allows, the construction of ARCII is brought to the subregional level by compiling indicators of activity between countries within each subregion (intrasubregional integration).

---

[1] For a full discussion on the construction of ARCII, please see Huh and Park (2018) "Asia-Pacific Regional Integration Index: Construction, Interpretation and Comparison" by Hyeon-Seung Huh and Cyn-Young Park at https://doi.org/10.1016/j.asieco.2017.12.001. An earlier version appeared in the ADB Working Paper Series https://www.adb.org/publications/asia-pacific-regional-integration-index. The ARCII was referred to as Asia-Pacific Regional Integration Index (APRII) in these papers.

The rest of the paper is structured as follows: Section II surveys some multiperiod PCA-based indicators. Section III details the extensions and refinements made to the methodology of Huh and Park (2018) in constructing the ARCII. Section IV presents the empirical results. Section V shows the construction of subregional indexes for Asia. Section VI discusses comparison of ARCII with regional integration indexes constructed for other regions. Section VII lays out the robustness checks performed on the ARCII. Finally, section VIII concludes with some policy implications and directions for future research.

II. REVIEW OF LITERATURE

Discussion of time dimension and longitudinal datasets is relatively sparse in the composite index literature. Only a handful of studies detail the methodology for constructing multiperiod PCA-based composite indicators (some of these are summarized in Table 1). Despite PCA being the main statistical tool for building the composite indexes listed in Table 1, the methodological differences are noteworthy. Various techniques are employed in each step of building a composite index, from the imputation of missing data to the weighting and aggregation of the overall index. For instance, missing values are imputed through linear interpolation and substitution with latest/closest available data in the KOF Index of Globalization (Dreher 2006, Dreher et al. 2010, and Gygli, Haelg, and Sturm 2018) while in the survey-based Logistics Performance Index (LPI) absent data are replaced with country mean responses, adjusted by the respondent's average deviation from a country mean in answers to the survey questions (World Bank 2017).

Normalization methods likewise vary. The KOF Index of Globalization employs panel normalization (i.e., normalizing values based on all available countries and years on hand) via min–max scaling (Swiss Federal Institute of Technology Zurich 2017), LPI utilizes annual normalization (i.e., normalizing values for each year) through standardization (z-scores) while a composite index of economic integration in Asia and the Pacific developed by Bo and Woo (2008) used methodologies involving distance to reference/base year and the conversion of raw indicators to percent share to total.

With regard to weighting and aggregation of the composite indexes, Dreher (2006), Dreher et al. (2010), Bo and Woo (2008) applied panel PCA-generated weights for the KOF Index of Globalization and a composite index of economic integration in Asia and the Pacific, respectively. Nonetheless, an updated version of the KOF Index of Globalization utilized 10-year rolling panel PCA-derived weights for compiling the index, with the intent of adapting to the changing relevance of certain variables in capturing globalization over time (Gygli, Haelg, and Sturm 2018). Meanwhile, PCA-generated weights for specific years are utilized for each biennial edition of the LPI, as it is assumed that the steady year-to-year weights ensure a high degree of comparability across various LPI editions (World Bank 2017).

Table 1: Selected Studies Employing Multiperiod Principal Component Analysis in Constructing Composite Indexes

	Coverage	Structure of Composite Index	Imputation of Missing Data	Normalization Method	Multivariate Analysis	Weighting and Aggregation
KOF Index of Globalization 2017 version (based on Dreher 2006, Dreher et al. 2010)	207 countries 1970–2014	23 indicators 5 subdimensions 3 dimensions	Linear interpolation; Missing values at the border are replaced with latest data	Panel min–max scaling, normalized values are then adjusted according to percentile distribution of original values	Multistage principal component analysis (PCA)	Additive using panel PCA-generated weights
KOF Index of Globalization 2018 version (based on Gygli, Haelg, and Sturm (2018)	209 countries 1970–2015	42 indicators 5 subdimensions 3 dimensions 1 *de facto* globalization Index 1 *de jure* globalization index	Linear interpolation; Missing values at beginning/end of series are substituted by the closest observation available	Panel min–max scaling, normalized values are then adjusted according to percentile distribution of original values	Multistage PCA	Additive using 10-year rolling panel PCA-generated weights
Composite Index of Economic Integration in the Asia and Pacific region (Bo and Woo 2008)	17 countries in the Asia Pacific Economic Cooperation (APEC) region 1990–2005	8 indicators 4 dimensions	Standard interpolation and extrapolation techniques (not specified)	Distance to reference/base year (1990) Percent share to the Asia and Pacific region	Two-stage PCA	Additive using panel PCA-generated weights
Logistics Performance Index (LPI) (World Bank 2017)	160 countries 2007, 2010, 2012, 2014, 2016	6 indicators 6 dimensions	Missing values replaced with country mean response for each question, adjusted by respondent's average deviation from country mean in answered questions	Standardization (z-scores)	PCA	Additive using year-specific PCA-generated weights
Asia-Pacific Regional Cooperation and Integration Index (ARCII) (Park and Claveria 2018)	158 countries 2006–2016	26 indicators 6 dimensions	Interpolation using linear growth; Averaging; Missing values at beginning/end of series are substituted by the closest observation available	Panel min–max scaling, normalized values are then adjusted according to percentile distribution of original values	Two-stage PCA	Additive using panel PCA-generated weights

Source: Authors' compilation.

Table 2: General Data Availability and Imputation of Missing Values of Asia-Pacific Regional Cooperation and Integration Index Indicators

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 average regional deposit rates relative to average global deposit rates											
	II-d	Pair-wise correlation of average regional equity returns minus average global equity returns											
III. Regional Value Chain	III-a	Ratio between the average trade complementarity index over regional trading partners and the average trade complementarity index over all trading partners											
	III-b	Ratio between the average trade concentration index over regional trading partners and the average trade concentration index over all trading partners											

continued on next page

Table 2 *continued*

Dimension	Indicator		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	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 average trade cost over regional trading partners and the average trade cost over all trading partners											
	IV-b	Ratio between the average liner shipping connectivity index over regional trading partners and the average 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											
	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.

III. METHODOLOGY

The aim of this paper is to show how the ARCII's ability to track progress of regional integration in Asia and the Pacific over time is strengthened by using a panel to build the index. Specifically, a panel approach helps compute the PCA weights for compiling the variables and subindexes. This method ensures comparability, which offers a host of advantages in interpreting composite indexes across different periods. First, it allows for analysis of the time evolution of regional integration for each economy. An increase (decrease) in the index through time indicates an improvement (decline) in regional integration. Moreover, absolute changes in the scores for a specific economy, group, or subgroup of economies add meaning to a numeric value to the estimated regional integration. When the PCA weights were computed for each period, the numeric value of an economy's estimated regional integration means nothing but its ranking vis-à-vis other economies. However, changes in comparable composite index scores across periods indicate the absolute evolution in regional integration (UNCTAD 2007). Comparability also helps identify the dimensions that are driving major changes in the composite index for each economy or region across different time periods.

The overall empirical strategy to achieve comparability is to utilize the available information from the whole sample of countries and years in each of the different steps taken in building the index, particularly in the data imputation, normalization, and weighting and aggregation stages.

A. Imputation of Missing Data

We follow Huh and Park (2017, 2018) for the composition of ARCII index and the country coverage used, but the dataset is extended to cover 2006–2016 instead of utilizing 2013 data only. As shown in Table 2, data is available for most of the indicators (17 out of 26) across most of the countries. The imputation methods of Huh and Park (2017, 2018) are applied to fill in the data gaps. In particular, indicator V-a (the proportion of intraregional outbound migration to total outbound migration) is linearly interpolated using bilateral migration data that is published every 5 years. For indicator V-c (the Logistics Performance Index), an average of available data in even years is used to impute missing data for the odd years in between.

For several indicators that lack data for specific countries, such as IV-a (regional and global average trade cost ratio), IV-c (LPI), and IV-c (the World Bank's Doing Business Index), regression imputation is likewise employed, as in Huh and Park (2017, 2018).[2] However, in place of data for all countries from a single year only, data for the regression imputation cover the entire sample of countries and years.[3] This is in line with the goal of ensuring comparability of ARCII over time by employing all the information available across the whole sample period.

Meanwhile, instead of linear extrapolation, missing observations at the beginning or end of a series are substituted by the closest observation available. In effect, the last nonmissing observation is carried backward (forward) when observations are missing at the beginning (end) of a series. This is similar to the technique adopted by Gygli, Haelg, and Sturm (2018) to update the methodology used to construct the KOF Index of Globalization.

[2] Appendix 3 of Huh and Park (2018) shows the specification of the regression imputation models.

[3] Regression results used for data imputation are summarized in the appendix table. Columns I and II compare the results of Huh and Park (2018) and this study which both show correctly signed and significant coefficients.

B. Normalization

Caution needs to be exercised in choosing the normalization method (e.g., panel or annual normalization) as different methods yield different outcomes and offer their own advantages and disadvantages. Moreover, attention should be paid to outliers as they can lead to unreliable or biased results.

As mentioned in section II, panel normalization involves normalizing indicators based on all sample years and all economies at hand. It is suitable for comparing progress across different economies through the years. However, whenever new data points become available, all indicators need to be normalized again using the new panel. A new dataset could change the minimum and maximum values for some indicators, and hence the value of the transformed indicators and resulting composite index. To maintain comparability between existing and new data, the composite index needs to be recalculated using the updated dataset (OECD 2008).

As an alternative to panel normalization, indicators for each year can be normalized—i.e., through annual normalization, which is similar to the methodology used to compute the single-year index. Typically, weights derived for a base year are applied to other years. As a result, previously constructed indexes are not affected. However, each year may have a different base for normalization (e.g., minimum and maximum values), which raises comparability issues over time.

Panel normalization is said to induce a "nonseparability" between years in a sample: a change in the data from 1 year can induce a change in ranking from another year (Lockwood 2004). Meanwhile, in annual normalization, use of different scales, means, and distributions will alter any weights assigned to the different components and therefore change the relative composition of the index (Dreher et al. 2010).

In this paper, we opt to employ panel normalization to maintain time consistency of the index. Specifically, a time element was added to the min–max scaling utilized by Huh and Park (2017, 2018). Each individual indicator x_{qc}^{t} of type q for a country c and time t, is transformed into:

$$I_t = \frac{x_{qc}^{t} - min_{t\epsilon T} min_c(x_q^t)}{max_{t\epsilon T} max_c(x_q^t) - min_{t\epsilon T} min_c(x_q^t)}$$

where the minimum and maximum values for each indicator are calculated across countries and time. The values of I_t range from 0 to 1, with higher values denoting greater integration. For indicators where higher values of the original variable imply lower integration, such as II-c (pairwise dispersion of deposit rates), III-b (average trade concentration ratio), and IV-a (average trade cost ratio), the transformation is given as:

$$I_t = 1 - \frac{x_{qc}^{t} - min_{t\epsilon T} min_c(x_q^t)}{max_{t\epsilon T} max_c(x_q^t) - min_{t\epsilon T} min_c(x_q^t)}$$

Hence, the minimum and maximum for each indicator are calculated across countries and time to account for the evolution of the indicators and the resulting composite index.

One of the drawbacks of min–max scaling is that extreme values can distort the distribution of normalized values. This can also understate/overstate the resulting composite index. To prevent outliers from exerting undue influence over the normalized indicators and the composite index, we transform the normalized data in accordance with the percentile distribution of the raw indicators, as in Dreher et al. (2010).

C. Weighting and Aggregation

Weighting and aggregation of data continue to be guided by the goal of improving comparability by utilizing all information at hand. The most important source of incomparability is said to be the systemic statistical properties of the index components that affect weighting (UNCTAD 2007). To avoid this issue, reference weights must be applied to all the years in the sample period. This makes the comparison of the composite index across the years possible.

PCA remains the main statistical tool to obtain the weights utilized for compiling the ARCII. In this paper, a panel PCA estimation is carried out to obtain time-consistent weights for aggregation. Following the notation of Huh and Park (2017, 2018), the data vector $X = (x_1, x_2, \dots, x_Q)$ becomes a multidimensional data vector $X_{TxQ} = (x_1^t, x_2^t, \dots, x_Q^t), t \epsilon T$, where T is the total number of periods and Q is the number of indicator (dimensions). Let Σ_{QxQ} be the correlation matrix of X_{TxQ}. The principal component (PC), $Z_i^t, i = 1,2, \dots, Q, t \epsilon T$, is defined as

$$Z_1^t = a_{11}x_1^t + a_{12}x_1^t + \cdots + a_{1Q}x_1^t$$

$$Z_2^t = a_{21}x_1^t + a_{22}x_1^t + \cdots + a_{2Q}x_1^t$$

$$Z_Q^t = a_{Q1}x_1^t + 2_{Q2}x_1^t + \cdots + a_{QQ}x_1^t$$

Or in matrix form, $Z = A'X_{TxQ}$ where $A = (a_1, a_2, \dots, a_Q)$. The coefficient matrix A maximizes the variance of $Z = E(ZZ') = A' \sum A$ subject to the following constraints:

$a_1'a_1 = a_2'a_2 = \cdots = a_Q'a_Q = 1$ (unit vector length) and

$cov(a_i'x, a_j'x) = 0, i \neq j$ (orthogonality condition)

The solution to the eigenvalue–eigenvector problem resulting from the above-constrained maximization problem is λ_i, which is equal to the variance of Z. Moreover, $\lambda_1 > \lambda_2 > \cdots > \lambda_Q$.

Using the loadings obtained from the panel PCA, we follow a weighting scheme laid out in Huh and Park (2017, 2018). As mentioned, the ARCII is compiled using weights obtained from a two-stage panel PCA. In the first stage, panel PCA is employed to apportion a weight to each indicator to construct subindexes for the six dimensions of regional integration. In the second stage, panel PCA is applied again to weight the subindexes to compile the overall index.

Panel PCA-derived weights are used as reference weights in computing the ARCII for each year of the sample period. Keeping the weights constant over time is useful in analyzing the evolution of the ARCII for each economy and regional/subregional grouping. It also allows comparison of the composite index across the years.

IV. EMPIRICAL RESULTS

A. Panel Principal Component Analysis-Derived Weights

Following the two-step panel PCA procedure and the criteria for retaining the number of principal components cited in Huh and Park (2017, 2018), the right bottom portion of Table 3 reports the weights apportioned to each of the six dimensions of the ARCII, while Table 4 shows the weights of indicators for each dimension.[4] Taking into account all the available information from 48 Asian countries for 2006–2016, the highest weight (0.187) was allocated to Dimension I (trade and investment) while the lowest weight (0.116) was given to Dimension II (money and finance). This lends credence to recent findings that financial integration in Asia continues to lag behind trade integration and that Asia's financial markets remains more globally than regionally integrated (ADB 2017).

B. Overall and Dimensional Subindexes over Time

Figure 1 shows a broadly steady trend of overall regional integration in Asia over the years. This indicates that regional integration is usually a gradual process (Bo and Woo 2008). The ARCII reflects a modest pace of integration over the period of 2006–2016. The dimensional subindexes mirrored the stable movement of the overall index. Among the subindexes, Dimension I (trade and investment) and V (movement of people) maintained relatively higher scores than the overall index throughout the sample period. Dimension III (regional value chain) and IV (infrastructure and connectivity) broadly tracked the overall index. Dimension II (money and finance) and VI (institutional and social integration) showed relatively lower integration. Dimension II also exhibited the highest volatility. This subindex increased sharply in 2008, coinciding with the height of the global financial crisis, and picked up again in 2011 before the crisis drew to a close, stabilizing thereafter. The pattern illustrates the phenomenon that financial market interconnectedness tends to increase during stress periods and to decline during recovery (Dungey et al. 2017).

