Trade integration in Asia: Trends and determinants

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Abstract. While economic nationalism over the globalization is mounting around the western world in recent years, Asia's external trade and the overall economy is growing faster than other regions in the world shifting the center of gravity of the world economy from the West to the East. However, it is unclear how the Asian economies are integrating within the region. Using the cross-country panel data from the Asian Regional Integration Center (ARIC) of the Asian Development Bank (ADB) and the World Development Indicators of the World Bank this study examines the trend and determinants of regional trade integration in Asia. The results show fast-growing intra-regional and overall trade of most of the countries in the region. It also finds a significant positive effect of the size of economy and access to mobile phone on total trade and intra-regional trade volume. Similarly, mobile phone concentration and urbanization have a significant positive effect on both the intra-Asian trade volume and its share of total trade. However, size of the economy has no significant effect on intra-regional trade share. The finding suggests that further liberalization of trade together with policies for boosting domestic/regional demand are helpful for the broader regional integration in Asia.

1. INTRODUCTION

As Asia is the biggest continent possessing high degree of social, economic and political diversity, Asia wide regional integration seems very challenging. However, Asian economy is growing faster than other regions and Asia wide comprehensive economic integration efforts are increasing in recent years (Wignaraja, 2014). Although backlash against globalization especially in Europe and United States of America (USA) is increasing recently (Kobrin, 2017), openness in Asia is moving forward rapidly (Sapkota, 2011) resulting some progress on regional integration at sub-regional level and more debate, discussion, and dialogue at broad regional level. We even witness Trans Pacific Partnership agreement being Asia at the centre even though it is unlikely to come in to effect soon due to the reverse policy shift by the new administration in USA. However, motives of and efforts to comprehensive Asian integration would continue even if not increase soon because Asian trade and investment is increasing rapidly and countries are reducing trade and other barriers (Kimura & Obashi, 2016). Using panel data of all Asian countries (including the Pacific and Oceania but countries with limited data) from 1990 to 2015, this Article examines the trend and determinants of total and intra-regional trade, and argues that the relative importance of the global market outside the region is increasing, hence it is important to boost regional demand and improve economic cooperation among nations within the region.

Liberalization of trade and investment regime both unilateral as well as plurilateral in many Asian countries at various times and levels (Rai, 2010) contributed rapid growth of trade in Asia specially since 1990s. The integration process is also driven by the production fragmentation across countries (Obashi &

Kimura, 2017). Unfortunately, Asian regional integration remains largely market driven (Krapohl & Fink, 2013) unlike western world where regional integration is strongly institutionalized such as European Union. So far, Asian economic integration followed the "flying geese pattern," which means capital, technology, and know-how moved from more developed to less developed nations (Kumar, 2017). Nevertheless, policy-driven regional integration is becoming more visible after the Asian financial crisis (1997/98) in different forms of bilateral free trade agreements (FTAs) and regional trade agreements (RTAs) at sub-regional level that proliferate within and outside Asia. Currently, every country is engaging in FTAs or sub-regional RTAs, however, these agreements are very different from each other, in terms of the scope, coverage, and commitments; therefore, Kawai and Wignaraja argued that multiple trade agreements can be detrimental to increasing trade due to the "spaghetti bowl effect" which refers to the problems likely due to the many rules of origin of a product and other complexities caused by involving many FTAs (Kawai & Wignaraja, 2009). As fundamental trade theory suggests, various studies revealed that broader and deeper economic cooperation covering whole or most of Asia would generate tremendous gains (Urata, 2013). Thus, the main question is what are the major determinants of total and intra-regional trade in Asia?