Figure 2 presents the contribution of each dimensional index to the overall composite index. Trade and investment along with movement of people seem to be the main drivers of regional integration in Asia. Infrastructure and connectivity comes a close third in its contribution to the overall index. While the institutional and social integration dimension presented the consistently lowest scores among the six dimensions over the sample period, money and finance had the lowest weight and dimensional contribution in the estimated panel ARCII. Therefore, money and finance integration seems to be the weakest link in regional integration in Asia.

[4] Huh and Park (2018) followed the standard practice of choosing principal components that (i) have associated eigenvalues exceeding 1 (Kaiser criterion), (ii) contribute individually to the explanation of total variance by at least 10%, and (iii) contribute cumulatively to explain more than 60% of total variance.

Table 3: Panel Principal Component Analysis and Weights for Aggregation for Asia

	Number of Principal Components															
	Dimension I					Dimension II				Dimension III				Dimension IV			
	1	2	3	4	5	1	2	3	4	1	2	3	4	1	2	3	4
Eigenvalue	**3.257**	**1.129**	0.400	0.119	0.096	**1.759**	**0.959**	0.783	0.499	**1.971**	**0.893**	0.692	0.444	**1.648**	**1.102**	0.883	0.368
Prop.	**0.651**	**0.226**	0.080	0.024	0.019	**0.440**	**0.240**	0.196	0.125	**0.493**	**0.223**	0.173	0.111	**0.412**	**0.275**	0.221	0.092
Cum prop	**0.651**	**0.877**	0.957	0.981	1.000	**0.440**	**0.680**	0.875	1.000	**0.493**	**0.716**	0.889	1.000	**0.412**	**0.687**	0.908	1.000
	Dimension V				Dimension VI					Overall							
	1	2	3	4	1	2	3	4	5		1	2	3	4	5	6	
Eigenvalue	**1.508**	**1.186**	0.782	0.524	**2.782**	**1.012**	0.772	0.309	0.125		**2.319**	**1.283**	**1.014**	0.712	0.460	0.212	
Prop	**0.377**	**0.297**	0.196	0.131	**0.556**	**0.202**	0.154	0.062	0.025		**0.387**	**0.214**	**0.169**	0.119	0.077	0.035	
Cum prop	**0.377**	**0.674**	0.869	1.000	**0.556**	**0.759**	0.913	0.975	1.000		**0.387**	**0.600**	**0.769**	0.888	0.965	1.000	
	Squared loadings																
	I-a	I-b	I-c	I-d	I-e	II-a	II-b	II-c	II-d	III-a	III-b	III-c	III-d	IV-a	IV-b	IV-c	IV-d
Z_1	0.190	0.236	0.249	0.174	0.151	0.347	0.317	0.234	0.101	0.288	0.281	0.180	0.251	0.021	0.102	0.455	0.422
Z_2	0.154	0.051	0.133	0.302	0.360	0.120	0.195	0.257	0.428	0.077	0.028	0.811	0.084	0.518	0.378	0.044	0.060
	V-a	V-b	V-c	V-d	VI-a	VI-b	VI-c	VI-d	VI-e		I	II	III	IV	V	VI	
Z_1	0.356	0.351	0.264	0.028	0.155	0.275	0.271	0.290	0.010		0.212	0.173	0.030	0.154	0.341	0.091	
Z_2	0.013	0.011	0.089	0.887	0.223	0.001	0.013	0.010	0.754		0.051	0.106	0.395	0.163	0.048	0.237	
Z_3											0.302	0.001	0.141	0.227	0.008	0.322	
	Weights for composite indexes																
Indicator	I-a	I-b	I-c	I-d	I-e	II-a	II-b	II-c	II-d	III-a	III-b	III-c	III-d	IV-a	IV-b	IV-c	IV-d
Weight	0.180	0.188	0.219	0.208	0.206	0.237	0.258	0.245	0.260	0.243	0.226	0.316	0.215	0.225	0.216	0.286	0.273
Indicator	V-a	V-b	V-c	V-d	VI-a	VI-b	VI-c	VI-d	VI-e		I	II	III	IV	V	VI	
Weight	0.248	0.244	0.209	0.299	0.173	0.199	0.199	0.213	0.216		0.187	0.116	0.156	0.172	0.186	0.182	

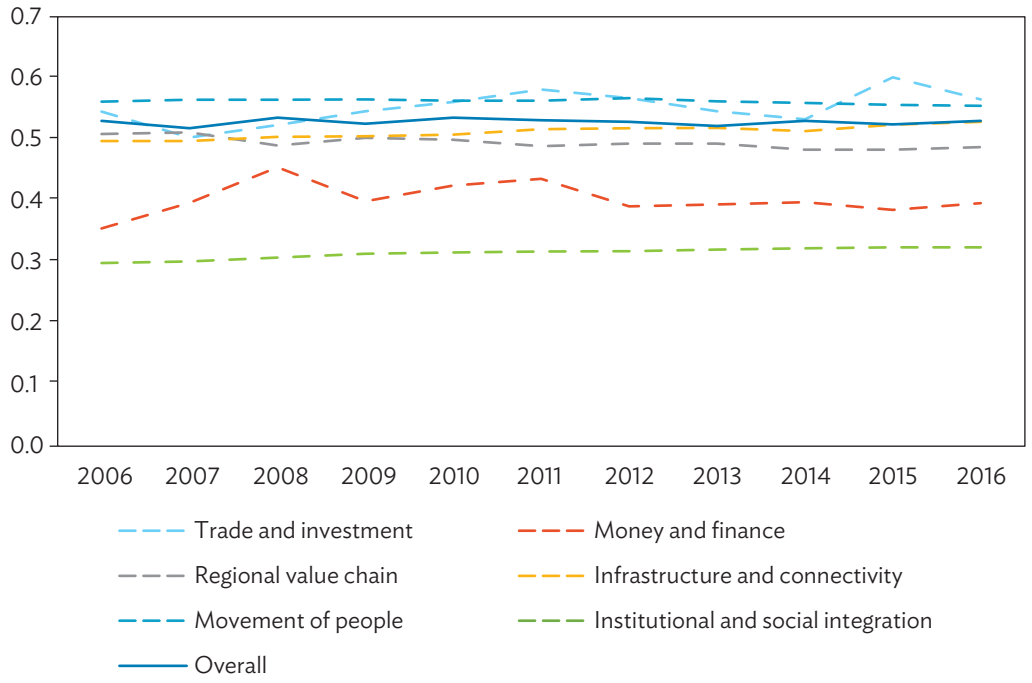
Notes: "Prop" and "Cum prop" rows report the fractions and cumulated fractions of total variation in the data accounted for by each principal component. Values in boldface are the principal components chosen for aggregation based on the criteria cited in Huh and Park (2018).
Source: Authors' calculations.

Table 4: Asia-Pacific Regional Cooperation and Integration Index Dimensions and Subdimensions, Panel Principal Component Analysis-Derived Weights

Dimensions and Subdimensions		Weights	
I. Trade and investment integration			**0.187**
I-a	Proportion of intraregional goods exports to total goods exports	0.180	
I-b	Proportion of intraregional goods imports to total goods imports	0.188	
I-c	Intraregional trade intensity index	0.219	
I-d	Proportion of intraregional foreign direct investment (FDI) inflows to total FDI inflows	0.208	
I-e	Proportion of intraregional FDI inflows plus outflows to total FDI inflows plus outflows	0.206	
II. Money and finance integration			**0.116**
II-a	Proportion of intraregional cross-border equity liabilities to total cross-border equity liabilities	0.237	
II-b	Proportion of intraregional cross-border bond liabilities to total cross-border bond liabilities	0.258	
II-c	Pair-wise dispersion of deposit rates averaged regionally relative to that averaged globally	0.245	
II-d	Pair-wise correlation of equity returns averaged regionally minus that averaged globally	0.260	
III. Regional value chain			**0.156**
III-a	Ratio between the averaged trade complementarity index over regional trading partners and the averaged trade complementarity index over all trading partners	0.243	
III-b	Ratio between the averaged trade concentration index over regional trading partners and the averaged trade concentration index over all trading partners	0.226	
III-c	Proportion of intraregional intermediate goods exports to total intraregional goods exports	0.316	
III-d	Proportion of intraregional intermediate goods imports to total intraregional goods imports	0.215	
IV. Infrastructure and connectivity			**0.172**
IV-a	Ratio between the averaged trade cost over regional trading partners and the averaged trade cost over all trading partners	0.225	
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	0.216	
IV-c	Logistics performance index (overall)	0.286	
IV-d	Doing business index (overall)	0.273	
V. Free movement of people			**0.186**
V-a	Proportion of intraregional outbound migration to total outbound migration	0.248	
V-b	Proportion of intraregional tourists to total tourists (inbound plus outbound)	0.244	
V-c	Proportion of intraregional remittances to total remittances	0.209	
V-d	Proportion of other Asian countries that do not require an entry visa	0.299	
VI. Institutional and social integration			**0.182**
VI-a	Proportion of other Asian countries that have signed free trade agreements	0.173	
VI-b	Proportion of other Asian countries that have an embassy	0.199	
VI-c	Proportion of other Asian countries that have signed business investment treaties	0.199	
VI-d	Proportion of other Asian countries that have signed double taxation treaties	0.213	
VI-e	Cultural proximity with other Asian countries relative to that with all other countries	0.216	

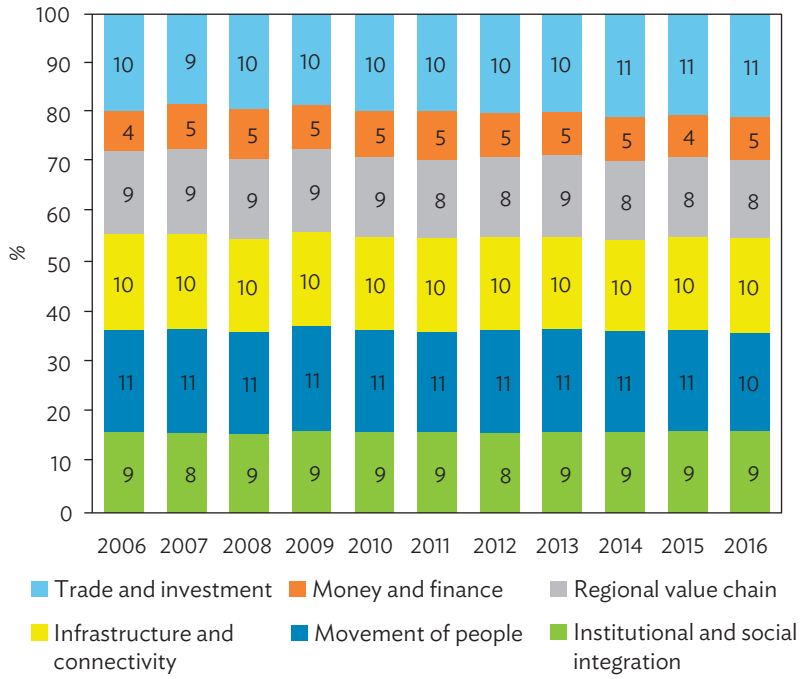
Source: Authors' calculations.

Figure 1: Overall Asia-Pacific Regional Cooperation and Integration Index and Dimensional Subindexes—Asia



Source: Authors' calculations.

Figure 2: Dimensional Contribution to Asia-Pacific Regional Cooperation and Integration Index—Asia



Source: Authors' calculations.

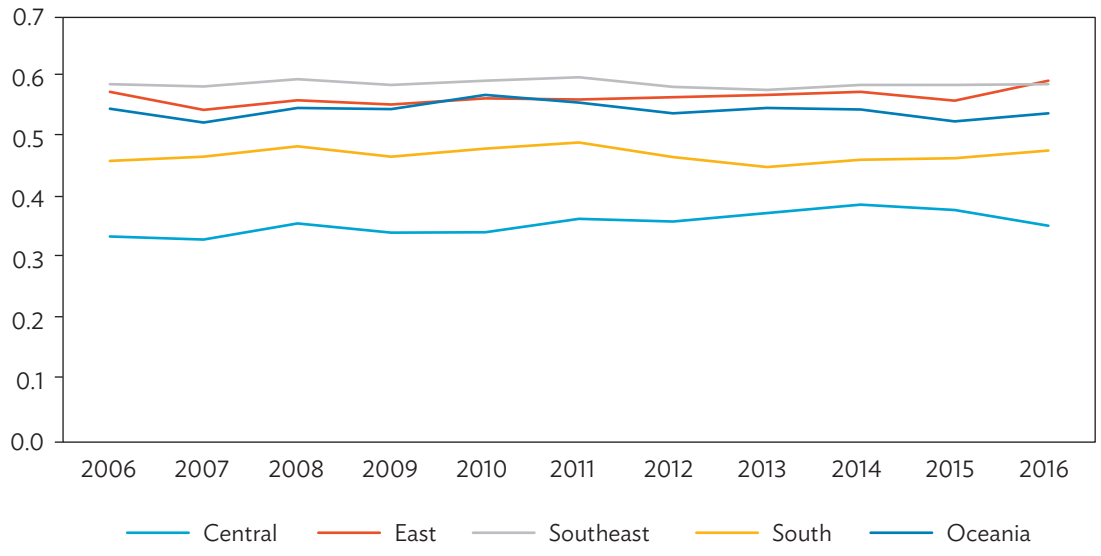
C. Performance of Asia Subregions

Across the subregions, Southeast Asia exhibited the highest degree of integration for the sample period, except in 2016, with an average score of 0.590 (Figure 3). East Asia showed an overall upward trend of regional integration from its lowest of 0.547 in 2007. It recorded a score higher than Southeast Asia in 2016. Oceania closely trailed East Asia and even surpassed it in 2010. Meanwhile, South Asia and Central Asia placed fourth and fifth throughout the sample period.

By dimension, trade and investment integration with the region was led by Southeast Asia (Figure 4). Two dimensional indexes (trade and investment and money and finance) appear to exhibit some volatility in their integration trends. All subregions exhibited relatively highly volatile subindexes of money and finance integration.[5] Moreover, the money and finance subindex peaked in 2008 for these subregions, reflecting the well-known statistical regularity of higher financial market correlations during crisis periods.

The remaining four subindexes displayed relatively stable movements across all Asia subregions. Southeast Asia scored highest in regional integration for the dimension of regional value chain until overtaken by Central Asia and East Asia in 2012. Oceania was the forerunner in regional integration for infrastructure and connectivity. Subregional variations in movement of people and institutional and social integration were particularly large across the sample period. Regional integration as reflected in the movement of people was dominated by Southeast Asia, while particularly weak in Central Asia. Finally, East Asia exhibited consistently higher institutional and social integration among other subregions of Asia, while the Pacific scored lowest on this front.

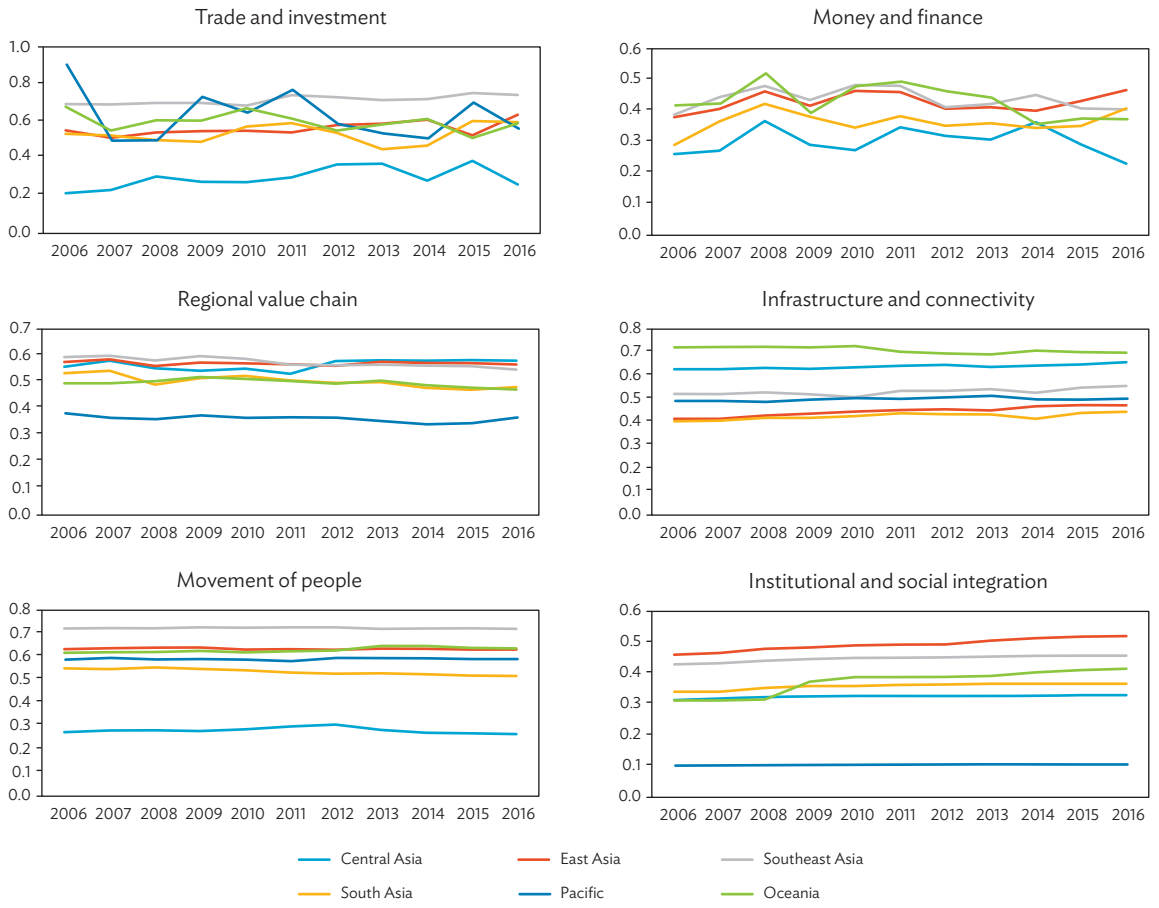
Figure 3: Overall Asia-Pacific Regional Cooperation and Integration Index—Asia Subregions



Source: Authors' calculations.

[5] Except for the Pacific, for which the money and finance subindex could not be computed because of lack of data.

Figure 4: Dimensional Subindexes—Asia Subregions

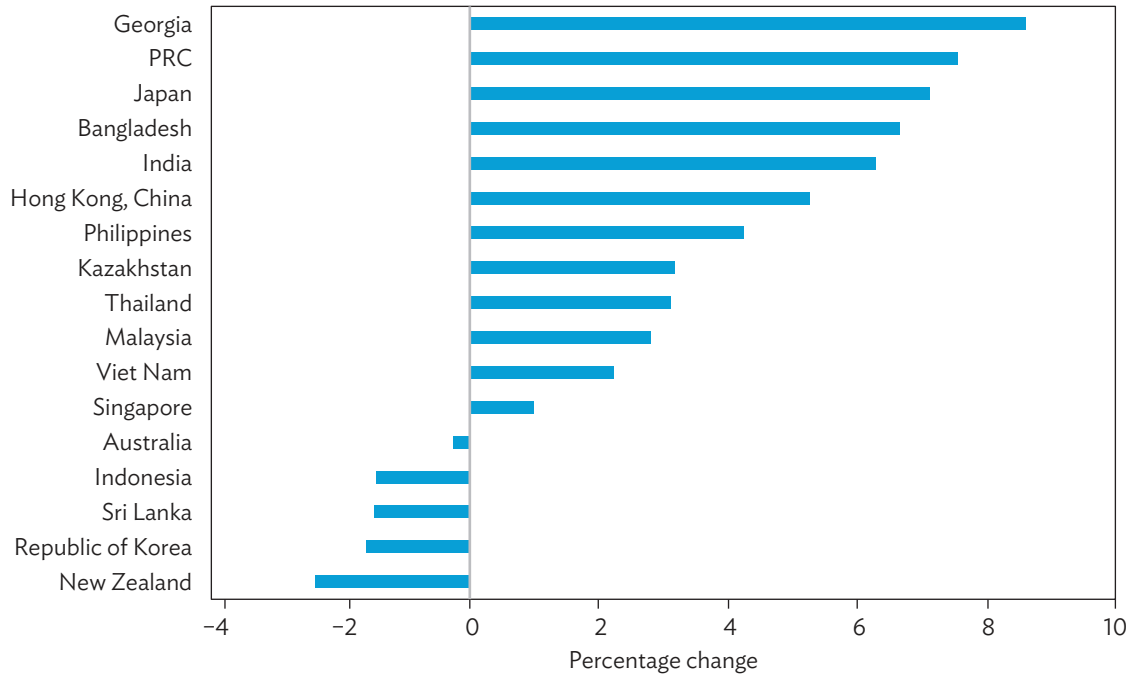


Source: Authors' calculations.

D. Leaders in Regional Integration

The time-varying ARCII enables examination of the evolution of regional integration of specific economies over time. This allows the leaders in regional integration from 2006 to 2016 to be determined. Of the 17 economies for which the ARCII could be computed for the years 2006 and 2016, 12 (more than 70%) recorded positive progress in regional integration across the 11-year sample period (Figure 5). Georgia turned out to have made the most advancement, followed by the People's Republic of China; Japan; Bangladesh; India; Hong Kong, China; the Philippines; Kazakhstan; Thailand; Malaysia; Viet Nam; and Singapore. Meanwhile, five economies slipped in regional integration from 2006 to 2016. These were New Zealand, the Republic of Korea, Sri Lanka, Indonesia, and Australia.

Figure 5: Asia-Pacific Regional Cooperation and Integration Index, 2016 versus 2006—Selected Asian Economies



Source: Authors' calculations.

V. CONSTRUCTION OF INTRASUBREGIONAL INTEGRATION INDEX

The analysis of Asia subregions in the preceding section pertained to the integration of each subregion relative to the full sample Asian region. That is, the subregional indexes were computed by averaging the scores of the countries in each subregion. Therefore, strictly speaking, the subregional indexes represent a subregion's average regional integration with Asia. For example, East Asia's integration score would represent the average integration of all countries in East Asia with Asia, rather than integration taking place among the countries of East Asia.

Intrasubregional integration indexes are compiled in this section to gauge the extent of pure intrasubregional activity for each subregion. Specifically, integration within a particular subregion is computed, taking advantage of the panel with sufficient observations to compute the PCA weights for the selected subregion. The construction of the intrasubregional integration index parallels that of the regional integration index, except that ratios of intrasubregional activity (in place of intraregional activity) to total activity are utilized and that normalization, percentile transformation, and weightings through panel PCA are performed for each subregion.[6]

Table 5 reports the panel PCA-derived weights for the intrasubregional integration indexes compiled for East, Southeast, and South Asia where the number of observations is large enough to compute the weights for the intrasubregional indexes. Table 6 shows that data limitations make computation of the intrasubregional index possible only for East, Southeast, and South Asia.

[6] Regression imputation was undertaken at the regional level to meet the required number of observations. Regression results are reported in Column III of the appendix table.

Table 5: Panel Principal Component Analysis-Derived Weights—Asia Intraregional versus Intrasubregional Integration Indexes

	Intraregional Integration Index	Intrasubregional Integration Index		
Dimension	Asia	East Asia	Southeast Asia	South Asia
Trade and investment	0.187	0.156	0.167	0.139
Money and finance	0.116	0.166	0.170	0.179
Regional value chain	0.156	0.167	0.154	0.155
Infrastructure and connectivity	0.172	0.175	0.175	0.165
Movement of people	0.186	0.171	0.186	0.181
Institutional and social integration	0.182	0.165	0.148	0.179
Sum	1.000	1.000	1.000	1.000

Source: Authors' calculations.

Table 6: Intrasubregional Integration Index, 2006–2016—Country Coverage

East Asia	Southeast Asia	South Asia
People's Republic of China	Cambodia	Bangladesh
Hong Kong, China	Indonesia	India
Japan	Lao People's Democratic Republic	Maldives
Republic of Korea	Malaysia	Nepal
Mongolia	Philippines	Pakistan
	Singapore	Sri Lanka
	Thailand	
	Viet Nam	

Source: Authors' compilation.

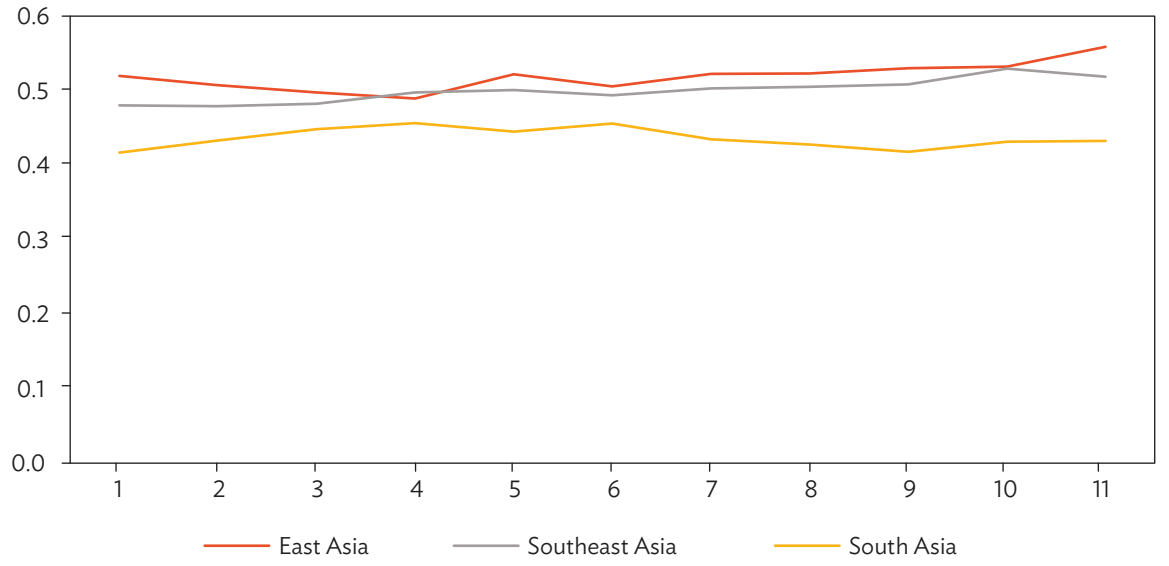
In East Asia, infrastructure and connectivity shows the highest weight, and trade and investment the lowest. Movement of people gets the largest share in Southeast Asia and South Asia's intrasubregional integration indexes. Institutional and social integration and trade and investment are apportioned the least weights for Southeast Asia and South Asia.

The Overall Intrasubregional Integration Index

Over the sampled years, intrasubregional integration was highest for East Asia, except for 2009, when it was overtaken by Southeast Asia (Figure 6). South Asia lagged the two subregions during the full sample period.

Infrastructure and connectivity as well as institutional and social integration appeared to be the driving forces behind integration of the countries within each of the East Asia, Southeast Asia, and South Asia subregions (Figure 7). Movement of people also made an increasingly greater contribution to integration within Southeast Asia after 2012.

Figure 6: Intrasubregional Integration Indexes

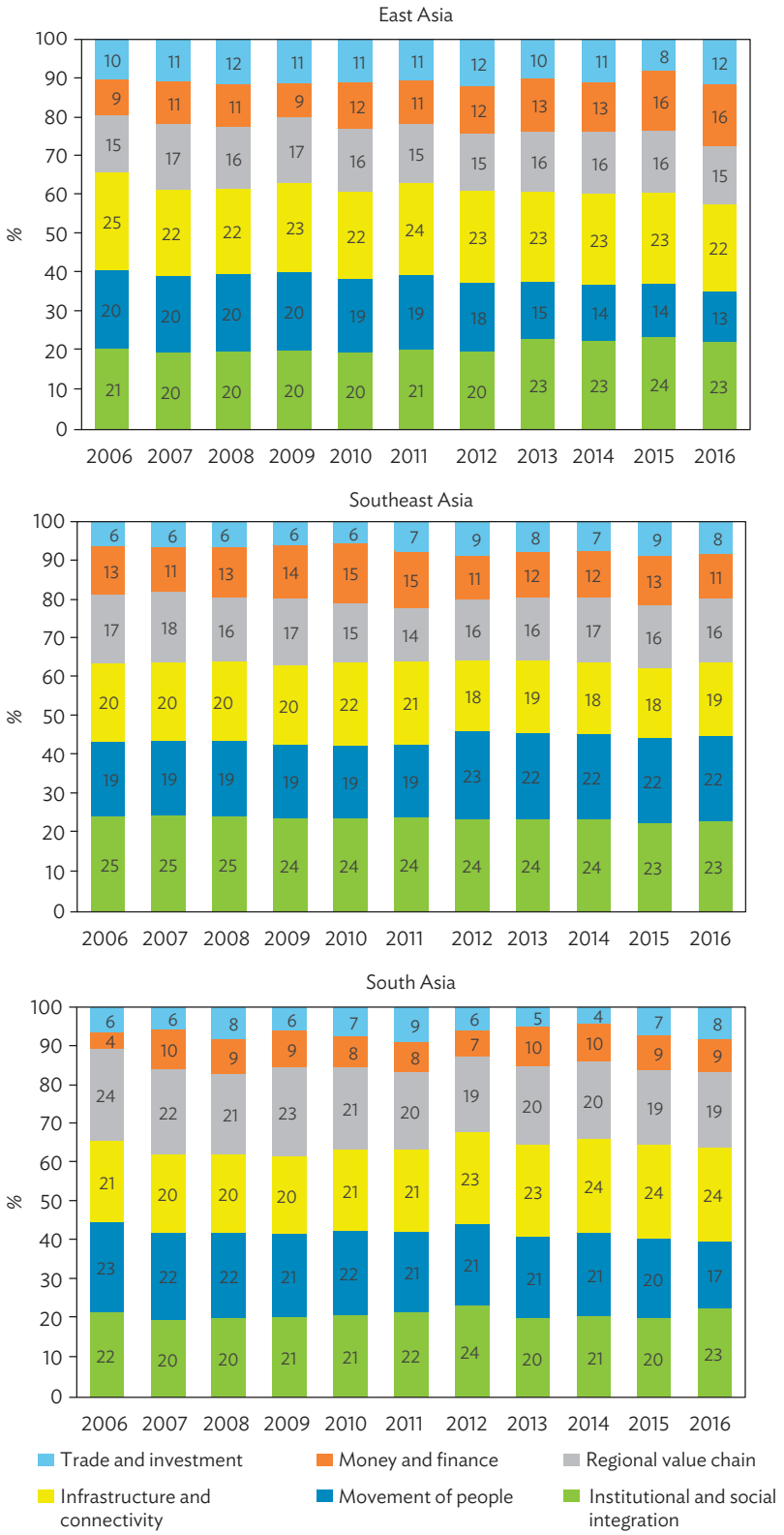


Source: Authors' calculations.