2. TRENDS OF INTERNATIONAL TRADE IN ASIA

In this Article, Asia is defined in a broader perspective following the definition and coverage of ADB that includes East to West Asia, North to South Asia, two Oceanian countries, Australia and New Zealand, and the Pacific Island countries. We included all the countries in the ADB's database if the data is sufficiently available for analysis. Appendix 1 shows the list of countries in Asia by sub-regional grouping underlining the 34 countries covered in this study. Due to the huge diversity across more than 30 percent of the global terrestrial surface and more than 60 percent of the global population in Asia (Population, 2015), broader Asia wide regional integration process is not institutionalized yet. Some regional integration institutions at sub-regional level, such as the Association of South East Asian Nations (ASEAN), and the South Asian Association for Regional Cooperation (SAARC) are progressing too slowly to create promising environment for all the stakeholders including the regional economic powers to institutionalize the broader Asian integration process markedly.

However, market led regional integration reflected in trade and investments is moving forward rapidly since the end of cold war in 1990 (Das, 2005). Figure 1 shows that Asia's trade peaked from 1.5 trillion US$ in 1990 to nearly 13 trillion US$ in 2014 dropping to 11.7 trillion in 2015. Similarly, intra-Asian trade also rose from 45.7 percent to 57.1 percent during the same period. This growing intra-Asian trade is fueled by many Asian countries' fast progress towards a highly diversified industrial base (Clark, Lima & Sawyer, 2017), fast growing production network within the region (Das, Sen, & Srivastava, 2016; Athukorala & Yamashita, 2006) and increasing trading capacity (ESCAP, 2013).
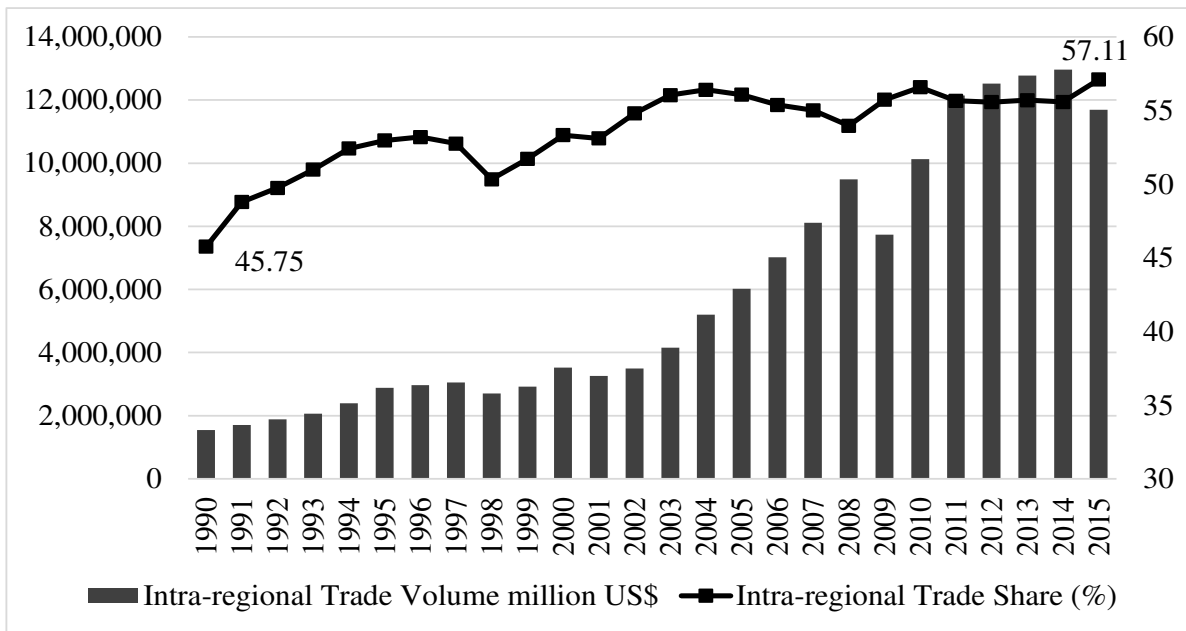
Figure 1 Trend of intra-Asian trade volume and intra-Asian trade share, 1990 – 2015

Source: authors' calculation using ADB's Regional Integration Indicator database.
The database is retrieved from: http://aric.adb.org/integrationindicators (21.05.2017)

Figure 2 shows the trend of total trade for top five and sum of the remaining 29 selected Asian economies. China's most rapid growth surpassing Japan in 2004 and progressing even faster since then. Other economies are progressing continuously except in 2009 and 2015. While global financial crisis in 2007-08 caused the sharp drop in trade in 2009, Lewis and Monarch pointed out some structural factors such as reversing the speed of trade openness, and the slowing of supply chain fragmentation, etc. as the causes of recent decline of global as well as Asian trade (Lewis & Monarch, 2016). However, the causes of the recent trade slowdown are not that obvious as in 2008/09 (ibid).