By dimension, Dimension III (regional value chain) and IV (infrastructure and connectivity) scored highly for intrasubregional integration in all three subregions (Figure 8). Dimension I (trade and investment) and II (money and finance) scored relatively low. The low score for trade and investment may be surprising, but it is natural considering that countries in these subregions (East, Southeast, and South Asia) trade and invest largely across other subregions rather than within themselves only.[7] Substantial subregional variations in the degree of intrasubregional integration were observed for Dimension II (money and finance) and Dimension VI (institutional and social integration).

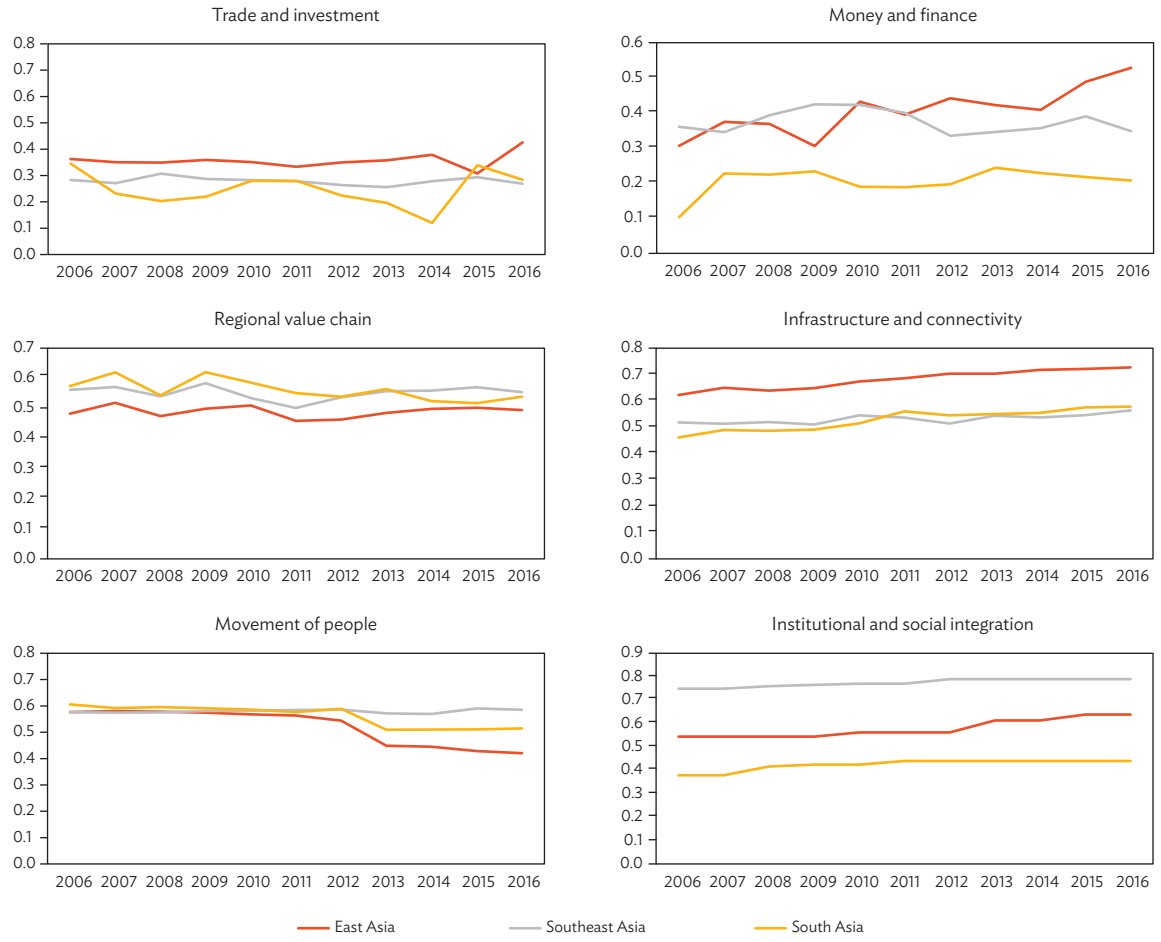
[7] The relatively greater intersubregional versus intrasubregional integration in trade and investment can also be seen from the higher magnitude of trade and investment subindex in Figure 4.

Figure 7: Dimensional Contribution to Intrasubregional Integration Indexes



Source: Authors' calculations.

Figure 8: Intrasubregional Dimensional Subindexes



Source: Authors' calculations.

In Dimension I (trade and investment), East Asia led the intrasubregional integration during the entire sample period, except for 2015. The subregion also consistently scored high for money and finance integration from 2012 onwards. South Asia took precedence in intrasubregional value chain integration until 2013 but was then surpassed by Southeast Asia. Intrasubregional integration in terms of infrastructure and connectivity was clearly dominated by East Asia. Southeast Asia led intrasubregional integration in the movement of people from 2013 onwards and dominated institutional and social integration across the entire sample period.

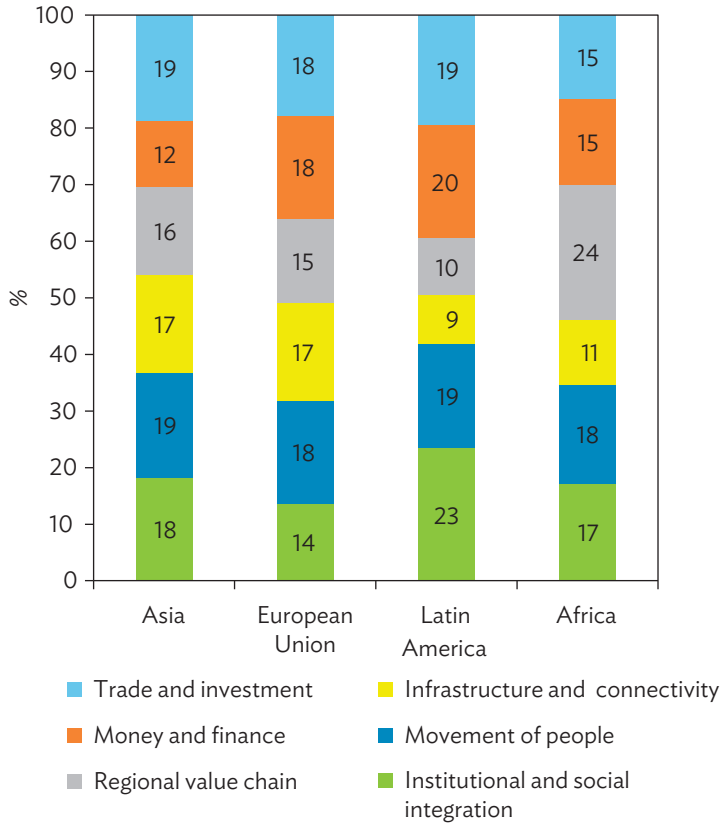
VI. COMPARISON WITH OTHER REGIONS

Corresponding integration indexes were built for other regions of the world, utilizing all available information for all the economies and years in the sample period (i.e., 158 economies for 2006–2016) in the data imputation, normalization, percentile transformation, and weighting and aggregation.[8]

Figure 9 compares the panel PCA-derived weights for Asia, the European Union (EU), Latin America, and Africa. The EU appears to have the most evenly distributed shares for the six dimensions of its regional integration index. Institutional and social integration and regional value chain integration account for the largest weight in the regional indexes of Latin America and Africa, respectively.

Across time, the EU clearly is the most advanced in regional integration. Asia comes second and close to the global average (Figure 10). Latin America places overall third, though was overtaken by Africa in 2009.

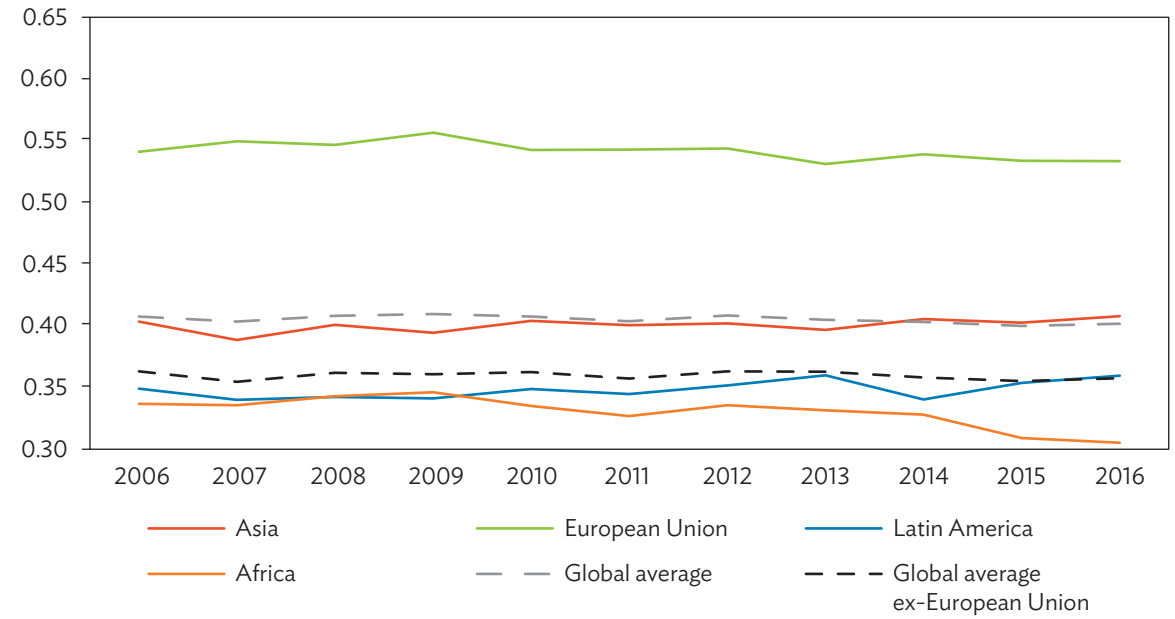
Figure 9: Summary of Panel Principal Component Analysis-Derived Weights —Asia versus Other Regions



Source: Authors' calculations.

[8] Results of the regression runs for data imputation are listed in Column II of the appendix table. Meanwhile, as in Huh and Park (2018), the United States and Canada are included as part of the global economy in the panel normalization.

Figure 10: Regional Integration Index—Asia versus Other Regions



Source: Authors' calculations.

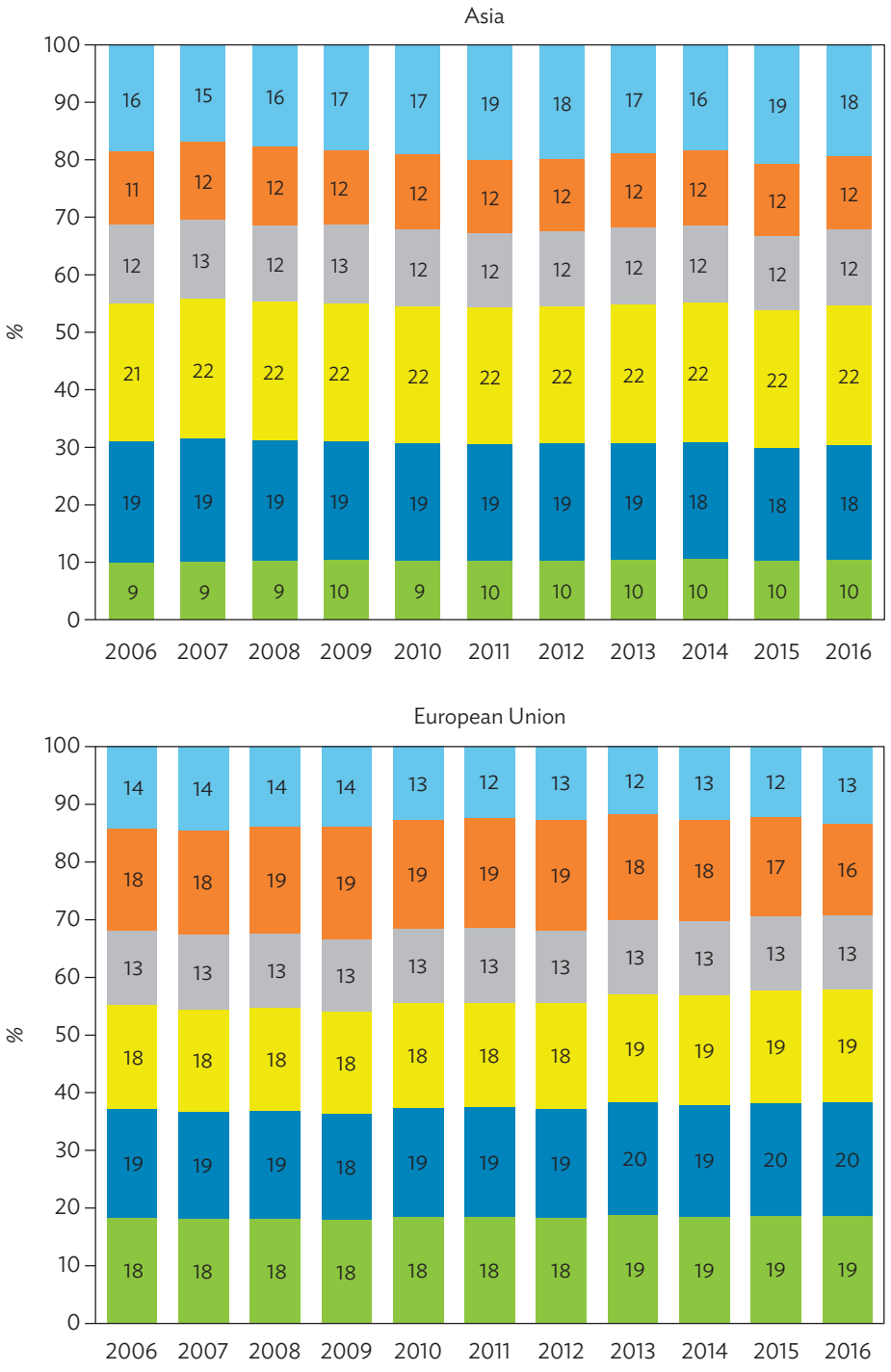
Infrastructure and connectivity appears to be the most forceful and stable foundation for regional integration in Asia. But over time, trade and investment have strengthened as a major contributor to regional integration, compensating for a modest weakening in movement of people (Figure 11). In the EU, contributions of all dimensions are broadly balanced, although money and finance, infrastructure and connectivity, movement of people, and institutional and social integration contribute a bit more than the other two measures. Institutional and social integration support regional integration the most in Latin America, while advances in the regional value chain contributes the most to regional integration in Africa.

Figure 12 shows that, over the years, EU consistently scores the highest in all dimensions of regional integration except for trade and investment, where Asia caught up with the EU from 2010 onward. The EU's money and finance integration has also visibly weakened since its peak in 2009, reflecting the impact of the euro crisis.