On the other hand, Hong, Lee, Liao and Senerviratne (2017) argued that the major cause for global and Asian trade slowdown was the recent weakness in China's imports. They also estimated the spillover effects from a rebalancing of demand in China and pointed out the negative impacts on neighbouring and other countries (ibid).

Although both global and intra-regional trade is increasing in Asia, it is interesting to observe the relative importance of trade of a region vis-à-vis global trade in the region. The intra-regional trade intensity index (TII) is useful in this purpose. As defined in ARIC home page, the intra-regional trade intensity index is the ratio of intra-regional trade share to the share of world trade with the region (ARIC, nd).
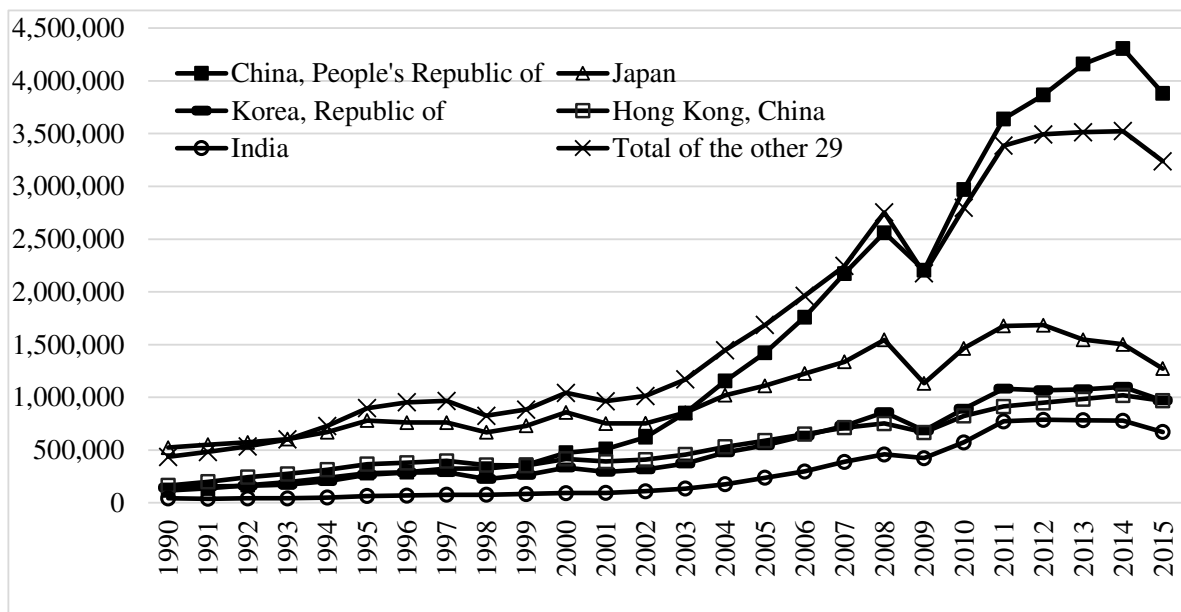
Figure 2. Trend of total trade volume of top five and rest of the 29 selected Asian economies, million US$, 1990 – 2015

Figure 3 shows the declining intra-regional TII from 2.03 in 1990 to 1.63 in 2015 indicating that the outside world is becoming more important than the Asian region to Asian countries. Although the decline was sharp in 1992-93, then gradual improvement until 2003, it continued to decline again sharply afterwards. It might be due to the faster pace of growth in global trade than the regional trade integration. Although TII value more than 1 means intra-regional trade is more important than the global trade in Asia, such declining trend clearly indicates huge challenges for Asian integration process in the future.
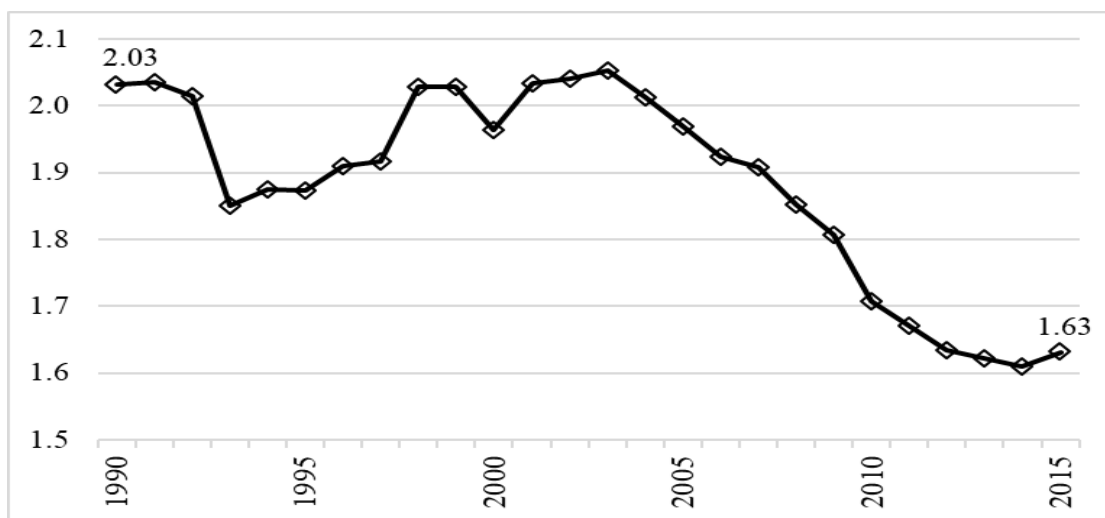

Figure 3. Trend of intra-regional trade intensity index (TII) of Asia, 1990 - 2015

Existing studies of the TII of Asian sub-regions revealed that the relative importance of trade within each of the sub-regions is greater than with the world (Sapkota & Shuto, 2016) although the TII trends are declined for each of the regions. The authors also found TII more than one for each sub-region to whole Asia. Therefore, we argue that overall Asian economic integration is desirable as many empirical assessments also showed huge benefits of such integration (Wignaraja, Morgan, Plummer & Zhai, 2015). Thus, main determinants of Asian economic integration are always a matter of exploration since beginning of 21st century.

3. METHODOLOGY

3.1 The data

We use the annual data of 34 Asian countries for the period of 1990-2015 taken from two online databases, namely ADB-ARIC Integration Indicators (ARIC, nd) and the World Development Indicators (WDI) (World Bank, nd). We consider intra-Asian trade volume and the proportion of intra-Asian trade to total trade of sample countries as the measure of regional trade integration and include as dependent variables in the model. Meanwhile, we also include total trade volume as a dependent variable to draw comparative perspectives on international trade.

The potential determinants of intra-regional trade are chosen based on the existing literature on trade. Basically, we consider similar determinants for both total trade and intra-regional trade. First, we include a trade-related variable; each country's number of bilateral Free Trade Agreements/regional Free Trade Agreements (FTAs/RTAs). Although the quality of FTAs and RTAs is different, the gravity model revealed that FTAs/RTAs lead to a trade creation effect, and trade diversion effect is far limited in general (Urata & Okabe, 2010). Thus, we expect positive effect of FTAs/RTAs on regional trade as well.

Traditional gravity model of trade has shown that the size of economy and distance between trade partners are the major determinants of inter-country trade (Helpman, Melitz & Rubinstein, 2008). It is expected that the larger economies in Asia may have proportionately more trade within the region similar to Southeast Asia sub-region (Thornton & Alessandro, 2002). So, we include gross domestic product (GDP) as a determinant of trade. We do not include distance in the study because our focus is regional trade not bilateral or inter-regional trade.