Rankings

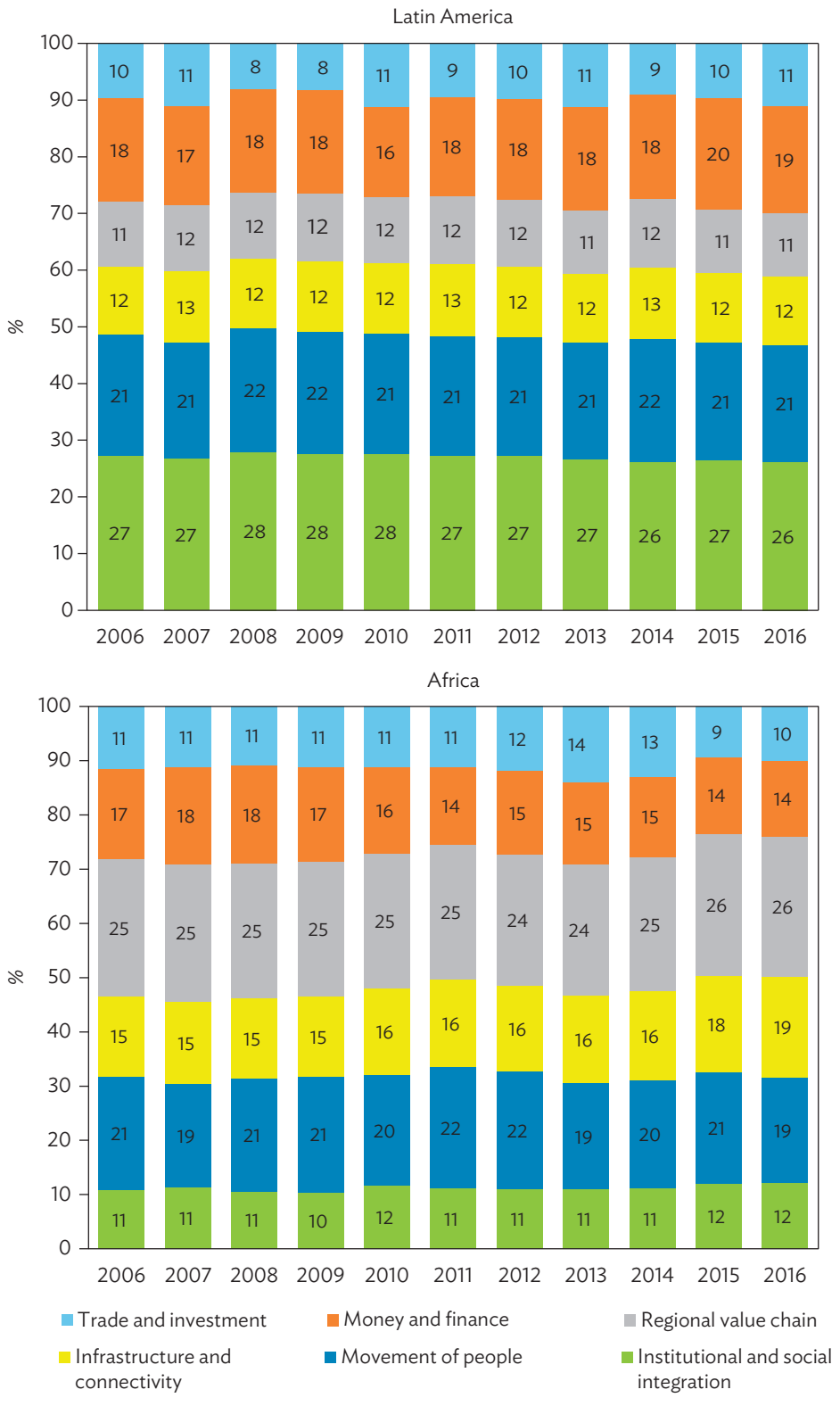
The time-consistent panel PCA allows tracing both absolute and relative changes in ARCII over time. Specifically, changes in ARCII scores across periods indicate the absolute evolution in regional integration performance while changes in ARCII rank over time indicate relative evolution. Table 7 summarizes the rankings in regional integration index for individual economies from 2006 to 2016 with shading according to the region in which they belong. While most EU economies congregate at the high ranks, Asian economies, particularly Singapore and Malaysia, can be seen climbing higher in international ranking and breaking through the spots dominated by the EU.

Figure 11: Dimensional Contribution to Overall Regional Integration Index —Asia versus Other Regions



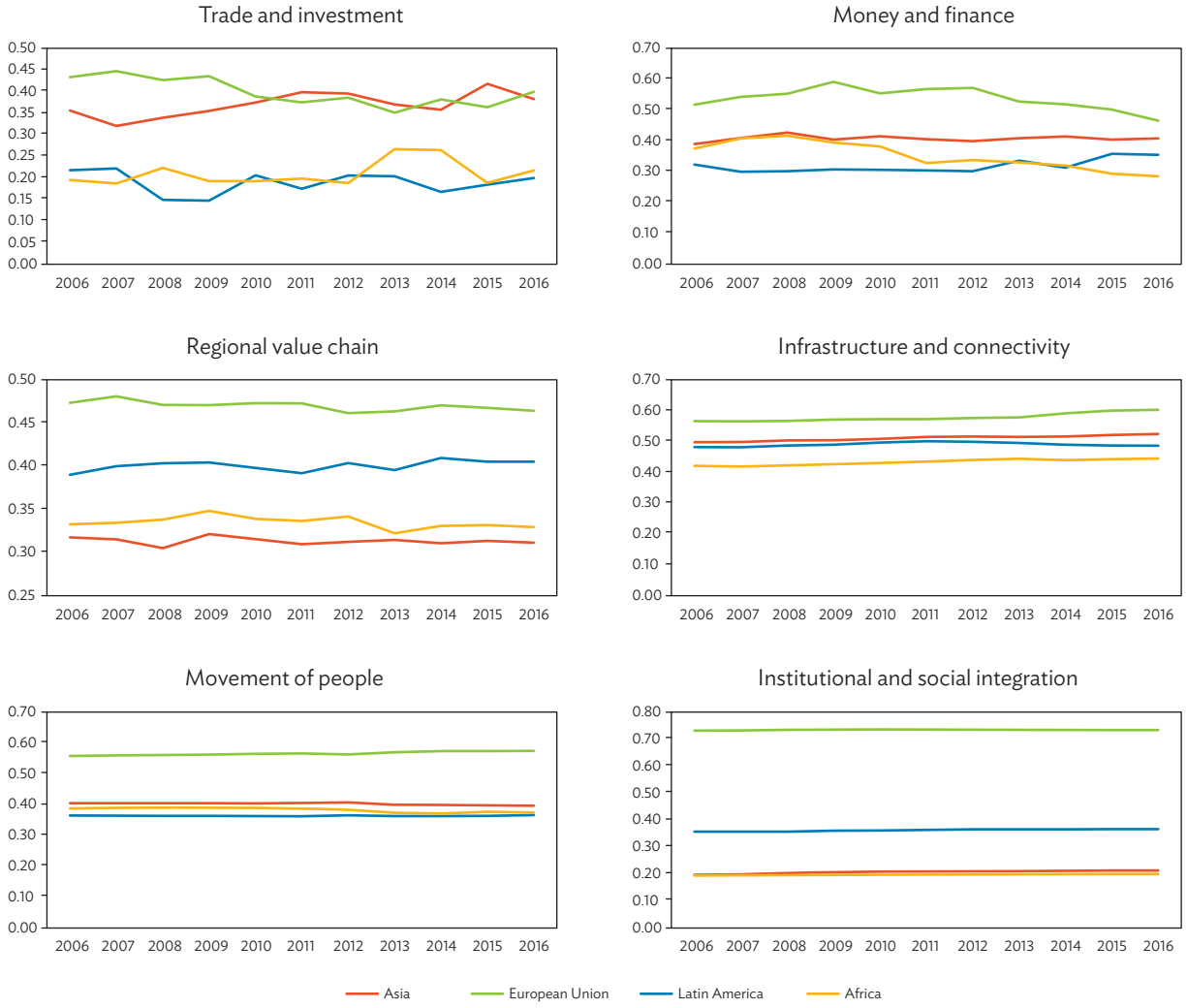
continued on next page

Figure 11 *continued*



Source: Authors' calculations.

Figure 12: Dimensional Subindexes—Asia versus Other Regions
(based on worldwide normalization)



Source: Authors' calculations.

Table 7: Economy Rankings, Regional Integration Indexes

Rank	2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016	
1	Slovak Republic	0.615	Czech Republic	0.617	Czech Republic	0.614	Slovak Republic	0.623	Czech Republic	0.616	Romania	0.614	Czech Republic	0.624	Slovak Republic	0.599	Czech Republic	0.610	Slovak Republic	0.600	Czech Republic	0.617
2	Czech Republic	0.597	Slovak Republic	0.607	Slovak Republic	0.602	Romania	0.613	Slovak Republic	0.606	Czech Republic	0.612	Slovak Republic	0.610	Romania	0.599	Slovak Republic	0.597	Romania	0.590	Slovak Republic	0.616
3	Poland	0.594	Belgium	0.594	Poland	0.599	Poland	0.608	Poland	0.599	Slovak Republic	0.601	Poland	0.598	Poland	0.596	Poland	0.592	Poland	0.589	Poland	0.599
4	Hungary	0.591	Hungary	0.589	Hungary	0.594	Czech Republic	0.607	Romania	0.593	Poland	0.600	Hungary	0.593	Czech Republic	0.586	Romania	0.581	Czech Republic	0.589	Belgium	0.587
5	Luxembourg	0.579	Poland	0.586	Romania	0.594	Belgium	0.597	Hungary	0.578	Hungary	0.581	Belgium	0.589	Portugal	0.562	Slovenia	0.572	Belgium	0.574	Romania	0.568
6	Romania	0.575	Romania	0.584	Luxembourg	0.573	Hungary	0.583	Luxembourg	0.563	Belgium	0.578	Romania	0.585	Luxembourg	0.561	Luxembourg	0.571	Austria	0.573	Luxembourg	0.562
7	Belgium	0.573	Austria	0.574	Sweden	0.567	Portugal	0.581	Portugal	0.561	Austria	0.571	Luxembourg	0.575	Hungary	0.557	Austria	0.570	Hungary	0.562	Hungary	0.560
8	Portugal	0.566	Finland	0.566	Belgium	0.561	Luxembourg	0.572	Finland	0.556	Finland	0.571	Slovenia	0.571	Austria	0.552	Hungary	0.561	Finland	0.551	Lithuania	0.553
9	Lithuania	0.563	Portugal	0.565	Austria	0.561	Sweden	0.567	Belgium	0.555	Portugal	0.555	Finland	0.558	Latvia	0.549	Estonia	0.555	Luxembourg	0.546	Estonia	0.552
10	Sweden	0.553	Luxembourg	0.558	Portugal	0.559	Slovenia	0.565	Austria	0.545	Luxembourg	0.552	Portugal	0.554	Belgium	0.541	Bulgaria	0.555	Slovenia	0.544	Sweden	0.547
11	Austria	0.545	Latvia	0.558	Estonia	0.556	Estonia	0.562	Latvia	0.544	Latvia	0.550	Austria	0.551	Bulgaria	0.537	Latvia	0.554	Sweden	0.542	Finland	0.538
12	Slovenia	0.542	Sweden	0.554	Lithuania	0.554	Finland	0.554	Sweden	0.543	Slovenia	0.548	Estonia	0.549	Germany	0.536	Sweden	0.554	Latvia	0.540	Portugal	0.538
13	Finland	0.538	Lithuania	0.553	Netherlands	0.551	Netherlands	0.552	Lithuania	0.541	Estonia	0.544	Sweden	0.549	Denmark	0.536	Belgium	0.552	Estonia	0.537	Austria	0.537
14	Netherlands	0.527	Ireland	0.551	Ireland	0.544	Lithuania	0.552	Ireland	0.538	Netherlands	0.543	Germany	0.541	Slovenia	0.535	Finland	0.550	Germany	0.529	Italy	0.537
15	Greece	0.527	Germany	0.546	Germany	0.540	Denmark	0.551	Estonia	0.538	Germany	0.543	Lithuania	0.528	Finland	0.534	Germany	0.545	Netherlands	0.522	Bulgaria	0.537
16	Estonia	0.527	Slovenia	0.540	Denmark	0.538	Austria	0.551	Germany	0.538	Sweden	0.541	Netherlands	0.526	Lithuania	0.523	Lithuania	0.533	Lithuania	0.521	Slovenia	0.526
17	Germany	0.524	Spain	0.533	Slovenia	0.537	Bulgaria	0.546	Netherlands	0.536	Ireland	0.533	Italy	0.525	Estonia	0.521	Portugal	0.530	Spain	0.518	Netherlands	0.524
18	Latvia	0.521	Estonia	0.533	Latvia	0.535	Ireland	0.542	Bulgaria	0.534	Bulgaria	0.530	Bulgaria	0.525	Netherlands	0.516	France	0.529	Greece	0.517	Germany	0.524
19	Denmark	0.521	Denmark	0.532	Finland	0.532	Germany	0.540	Spain	0.532	Greece	0.526	Greece	0.521	Italy	0.515	Spain	0.527	Bulgaria	0.517	France	0.523
20	Bulgaria	0.517	Italy	0.527	Spain	0.530	Spain	0.539	Denmark	0.531	France	0.526	Spain	0.520	France	0.513	Netherlands	0.524	Portugal	0.516	Latvia	0.515
21	Italy	0.515	France	0.526	Bulgaria	0.523	Greece	0.536	Slovenia	0.526	Spain	0.522	Denmark	0.518	Sweden	0.513	Ireland	0.513	Italy	0.515	Spain	0.512
22	France	0.513	Greece	0.522	Greece	0.519	Italy	0.533	Greece	0.520	Italy	0.513	France	0.516	Spain	0.511	Italy	0.512	France	0.515	Malaysia	0.510
23	Ireland	0.508	Netherlands	0.514	France	0.519	France	0.529	France	0.516	Denmark	0.511	Ireland	0.513	Ireland	0.510	Denmark	0.510	Denmark	0.509	Denmark	0.497
24	Spain	0.504	Malta	0.503	Italy	0.510	Latvia	0.524	Italy	0.506	Malaysia	0.492	Malaysia	0.503	Malaysia	0.497	Malaysia	0.503	Malaysia	0.505	Greece	0.495
25	Cyprus	0.498	Bulgaria	0.503	United Kingdom	0.497	Malta	0.508	Malta	0.492	Thailand	0.485	Malta	0.503	Greece	0.480	Greece	0.489	Ireland	0.495	Singapore	0.493
26	United Kingdom	0.497	Cyprus	0.500	Cyprus	0.479	Cyprus	0.500	Singapore	0.487	Lithuania	0.484	Latvia	0.493	PRC	0.470	United Kingdom	0.475	Singapore	0.484	PRC	0.484
27	Malaysia	0.491	United Kingdom	0.495	Malaysia	0.478	United Kingdom	0.491	Malaysia	0.484	Singapore	0.479	Cyprus	0.477	United Kingdom	0.469	Singapore	0.473	Cyprus	0.476	Ireland	0.481
28	Singapore	0.480	Malaysia	0.488	Singapore	0.477	Singapore	0.478	New Zealand	0.474	PRC	0.474	Thailand	0.476	Thailand	0.467	PRC	0.470	Thailand	0.475	United Kingdom	0.480
29	Malta	0.473	Singapore	0.472	Malta	0.469	Malaysia	0.475	Cyprus	0.473	Cyprus	0.472	Singapore	0.473	Singapore	0.465	Thailand	0.467	United Kingdom	0.473	Hong Kong, China	0.475
30	Korea, Republic of	0.452	Namibia	0.454	PRC	0.463	Korea, Republic of	0.462	PRC	0.470	United Kingdom	0.471	United Kingdom	0.472	Korea, Republic of	0.457	Cyprus	0.462	PRC	0.472	Thailand	0.473
31	Thailand	0.451	Thailand	0.450	Korea, Republic of	0.460	Swaziland	0.462	United Kingdom	0.468	Korea, Republic of	0.470	PRC	0.466	Swaziland	0.456	Korea, Republic of	0.461	Lao People's Democratic Republic	0.468	Japan	0.456
32	Hong Kong, China	0.445	PRC	0.447	Hong Kong, China	0.457	PRC	0.462	Korea, Republic of	0.464	Malta	0.464	Hong Kong, China	0.457	Hong Kong, China	0.452	New Zealand	0.459	Korea, Republic of	0.460	Korea, Republic of	0.443
33	PRC	0.442	Korea, Republic of	0.438	Thailand	0.453	Thailand	0.455	Thailand	0.461	New Zealand	0.458	Korea, Republic of	0.455	New Zealand	0.448	Lao People's Democratic Republic	0.456	Malta	0.455	Cyprus	0.442
34	New Zealand	0.442	New Zealand	0.427	Indonesia	0.445	New Zealand	0.448	Hong Kong, China	0.458	Hong Kong, China	0.445	Indonesia	0.438	Malta	0.447	Hong Kong, China	0.454	Indonesia	0.437	Malta	0.438
35	Malawi	0.427	Hong Kong, China	0.426	New Zealand	0.440	Hong Kong, China	0.447	Namibia	0.451	Japan	0.428	Japan	0.431	Cyprus	0.444	Indonesia	0.437	Japan	0.432	New Zealand	0.435
36	Indonesia	0.427	Nicaragua	0.423	Japan	0.426	Japan	0.433	Japan	0.431	Indonesia	0.427	Lao People's Democratic Republic	0.421	Lao People's Democratic Republic	0.439	Malta	0.429	Nicaragua	0.426	Viet Nam	0.428
37	Nicaragua	0.427	Indonesia	0.420	Viet Nam	0.423	Paraguay	0.418	Indonesia	0.427	Venezuela, Republic Bolivariana	0.409	New Zealand	0.420	Indonesia	0.436	Japan	0.428	Viet Nam	0.415	Indonesia	0.428
38	Japan	0.424	Japan	0.415	Swaziland	0.418	Indonesia	0.417	Viet Nam	0.420	Swaziland	0.405	St. Lucia	0.415	Japan	0.431	Viet Nam	0.420	New Zealand	0.410	Nepal	0.426
39	Uruguay	0.421	Colombia	0.389	Namibia	0.412	Namibia	0.405	Australia	0.408	Namibia	0.403	Viet Nam	0.411	Panama	0.409	Nepal	0.415	Hong Kong, China	0.409	St. Lucia	0.423