Most cross-country studies have used the level of economic development as a main factor of bilateral international trade. Similar to Sharma and Chua (2000), we also consider gross national income (GNI) per capita as another determinant of trade. We include mobile cellular subscriptions (per 100 people) in the set of determinants because mobile technology may boost the environment for international interaction and networking and may help to increase intra-regional trade (Bankole, Osei-Bryson & Brown, 2013). Finally, we include urbanization as another prospective determinant of trade. Brakman and Marrewijk (2013), and Smart and Smart (2003) suggested that trade patterns may also

depend on the level of urbanization between countries because urbanization may increase mobility and promote network (Bral,am & Marrewijk, 2013).

Trade volumes, GDP and GNI per capita are expressed in 2011 international dollar ($) in millions. The summary statistics and correlation matrix of the variables are given in Appendix 2 and Appendix 3.

3.2 Model specification

We follow the dynamic panel data approach to estimate the determinants of the international trade and intra-regional trade in Asia. The trade volumes and the proportion of intra-regional trade of each country change slowly over time, which means the current levels of trade depend on past outcomes. Thus, the lagged dependent variable is included as one of the determinants in the model. However, inclusion of lag dependent variables as a predictor creates a dynamic structure of the model. Therefore, fixed country effects and the OLS estimator cannot be used as it becomes biased and inconsistent (Nickell, 1981). To solve this problem, many experts suggested a system generalized method of moments (GMM) estimator as specified in the following model (Arellano & Bover, 1995; Blundell & Bond, 1998).

$$Y_{it} = a + \beta_1 Y_{it-1} + \beta_2 X_{it} + \eta_i + \varepsilon_{it}$$

where, Y_{it} is the dependent variables measured by the natural logarithm of (i) total trade volume (million PPP $), (ii) intra-Asian trade volume (million PPP $), and (iii) the share of intra-Asian trade to total trade of country i at year t. Y_{it-1} is one period lag of the dependent variables. X_{it} is a set of dependent variables and includes natural logarithm of GDP, GNI per capita, number of TFTA/FTAs and number of mobile phone subscriptions (per 100). We also include urban population growth, and sub-region dummies (with East Asia as base category) to control for the regional effect.

Among parameters, a is the constant term; β_1 is the coefficient of depend variable and β_2 is a vector of the coefficients of determinants; η_i is the country fixed effect; and ε_{it} is the error term which follows a normal distribution.

System GMM is appropriate for our data for several reasons. First, if the explanatory variables (Y_{it}) are correlated with error term ε_{it} possibly due to simultaneity, omitted bias or measurement errors, the estimated coefficients may be inconsistent and biased. Particularly, lag of dependent variables, GDP, GNI per capita and T/FTAs may be endogenous, as the volume and pattern of trade may determine the size of the economy, development level and direction of trade. System GMM uses a large matrix of available instruments and weights them properly to overcome the endogeneity problem. Arellano and Bover (1995) claimed that the problem of endogeneity can be partially solved by controlling fixed effects and time; however, if there are certain unobserved variable changes over time and across the countries, the problem may remain. Blundell and Bond (1998) claimed that GMM addresses the problem of endogeneity. Second, as Roodman (2009) suggested, GMM is also appropriate for controlling individual fixed effect, and addressing heteroscedasticity and serial autocorrelation. While estimating the system GMM in stata, we use *xtabond2* command as explained by Roodman using the endogenous variables (discussed earlier) as *gmmstyle* instruments and the remaining variables as *ivstyle* instruments. Thus, lag of all endogenous

variables are used as instruments for all endogenous variables. The Hansen test of overidentifying restrictions and autocorrelation tests are carried to assess the validity of the instruments used. The Hansen test and the second order correlation tests indicate that we cannot reject the validity of the moment conditions assumed for the estimation.

4. EMPIRICAL RESULTS AND DISCUSSION

The system GMM estimates of the determinants of trade volume and intra-Asian trade share is presented in Table 1. Column 1 reports the estimates of total trade volume while columns 2 and 3 report the estimates of the intra-Asian trade volume and its share to total trade respectively. The signs and values of the coefficient indicate the direction and magnitude of effects respectively.

The lag dependent variable is significant positive in all the specifications considered. The estimates show that one percent increase in trade volume in current year contributes to 0.54 percent increase in the next year's trade volume while one percent increase in intra-regional trade volume or its share to total trade in this year increases about 0.4 percent intra-regional trade or its share in the next year. It indicates that if a country or economy could increase the overall as well as intra-regional trade in a certain year, it provides foundation for the future growth.

The size of economy (measured by GDP) has also positive and significant effect on the total trade and intra-Asian Trade volume: one percent increase in GDP would increase total trade volume by 0.42 percent and intra-regional trade volume by 0.51 percent. However, we do not find significant effect of GDP on the share of intra-Asian trade. The result is consistent with the finding of Gaulier, Lemoine and Deniz that the trade growth of larger economies, such as China, contributed more from outside Asia than inside the region (Gaulier, Lemoine & Unal-Kesenci, 2007). Meanwhile, we do not find significant effect of GNI per capita, i.e. the level of economic development both on trade volume and intra-regional trade share.

Surprisingly, FTAs/RTAs have no effect on both total and intra-regional trade. The finding differs from the existing literature such as Baier and Bergstrand (2007) argued that bilateral FTA approximately doubles the trade between the members and Ghosh and Yamarik (2004) found the trade-creating effect of RTAs. Arguably, Asian FTAs/RTAs mostly follow "open regionalism" and it does not discourage trade with non-members (Camroux, 2012). Declining intra-regional TII in Figure 3 also indicates that trade beyond Asia has been becoming more important than within the region and recent trade growth is mainly driven by the outside trade in the region.

Similarly, technological advancement measured by the mobile cellular subscription is found significantly favorable to increase intra-regional trade. The magnitude of the effect is almost double for intra-regional trade than global trade; the elasticity of total trade with mobile phone subscription is 4.2 percent while that for intra-Asian trade is 8.9 percent. It is also interesting that the intensity of mobile phone not only increases trade volume but also increases the share of intra-regional trade. The result is consistent with the recent findings of Bankole, Osei-Bryson and Brownas (2013) as they found a significant positive effect of ICT on intra-African trade. Moreover, we find no effect of urbanization on

total trade volume but positive and significant on intra-Asian trade and its share to total trade. Indeed, urbanization contributes to intra-regional trade through increasing the cross-border movement of people (Skeldon, 2006) and promoting international networks (Smart & Smart, 2003).