continued on next page

Table 7 *continued*

Rank	2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016	
40	Australia	0.419	Costa Rica	0.387	Malawi	0.411	Viet Nam	0.403	Paraguay	0.407	Uruguay	0.402	Australia	0.408	Colombia	0.407	Australia	0.397	Australia	0.408	Mongolia	0.420
41	Viet Nam	0.403	Uruguay	0.386	Australia	0.399	Australia	0.397	Uruguay	0.393	Bangladesh	0.399	Panama	0.399	Viet Nam	0.397	Philippines	0.395	Costa Rica	0.400	Nicaragua	0.417
42	Paraguay	0.400	Argentina	0.384	Nicaragua	0.388	Uruguay	0.386	Chile	0.388	Australia	0.395	Costa Rica	0.394	Venezuela, Republic Bolivariana	0.397	Costa Rica	0.391	Cambodia	0.400	Australia	0.411
43	Venezuela, Republic Bolivariana	0.396	Viet Nam	0.384	Argentina	0.385	Philippines	0.384	India	0.385	Viet Nam	0.395	Swaziland	0.392	Australia	0.397	Benin	0.391	Argentina	0.395	Cambodia	0.403
44	Argentina	0.390	Australia	0.383	Costa Rica	0.383	Chile	0.383	Nepal	0.381	Philippines	0.392	Namibia	0.391	Paraguay	0.396	Mongolia	0.389	Philippines	0.392	Trinidad and Tobago	0.401
45	Costa Rica	0.390	Venezuela, Republic Bolivariana	0.383	Paraguay	0.382	Venezuela, Republic Bolivariana	0.380	Colombia	0.378	India	0.392	Niger	0.390	Niger	0.395	Nicaragua	0.389	India	0.391	Philippines	0.397
46	Tanzania	0.384	Zimbabwe	0.380	Bangladesh	0.381	Argentina	0.378	Bangladesh	0.376	Nepal	0.390	India	0.389	Benin	0.393	Cambodia	0.387	Chile	0.389	India	0.397
47	Philippines	0.378	Nepal	0.377	Venezuela, Republic Bolivariana	0.376	Togo	0.378	Costa Rica	0.375	Colombia	0.377	Argentina	0.388	Cambodia	0.390	Argentina	0.387	Nepal	0.389	Colombia	0.395
48	Uganda	0.372	Philippines	0.373	Chile	0.376	India	0.378	Philippines	0.368	Paraguay	0.376	Colombia	0.387	Argentina	0.389	Rwanda	0.386	Peru	0.388	Paraguay	0.392
49	Chile	0.370	Chile	0.371	India	0.376	Nicaragua	0.367	Panama	0.368	Costa Rica	0.372	Bangladesh	0.386	Namibia	0.387	Burkina Faso	0.385	Ecuador	0.384	Uruguay	0.390
50	India	0.366	India	0.368	Uruguay	0.374	Tanzania	0.366	Uganda	0.365	Argentina	0.368	Cambodia	0.386	Philippines	0.386	Ecuador	0.384	Malawi	0.384	Bangladesh	0.382
51	Colombia	0.362	South Africa	0.347	Colombia	0.374	Uganda	0.365	Argentina	0.365	Peru	0.367	Philippines	0.383	India	0.385	India	0.383	Namibia	0.383	Costa Rica	0.382
52	Namibia	0.362	Bangladesh	0.346	Philippines	0.373	Colombia	0.363	Tanzania	0.364	Chile	0.366	Nicaragua	0.377	Costa Rica	0.384	Panama	0.381	Panama	0.377	Chile	0.381
53	Sri Lanka	0.361	Uganda	0.345	Nepal	0.363	Costa Rica	0.362	Venezuela, Republic Bolivariana	0.359	Uganda	0.359	Chile	0.377	Rwanda	0.383	Swaziland	0.380	Paraguay	0.375	Panama	0.373
54	Trinidad and Tobago	0.350	Peru	0.342	Kenya	0.360	Kenya	0.359	Kenya	0.353	Panama	0.350	Uruguay	0.371	Chile	0.380	Uruguay	0.376	Colombia	0.370	Namibia	0.370
55	South Africa	0.347	Panama	0.342	Uganda	0.352	Bangladesh	0.352	Peru	0.347	Trinidad and Tobago	0.348	Mongolia	0.369	Nicaragua	0.380	Chile	0.375	Trinidad and Tobago	0.368	Argentina	0.365
56	Bangladesh	0.335	Dominica	0.341	Peru	0.347	Panama	0.352	South Africa	0.346	Togo	0.343	Venezuela, Republic Bolivariana	0.367	Uruguay	0.379	Venezuela, Republic Bolivariana	0.373	Bangladesh	0.367	Sri Lanka	0.360
57	Kenya	0.333	Nigeria	0.337	Sri Lanka	0.345	South Africa	0.350	Sri Lanka	0.331	South Africa	0.338	Mozambique	0.364	Mongolia	0.368	Paraguay	0.370	Uruguay	0.365	Rwanda	0.359
58	Niger	0.328	Trinidad and Tobago	0.337	Mali	0.343	Sri Lanka	0.347	Mexico	0.324	Nigeria	0.337	Uganda	0.360	Ghana	0.367	Colombia	0.365	Rwanda	0.363	Venezuela, Republic Bolivariana	0.350
59	Peru	0.326	Kenya	0.335	South Africa	0.342	Peru	0.346	Nigeria	0.321	Mexico	0.331	Paraguay	0.358	Nepal	0.358	Malawi	0.365	Venezuela, Republic Bolivariana	0.359	Ghana	0.349
60	Nigeria	0.326	Sri Lanka	0.327	Panama	0.340	Benin	0.330	St. Lucia	0.320	Sri Lanka	0.330	Benin	0.354	Bangladesh	0.356	Niger	0.364	St. Lucia	0.353	Burkina Faso	0.349
61	Panama	0.325	Mongolia	0.318	Mexico	0.327	Malawi	0.330	Mali	0.319	Kenya	0.327	South Africa	0.346	Peru	0.354	Namibia	0.361	Mongolia	0.353	Barbados	0.343
62	Burkina Faso	0.325	Mexico	0.314	Niger	0.327	Zambia	0.330	Trinidad and Tobago	0.315	St. Kitts and Nevis	0.325	Malawi	0.343	Togo	0.354	Pakistan	0.357	Sri Lanka	0.346	Uganda	0.341
63	Mexico	0.321	Tanzania	0.310	Tanzania	0.325	Senegal	0.323	Mongolia	0.311	Malawi	0.322	Ecuador	0.340	Grenada	0.354	Mali	0.355	Mozambique	0.345	Peru	0.340
64	Zimbabwe	0.319	Senegal	0.308	Trinidad and Tobago	0.317	Nepal	0.320	Jamaica	0.309	Mali	0.315	Peru	0.339	Malawi	0.353	Mozambique	0.350	Mexico	0.336	Mexico	0.338
65	Brazil	0.306	Brazil	0.303	Zambia	0.315	Mexico	0.319	Niger	0.306	Kyrgyz Republic	0.313	Mexico	0.338	St. Lucia	0.351	Sri Lanka	0.346	Niger	0.335	Mozambique	0.337
66	Jamaica	0.298	St. Lucia	0.295	Nigeria	0.313	Mali	0.318	Zambia	0.303	Benin	0.311	Sri Lanka	0.335	Botswana	0.350	Mexico	0.342	Pakistan	0.334	Ecuador	0.333
67	Zambia	0.298	Zambia	0.290	Brazil	0.310	Trinidad and Tobago	0.313	Brazil	0.303	Mauritius	0.308	Tanzania	0.334	Mexico	0.337	Botswana	0.342	Benin	0.323	Pakistan	0.322
68	Senegal	0.290	Jamaica	0.283	Mongolia	0.305	Niger	0.313	Bahamas, The	0.285	Niger	0.308	Trinidad and Tobago	0.325	Uganda	0.336	Peru	0.341	Kazakhstan	0.322	Botswana	0.321

continued on next page

Table 7 *continued*

Rank	2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016	
69	Kazakhstan	0.286	Georgia	0.266	Jamaica	0.290	St. Lucia	0.311	Mauritius	0.283	Mongolia	0.305	Kenya	0.323	Trinidad and Tobago	0.331	Trinidad and Tobago	0.341	Kyrgyz Republic	0.318	South Africa	0.313
70	Mauritius	0.269	Kazakhstan	0.259	Georgia	0.287	Brazil	0.309	Kazakhstan	0.280	Brazil	0.300	Mali	0.316	Zambia	0.331	Kyrgyz Republic	0.334	Uganda	0.317	Brazil	0.307
71	Georgia	0.257	Antigua and Barbuda	0.252	Senegal	0.286	Antigua and Barbuda	0.302	Senegal	0.275	St. Lucia	0.285	Georgia	0.310	Ecuador	0.327	Uganda	0.334	Zambia	0.315	Nigeria	0.306
72	Bahamas, The	0.255	Mauritius	0.251	Kazakhstan	0.265	Mongolia	0.296	Georgia	0.264	Tanzania	0.279	Senegal	0.303	South Africa	0.325	Zambia	0.332	South Africa	0.315	Jamaica	0.306
73	Antigua and Barbuda	0.247	Bahamas, The	0.249	Bahamas, The	0.262	Nigeria	0.293			Senegal	0.277	Brazil	0.302	Pakistan	0.322	Ghana	0.326	Ghana	0.315	Zambia	0.305
74					Mauritius	0.257	Kazakhstan	0.279			Jamaica	0.276	Jamaica	0.297	Georgia	0.322	Bahamas, The	0.322	Botswana	0.314	Grenada	0.305
75					Antigua and Barbuda	0.247	Mauritius	0.275			Georgia	0.276	Togo	0.293	Sri Lanka	0.321	South Africa	0.320	Brazil	0.313	Senegal	0.302
76							Jamaica	0.265			Zambia	0.273	Zambia	0.289	Mali	0.320	Brazil	0.315	Nigeria	0.301	Togo	0.301
77							Georgia	0.263			Bahamas, The	0.267	Mauritius	0.287	Mozambique	0.318	Bangladesh	0.314	Senegal	0.295	Mauritius	0.293
78							Bahamas, The	0.246			Kazakhstan	0.263	Nigeria	0.286	Jamaica	0.316	Togo	0.309	Togo	0.293	Bahamas, The	0.290
79													St. Kitts and Nevis	0.285	Brazil	0.315	Nigeria	0.307	Mali	0.292	Kazakhstan	0.289
80													Bahamas, The	0.274	Nigeria	0.307	Senegal	0.303	Morocco	0.284	Kenya	0.286
81													Kazakhstan	0.264	Senegal	0.300	St. Lucia	0.303	Tanzania	0.284	Morocco	0.283
82													Kyrgyz Republic	0.263	Mauritius	0.296	Algeria	0.303	Barbados	0.283	Georgia	0.278
83															Kazakhstan	0.294	Kazakhstan	0.303	Antigua and Barbuda	0.282	Tanzania	0.274
84															Kenya	0.294	St. Vincent and the Grenadines	0.297	Bahamas, The	0.282	Algeria	0.260
85															Morocco	0.274	Grenada	0.287	Mauritius	0.281	Kyrgyz Republic	0.260
86															Bahamas, The	0.274	Tanzania	0.284	Jamaica	0.279	Seychelles	0.232
87															Kyrgyz Republic	0.266	Georgia	0.282	Georgia	0.272	Cape Verde	0.222
88															Tanzania	0.260	Jamaica	0.282	Kenya	0.266		
89															Algeria	0.252	Barbados	0.281	Algeria	0.261		
90	Legend:														Seychelles	0.243	Kenya	0.279	Seychelles	0.228		
91		Asia															Morocco	0.273				
92		European Union															Mauritius	0.273				
93		Latin America															Antigua and Barbuda	0.246				
94		Africa															Seychelles	0.227				
No. of economies		73		73		75		78		72		78		82		90		94		90		87

PRC = People's Republic of China.
Source: Authors' calculations.

.

VII. ROBUSTNESS CHECKS

As a robustness check, a PCA is applied to data for 2014, which has the most number of observations for all countries. Similar analyses are conducted using both cross-section (year-specific) and panel PCA-derived weights. In addition, alternative runs without percentile transformation were made in order to determine the net effect of panel PCA-derived weights on the final results.

Table 8 summarizes the PCA-derived weights from various iterations. Overall, dimensional weights are broadly consistent between panel and cross-section PCAs with or without percentile transformation. For example, Dimensions I, IV, and V have relatively high weights, while Dimension II has the lowest weight for Asia across the alternative runs.

Figures 13–15 indicate relatively robust results for degrees of regional integration across different subregions in Asia, regardless of whether panel PCA and percentile transformation are applied. However, Figure 16 shows noticeable adjustments to the scores of the EU's money and finance subindex when percentile transformation is applied to min–max normalized indicators. This highlights the tendency of min–max scaling to skew transformed indicators toward extreme values that could lead to biased results. Percentile transformation tempers the sensitivity to outliers that is caused by min–max scaling.

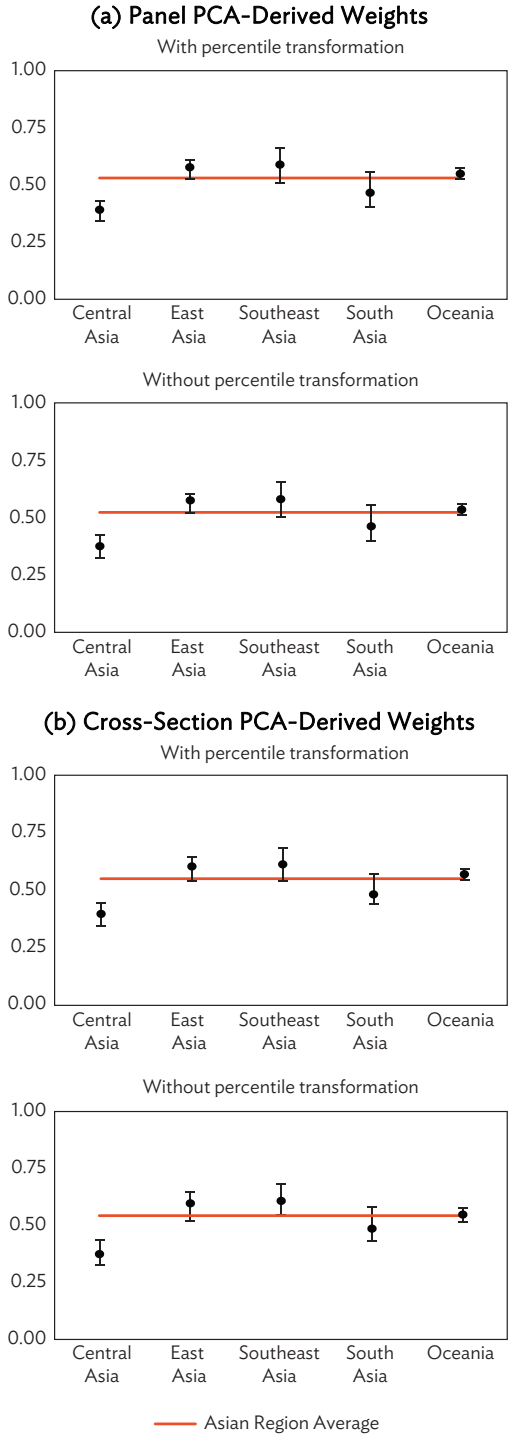
Table 8: Principal Component Analysis-Derived Weights

	Without Percentile Transformation											
	Panel PCA						Cross-Section PCA					
Dimension	I	II	III	IV	V	VI	I	II	III	IV	V	VI
Asia	0.170	0.119	0.169	0.177	0.183	0.182	0.172	0.108	0.176	0.192	0.180	0.172
European Union	0.157	0.202	0.171	0.159	0.147	0.164	0.148	0.189	0.180	0.165	0.142	0.175
Latin America	0.160	0.111	0.160	0.213	0.173	0.182	0.178	0.172	0.162	0.151	0.167	0.171
Africa	0.171	0.114	0.205	0.207	0.148	0.155	0.156	0.161	0.166	0.180	0.185	0.152

	With Percentile Transformation																							
	Using Asia Regional Bilateral Data												Using Asia Subregional Bilateral Data											
	Panel PCA						Cross-Section PCA						Panel PCA						Cross-Section PCA					
Dimension	I	II	III	IV	V	VI	I	II	III	IV	V	VI	I	II	III	IV	V	VI	I	II	III	IV	V	VI
Asia	0.187	0.116	0.156	0.172	0.186	0.182	0.174	0.121	0.154	0.187	0.179	0.185												
Central Asia																								
East Asia													0.156	0.166	0.167	0.175	0.171	0.165	0.167	0.166	0.167	0.167	0.167	0.167
Southeast Asia													0.167	0.170	0.154	0.175	0.186	0.148	0.171	0.130	0.170	0.185	0.178	0.166
South Asia													0.139	0.179	0.155	0.165	0.181	0.179	0.145	0.146	0.158	0.181	0.202	0.168
Pacific																								
Oceania																								
European Union	0.177	0.183	0.148	0.172	0.182	0.136	0.157	0.184	0.154	0.146	0.155	0.206												
Latin America	0.194	0.201	0.099	0.086	0.185	0.234	0.193	0.122	0.165	0.147	0.179	0.195												
Africa	0.148	0.151	0.239	0.115	0.176	0.171	0.209	0.195	0.075	0.156	0.237	0.129												

PCA = principal component analysis.
Source: Authors' calculations.

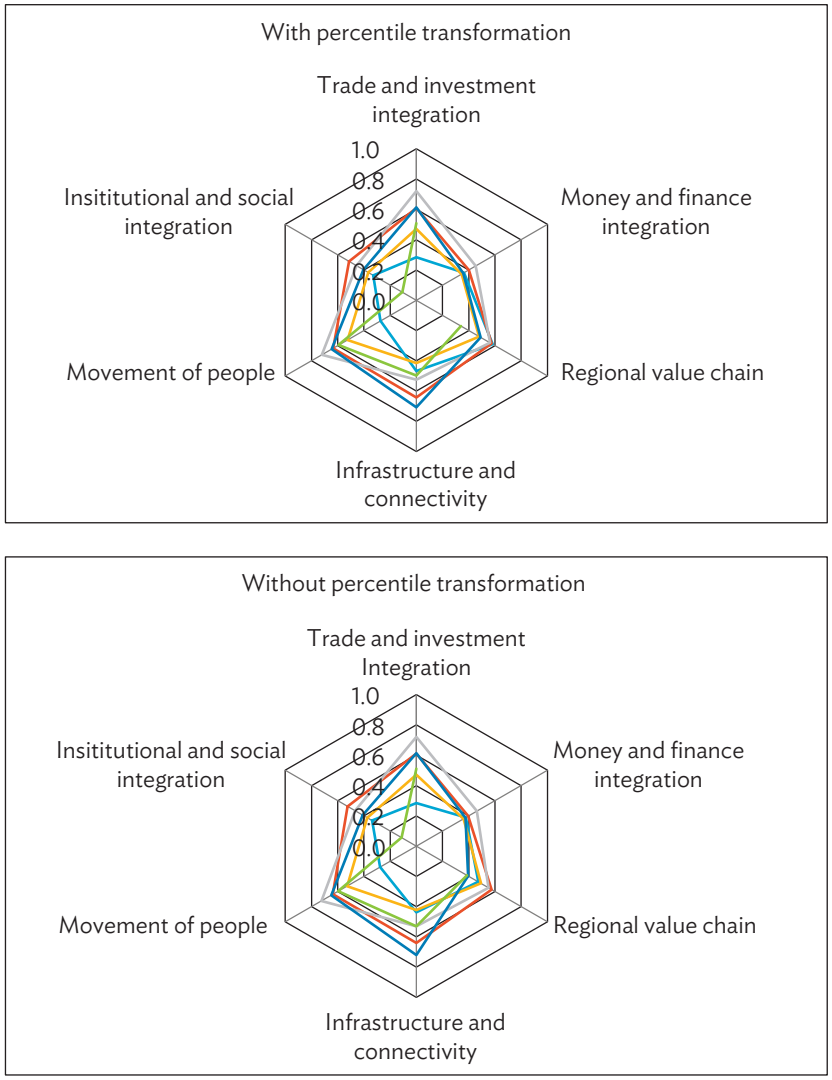
Figure 13: Asia-Pacific Regional Cooperation and Integration Index, 2014, Asia Subregions—Using Panel versus Cross-Section Principal Component Analysis-Derived Weights



PCA = principal component analysis.
Note: In the charts above, the maximum (upper band), minimum (lower band) and average values (thick dot) of subregional indexes as well as the average value of Asia-Pacific Regional Cooperation and Integration Index (horizontal line) are reported.
Source: Authors' calculations.

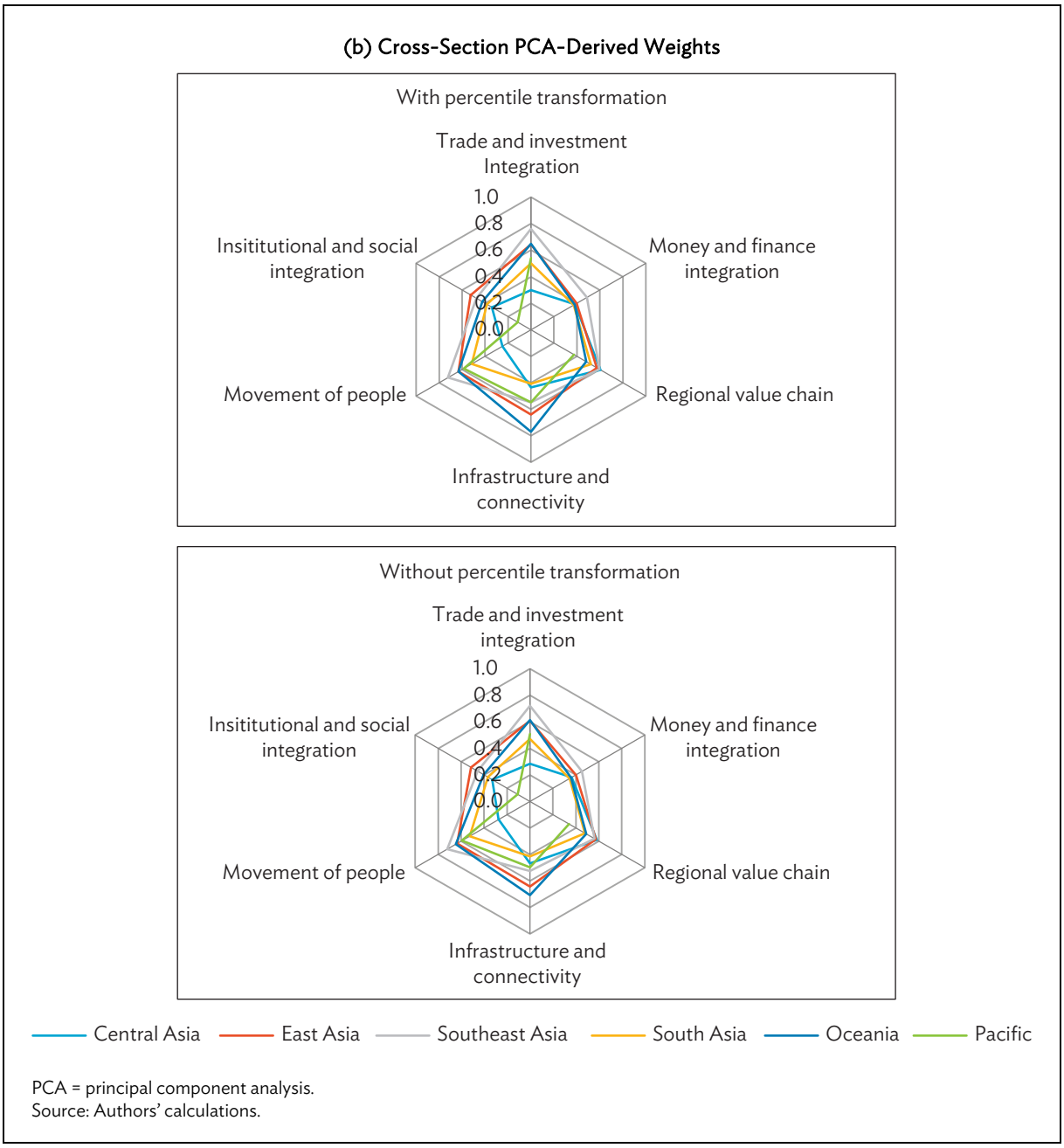
Figure 14: Dimensional Subindexes, 2014, Asia Subregions—Using Panel versus Cross-Section Principal Component Analysis-Derived Weights

(a) Panel PCA-Derived Weights



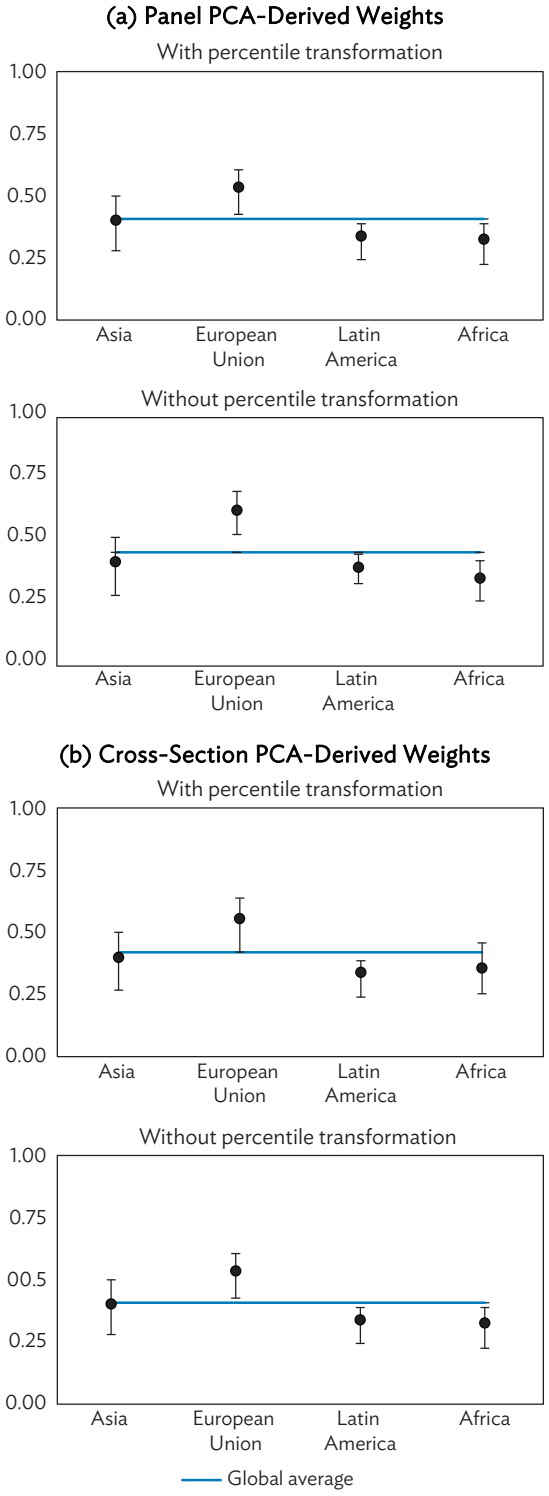
continued on next page

Figure 14 *continued*



PCA = principal component analysis.
Source: Authors' calculations.