Table 1 Determinants of intra-regional trade in Asia, 1990-2015

Variables	Log of total trade volume (PPP, million $ 2011)	Log of intra-Asian trade volume (PPP, million $ 2011)		Log of intra-Asian trade share (%)	
	(1)	(2)	(3)	(4)	(5)
Lagged dependent variable	0.535***	0.403***	0.392***	0.376***	0.376***
	(0.073)	(0.043)	(0.047)	(0.014)	(0.015)
Log of GDP, PPP (million constant 2011 int'l $)	0.421***	0.516***	0.537***	-0.042	-0.028
	(0.094)	(0.088)	(0.073)	(0.028)	(0.027)
Log of GNI per capita, PPP (constant 2011 int'l $)	0.006	0.053	0.018	0.036	0.020
	(0.068)	(0.056)	(0.047)	(0.033)	(0.031)
Log of all FTAs/RTAs (signed an in effect)	-0.020	-0.045		-0.010	
	(0.042)	(0.040)		(0.018)	
Log of intra-regional FTAs/RTAs (signed an in effect)			-0.091**		-0.028**
			(0.037)		(0.014)
Log of mobile cellular subscriptions (per 100 people)	0.042***	0.089***	0.103***	0.038***	0.041***
	(0.016)	(0.015)	(0.015)	(0.007)	(0.008)
Urban population growth (annual %)	0.000	0.042***	0.043***	0.040***	0.038***
	(0.018)	(0.014)	(0.016)	(0.010)	(0.009)
Central Asia region	-0.188**	-0.516***	-0.536***	-0.417***	-0.414***
	(0.095)	(0.086)	(0.080)	(0.041)	(0.040)
East Asia region	-0.109	-0.100	-0.190	-0.039	-0.067
	(0.191)	(0.271)	(0.248)	(0.084)	(0.083)
Oceania region	-0.483***	-0.609***	-0.563***	-0.108	-0.049
	(0.138)	(0.097)	(0.101)	(0.212)	(0.195)
South Asia region	-0.450***	-0.674***	-0.736***	-0.191**	-0.220***
	(0.147)	(0.158)	(0.124)	(0.079)	(0.071)
The Pacific region	-0.264	-0.256	-0.235	-0.028	0.023
	(0.236)	(0.260)	(0.183)	(0.104)	(0.102)
Constant	0.517	0.007	0.206	2.587***	2.582***
	(0.619)	(0.633)	(0.505)	(0.217)	(0.227)
Observations	785	785	785	785	785
Number of countries	34	34	34	34	34
AR (1) test	0.012	0.005	0.005	0.003	0.003
AR (2) test	0.871	0.661	0.638	0.333	0.333
Sargan test (p-value)	366.4	387.5	380.5	639.7	628.6
	(1.0)	(1.0)	(1.0)	(0.99)	(0.99)

Source and Notes: authors' estimation using two-step system GMM; Standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$; Data for intra-regional trade in Asia, and number of FTAs/RTAs are from ADB-ARIC Integration Indicators retrieved from: http://aric.adb.org/integrationindicators and remaining variables are from World Development Indicators (WDI): http://data.worldbank.org/data-catalog/world-development-indicators (21.05.2017).

Finally, we find heterogeneity in total trade volume and intra-Asian trade among the six sub- regions in Asia. In comparison to Southeast Asia sub-region, the volume of total trade is significantly lower in Oceania, Central Asia and South Asia sub-regions while other sub-regions have not significantly different level of trade. The sub-regions follow similar pattern of intra-Asian trade volume. Similarly, the share of intra-regional trade to total trade is significantly lower in Central Asia and South Asia sub-regions. The results suggest South East Asian countries have not only well diversified the trade but also have better position in intra-regional trade integration in terms of volume and its share to total trade in comparison to Central Asia and South Asia countries.

5. CONCLUSION

This article explored the trend and determinants of regional as well as global trade integration in Asia using the annual panel data from 1990 to 2015 of 34 Asian countries. Although Asia's (including the Pacific and Oceania) global and intra-regional trade increased, we found that the relative importance of regional trade vis-à-vis global trade, measured by the intra-regional TII, decreased over the period. The finding indicates that as countries' trading capacities grow, they tend to trade globally rather than regionally. Such a declining regional importance of trade within the region is not encouraging evidence for broader regional integration in Asia. Thus, trade and investment policies that boost regional trade and investment are essentially important for countries in the region for rapid progress on broader Asian integration.

The Dynamic panel-data estimation in two-step system GMM showed that the previous level of trade, size of the economy and access to mobile phone technology have significant and positive effects on both total as well as intra-regional trade. However, the size of economy has no effect on the intra-regional trade share. Urbanization has significant positive effect on intra-regional trade and its share to total trade but not with the total trade. However, FTAs and RTAs are found insignificant for both global and intra-regional trade. The finding suggests that the quality of FTAs/RTAs matters more than the quantity itself for boosting intra-regional trade in the region and in-depth investigation is needed to understand the quality and utilization of FTAs and RTAs. Further liberalization of trade regime together with policies for boosting domestic/regional demand is also essentially important for the comprehensive Asia wide regional integration.