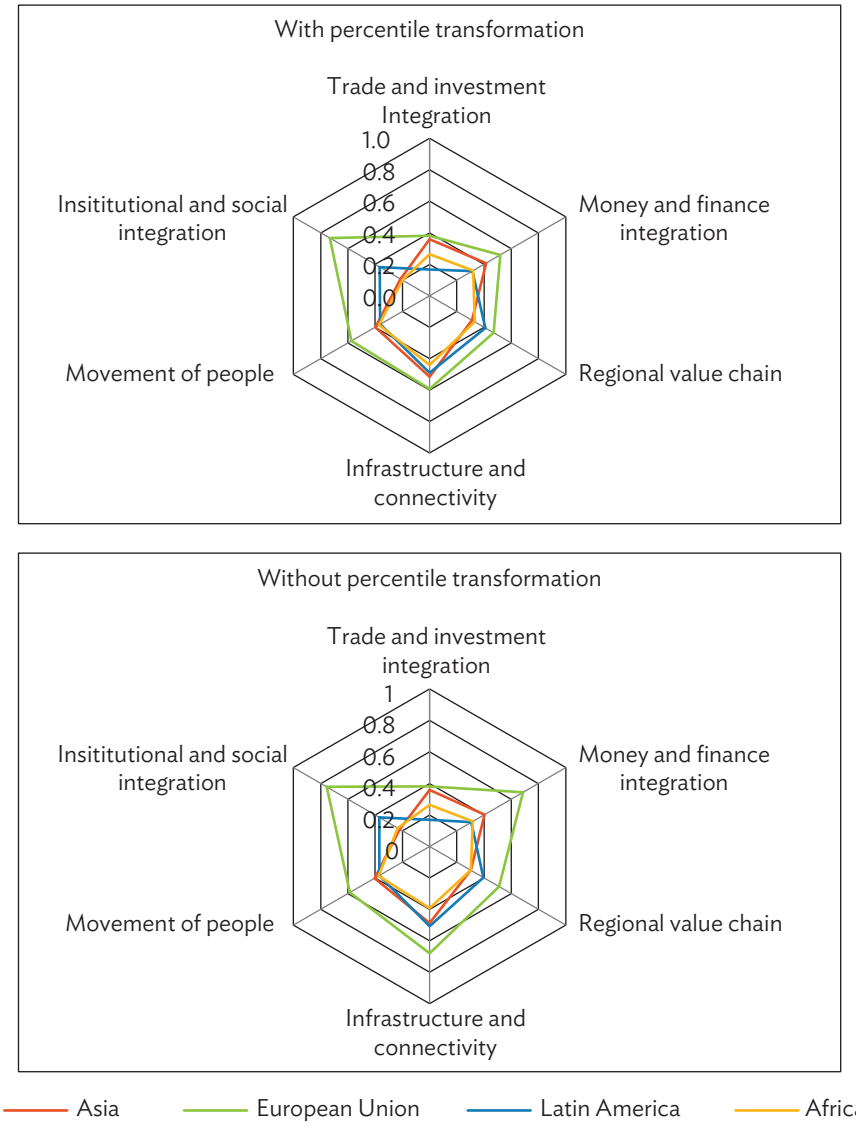
Figure 15: Regional Integration Indexes, 2014, Asia versus Other Regions—Using Panel versus Cross-Section Principal Component Analysis-Derived Weights



PCA = principal component analysis.
Note: In the charts above, the maximum (upper band), minimum (lower band) and average values (thick dot) of regional indexes as well as the global average value of the integration indexes (horizontal line) are reported.
Source: Authors' calculations.

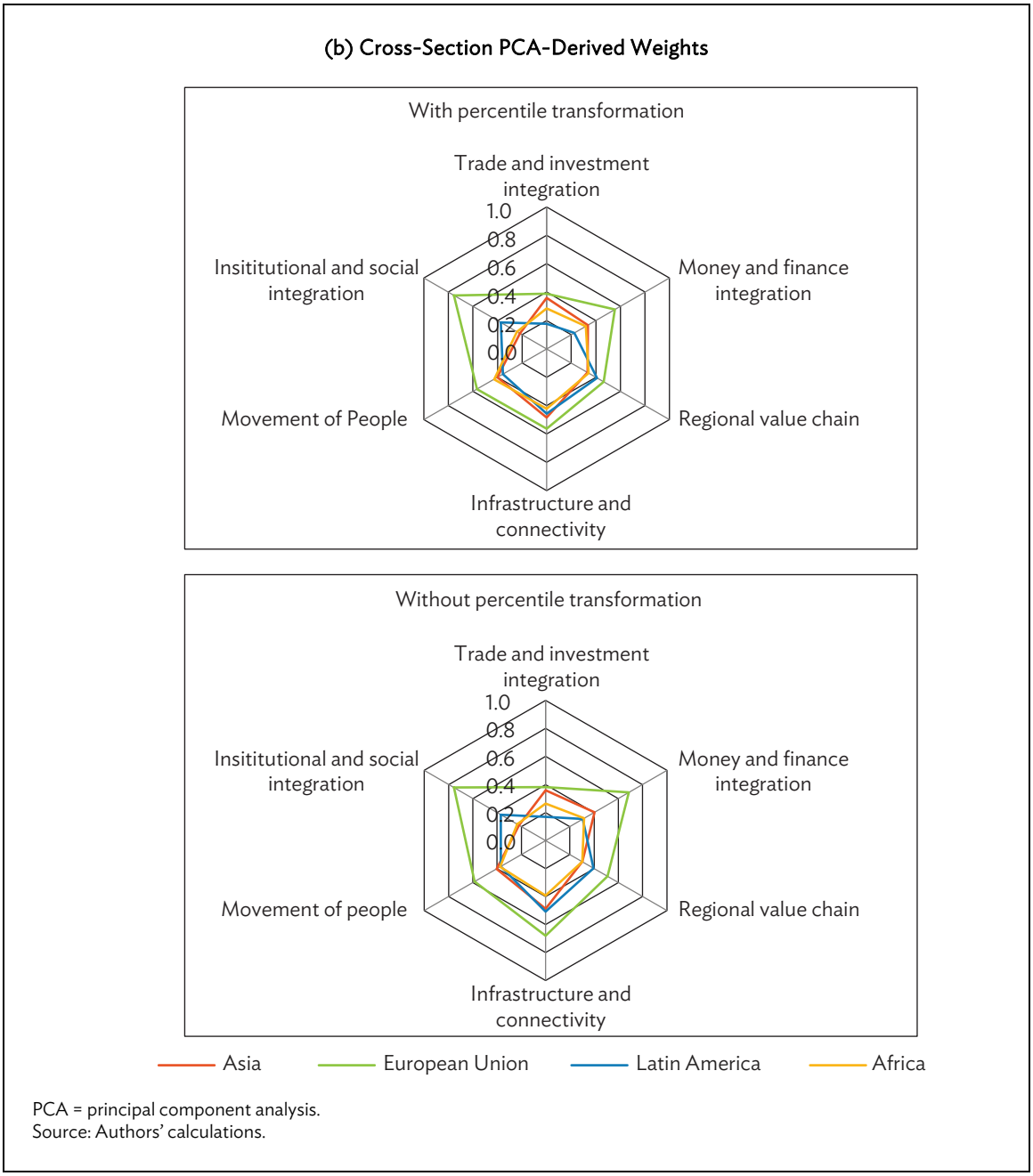
Figure 16: Dimensional Subindexes, 2014, Asia versus Other Regions—Using Panel versus Cross-Section Principal Component Analysis-Derived Weights

(a) Panel PCA-Derived Weights



continued on next page

Figure 16 *continued*



PCA = principal component analysis.
Source: Authors' calculations.

VIII. CONCLUSION

In this paper, we propose a panel approach in the construction of the ARCII, with the aim of strengthening the index's ability to track progress of regional integration in Asia and the Pacific over time. To ensure comparability across years, we made use of all available information from the entire 2006–2016 sample period. In particular, panel-based procedures are employed in imputing missing values, normalizing raw data, and deriving dimensional and subdimensional weights via PCA in compiling the ARCII.

Unlike the cross-sectional analysis employing a single year, a panel approach adds comparability of the indexes over time, which allows for a richer and more dynamic analysis of composite indexes across different periods. It enables analysis of the time evolution and identification of the main drivers and weakest links of overall integration at the subregional, regional, and global levels over different periods of time.

Although regional integration is a dynamic process, the pace of integration in Asia was broadly steady during the 11-year sample period. However, modest gains were made as most economies in the sample increased their regional integration from 2006 to 2016. Of the six dimensions of ARCII, trade and investment and movement of people appeared to be the main drivers of regional integration in terms of the size of panel PCA-derived weights, subindex magnitudes, and the significance of the dimensional contributions. The money and finance dimension was the weakest link in overall integration in Asia, based on its lowest weight and its contribution share.

On average, Southeast Asia is most integrated with Asia as a whole, while East Asia has been catching up in recent years. Central Asia is the least regionally integrated. When computed for the subregions, East Asia displays the highest level of intrasubregional integration, followed by Southeast Asia and South Asia. Meanwhile, compared to other regions, Asia comes second to the EU in regional integration, but several Asian economies—led by Malaysia and Singapore—have entered the top tier of rankings and are comparable to EU economies. Global comparison shows Asia's regional integration is driven mainly by infrastructure and connectivity and, of late, by trade and investment. The region's institutional and social integration has been consistently lower than in other regions in both magnitude and its dimensional contribution.

These results suggest there are significant policy implications for countries trying to strengthen cooperation and integration in Asia. The region has made gradual progress in regional integration, but its money and financial integration have tended to lag trade and investment and movement of people. Money and finance integration is also highly volatile and spikes during times of crisis. These features call for greater policy cooperation to ensure the region's financial stability. The findings in this paper broadly support those expressed in ADB 2017. To advance more balanced financial, social, and institutional integration across the region, collective efforts are needed to remove national barriers to regional integration, adopt regional standards, and institutionalize regional integration frameworks.

APPENDIX: REGRESSION IMPUTATION RESULTS

	I	II	III	IV	V
Version	Huh and Park (2018)	Park and Claveria (2018)			
Estimation method	OLS	Panel LS		OLS	
Sample	158 economies 2013	158 economies 2006–016	48 Asian economies 2006–2016	158 economies 2014	48 Asian economies 2014
Dependent variable: Ease of Doing Business Index (IV-d)					
Constant	3.82	7.89	15.93	3.27	15.27
	(0.32)	(0.00)	(0.00)	(0.39)	(0.05)
LPI	19.83	18.17	16.42	19.65	16.47
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
R^2	0.64	0.59	0.59	0.64	0.55
Adjusted R^2	0.64	0.59	0.59	0.63	0.540
F-statistic	229.33	2112.01	573.52	232.42	43.26
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Dependent variable: LPI (IV-c)					
Constant	0.91	0.91	0.59	0.94	0.78
	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)
Ease of Doing Business	0.03	0.03	0.04	0.03	0.03
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
R^2	0.64	0.59	0.59	0.64	0.55
Adjusted R^2	0.64	0.59	0.59	0.63	0.54
F-statistic	229.33	2112.01	573.52	232.42	43.26
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Dependent variable: Trade cost (IV-a)					
Constant	2.46	1.79	0.58	1.61	0.71
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Liner shipping bilateral connectivity index (IV-b)	−1.27	−0.84	−0.12	−0.56	0.09
	(0.00)	(0.00)	(0.00)	(0.00)	(0.37)
LPI	−0.12	−0.09	−0.06	−0.14	−0.13
	(0.00)	(0.00)	(0.01)	(0.00)	(0.06)
Distance between trading partners	0.29	0.52	1.88	0.48	0.44
	(0.00)	(0.00)	(0.00)	(0.00)	(0.44)
R^2	0.67	0.74	0.43	0.63	0.26
Adjusted R^2	0.66	0.74	0.42	0.62	0.18
F-statistic	53.94	986.70	56.49	66.81	3.15
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

OLS = ordinary least squares, LPI = Logistics Performance Index, LS = least squares.
Note: p-values in parentheses.
Source: Authors' calculations.

REFERENCES

Asian Development Bank (ADB). 2017. *Asian Economic Integration Report 2017: The Era of Financial Interconnectedness: How Can Asia Strengthen Financial Resilience?* Manila. https://aric.adb.org/aeir.

Bo, Chen, and Yuen Pau Woo. 2008. *A Composite Index of Economic Integration in the Asia-Pacific Region.* New York: United Nations Public Administration Network. http://unpan1.un.org/intradoc/groups/public/documents/apcity/unpan049069.pdf (accessed December 2017).

Dreher, Axel. 2006. "Does Globalization Affect Growth? Evidence from a New Index of Globalization." *Applied Economics* 38 (10): 1091–110.

Dreher, Axel, Noel Gaston, Pim Martens, and Lotte Van Boxem. 2010. "Measuring Globalization — Opening the Black Box. A Critical Analysis of Globalization Indices." *Journal of Globalization Studies* 1 (1): 166–85.

Dungey, Mardi, Biplob Chowdhury, Moses Kangogo, Mohammad A. Sayeed, and Vladimir Volkov. 2017. "The Changing Network of Financial Market Linkages: The Asian Experience." Background paper for Asian Economic Integration Report 2017 Theme Chapter on "The Era of Financial Interconnectedness: How Can Asia Strengthen Financial Resilience?" Manuscript.

Gygli, Savina, Florian Haelg, and Jan-Egbert Sturm. 2018. "The KOF Globalisation Index–Revisited." KOF Working Paper 439. https://www.ethz.ch/content/dam/ethz/special-interest/dual/kof-dam/documents/Globalization/2018/KOF_Globalisation%20Index _Revisited.pdf (accessed March 2018).

Huh, Hyeon-Seung, and Cyn-Young Park. 2017. "Asia-Pacific Regional Integration Index: Construction, Interpretation, and Comparison." ADB Economics Working Papers Series No. 511. https://www.adb.org/publications/asia-pacific-regional-integration-index.

———. 2018. "Asia-Pacific Regional Integration Index: Construction, Interpretation, and Comparison." *Journal of Asian Economics* 54: 22–38. https://doi.org/10.1016/j.asieco.2017.12.001 (accessed February 2018).

Lockwood, Ben. 2004. "How Robust is the Kearney/Foreign Policy Globalization Index?" *The World Economy* 27 (4): 507–524.

Organisation for Economic Co-operation and Development (OECD). 2008. *Handbook on Constructing Composite Indicators: Methodology and User Guide. European Commission.* Paris.

Swiss Federal Institute of Technology Zurich. 2017. KOF Index of Globalization. http://globalization.kof.ethz.ch/media/filer_public/2017/04/19/method_2017.pdf (accessed September 2017).

United Nations Conference on Trade and Development (UNCTAD). 2007. *Developing Countries in International Trade 2007. Trade and Development Index.* Geneva.

World Bank. The LPI Methodology. https://wb-lpi-media.s3.amazonaws.com/LPI%20Methodology.pdf (accessed September 2017).

Constructing the Asia-Pacific Regional Cooperation and Integration Index: A Panel Approach

This paper employs a panel approach in constructing the Asia-Pacific Regional Cooperation and Integration Index (ARCII) to strengthen the index's ability to track the progress of economic integration in the region over time. Of the six dimensions featured in the ARCII, trade and investment and movement of people are the main drivers of regional integration, while the money and finance dimension was the weakest link. Findings suggest the pace of integration in 2006–2016 was steady, driven by trade and investment. Modest gains in regional integration were made across most economies. Meanwhile, Asia comes second to the European Union (EU) in progress on regional integration, but in recent years several Asian economies have broken through to the top tier dominated by the EU economies.

About the Asian Development Bank

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to a large share of the world's poor. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

ADB

ASIAN DEVELOPMENT BANK
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org