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APPENDICES

Appendix 1.   List of all Asian countries (underlined included in the analysis)

Central Asia sub-region (all 8 selected)	Armenia; Azerbaijan; Georgia; Kazakhstan; the Kyrgyz Republic; Tajikistan; Turkmenistan; and Uzbekistan
East Asia sub-region (5 selected)	People's Republic of China; Japan; Hong Kong, China; the Republic of Korea; Mongolia; and Taiwan, China
Southeast Asia sub-region (9 selected)	Brunei Darussalam; Cambodia; Indonesia; the Lao People's Democratic Republic (Lao PDR); Malaysia; Myanmar; the Philippines; Singapore; Thailand; and Viet Nam
South Asia sub-region (5 selected)	Afghanistan; Bangladesh; Bhutan; India; the Maldives; Nepal; Pakistan; and Sri Lanka
The Pacific sub-region (5 selected)	Cook Islands; Fiji; Kiribati; the Marshall Islands; the Federated States of Micronesia; Nauru; Palau; Papua New Guinea; Samoa; Solomon Islands; Timor-Leste; Tonga; Tuvalu; and Vanuatu
Oceania sub-region (all two selected)	Australia and New Zealand

Source: Asian Development Bank (ADB), retrieved from: https://www.adb.org/about/members (21.05.2017).

Appendix 2. Summary statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
Dependent variables					
Total trade volume, PPP (million constant 2011 int'l $)	884	391184	864615	223	7945950
Intra-Asian trade volume, PPP (million constant 2011 int'l $)	884	207422	426313	188	3625578
Intra-Asian trade share (%)	884	53.48	21.26	2	95.2
Independent variables					
GDP, PPP (million constant 2011 int'l $)	884	679318	1808829	340.1	18600000
GNI per capita, PPP (constant 2011 int'l $)	884	12885	18193	1000	87549.6
Number of FTAs/RTAs (signed and in effect) among Asian countries	884	3.62	3.65	0	20
Mobile cellular subscriptions (per 100 people)	884	38.96	48.21	0	235.61
Urban population growth (annual %)	884	2.17	1.72	-3.1	7.03

Source: Data for intra-regional trade in Asia, and number of FTAs/RTAs are retrieved from ADB's Regional Integration Indicator database, available at: http://aric.adb.org/integrationindicators, and remaining are retrieved from the World Bank's World Development Indicators database, available at: https://data.worldbank.org/data-catalog/world-development-indicators (21.05.2017).

Appendix 3. Correlation matrix

	lntradev	lntrvasia	lntrasia	lngdp	lngnipc	lntftas	lnmobile	popgu
lntradev	1							
lntrvasia	0.97	1.00						
lntrasia	-0.05	0.19	1.00					
lngdp	0.97	0.93	-0.09	1.00				
lngnipc	0.52	0.54	0.13	0.44	1.00			
lntftas	0.25	0.26	0.05	0.22	0.29	1.00		
lnmobile	0.38	0.43	0.23	0.31	0.57	0.66	1.00	
popgu	0.01	0.11	0.47	0.03	-0.25	-0.15	-0.13	1

Sources: authors' calculation using the data of intra-regional trade in Asia, and number of FTAs/RTAs retrieved from ADB's Regional Integration Indicator database, available at: http://aric.adb.org/integrationindicators, and remaining retrieved from the World Bank's World Development Indicators database, available at: https://data.worldbank.org/data-catalog/world-development-indicators (21.05.2017).

Notes: All variables (except popgu) are in log form: lntradev=Log of total trade volume PPP (million constant 2011 international $); lntrvasia=Log of intra-Asian trade volume PPP (million constant 2011 international $); lntrasia=Log of intra-Asian trade share (%); lngdp=Log of GDP in PPP (million constant 2011 international $); lngnipc=Log of GNI per capita, PPP (constant 2011 international $); lntftas=Log of number of total FTAs/RTAs (signed and in effect); lnmobile=Log of mobile cellular subscriptions (per 100 people); popgu=Urban population growth rate (annual %).