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Is Pan-Asian Economic Integration Moving Forward?

Evidence from Regional Trade Statistics

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Abstract: *Asia is growing economically faster than any other region in the world that even led the shift of the center of gravity of global economy from West to East. However, it is not clear whether the Asian economy is integrating more regionally or globally. In the context of growing efforts of regional integration at pan-Asian as well as its sub-regional level, it is worthwhile to explore the pan-Asian trade flows regionally as well as globally. Thus, this paper examines the trend and determinants of economic integration in pan-Asia, and its sub-regions in terms of the trade intensity index (TII) and intra-regional trade share. ADB's ARIC database revealed that despite rapid increase in intra-Asian trade volume of all countries from 1990 to 2012, the trends of intra-regional trade share of different countries are different indicating that countries in the region are functioning independently and stronger economic tie is yet to build within the pan-Asia and its sub-regions. Furthermore, the dynamic panel data analysis resulted that FTAs/RTAs are one of the main determinants of growing intra-Asian trade share. Other determinants are countries' level of economic development, FDI stock, urban population growth and access to ICT. Thus, we argue that active participation in FTAs/RTAs, open FDI policy, urbanization and technological development of Asian countries create an enabling environment for pan-Asian economic integration.*

Key Words: Pan-Asia, Economic Integration, Trade Statistics, Intra-Regional Trade, Panel Data Econometrics

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1. Introduction

As Asia is growing economically faster than any other region in the world recent regional integration efforts are increasing towards Pan-Asian economic integration (Wignaraja 2014). Despite continued efforts on deeper integration at each sub-regional level, countries from East Asia, Southeast Asia, South Asia, Oceania and Pacific are involving in the negotiations of large integration initiatives, such as Regional Comprehensive Economic Partnership (RCEP) (Chia 2013). However, there is no such a bold effort that can pave the way for realizing Asia-wide

regional integration in the near future. In this context, this paper examines the trend and determinants of economic integration in Asia in terms of the trade intensity index (TII) and intra-regional trade share.

Asian trade within the Asia and with the world is increased rapidly over the last two decades. This trend is contributed by continuous unilateral as well as plurilateral liberalization by many Asian countries and sub-regions at various time (Rai 2010). However, unlike Europe and North America where regional integration is driven by policy and institution, Economic integration in Asia is still largely market driven. As Kumar (2009) argued, Asian economic integration followed the “flying geese pattern”, which means capital, technology, and know-how moved from more developed to less developed nations. For instance, it first moved from Japan to the Asian economic tigers¹ and then to other Southeast Asian countries, mainly to Thailand, Malaysia, Indonesia, and the Philippines. The economic integration process was further fueled by trade and investments liberalization along with the production fragmentation across countries. Policy driven regional integration is also becoming visible after the Asian financial crisis (1997/98). Different forms of bilateral free trade agreements (FTAs) and regional trade agreements (RTAs) are proliferating within and outside Asia, and currently, every country is engaging in some FTAs or RTAs. However, most of the RTAs are at sub-regional level, and the broader pan-Asian level cooperation is not progressing well. Furthermore, these agreements are very different from each other, in terms of its scope, coverage, and commitments, therefore, Kawai and Wignaraja (2009) argued that multiple trade agreements can be detrimental to increasing trade due to the “spaghetti bowl effect”.² Similarly, various studies revealed that broader and deeper economic cooperation at the pan-Asian level would generate tremendous gains, hence opposed integration among a small

¹ The “Asian economic tigers” is a widely used term in development discourse, which refers to the newly emerged economic powers in Asia namely Hong Kong, Singapore, South Korea, and Taiwan. These countries achieved rapid economic development through outward looking open economic policies for development.

² A well-known economist Jagdish Bhagwati first used the term “spaghetti bowl effect” in 1995, which refers to the problems likely due to many rules of origin of a product and other complexity cause by involving in many FTAs.

group of countries at different sub-regional levels (Urata, 2013). Thus, it is worthwhile to observe the progress toward broader pan-Asian regional integration though it is still largely market driven.

The paper is organized as follows. Section 2 examines the trend of inter sub-regional and intra-regional trade in Asia. Economic Integration database of Asian Development Bank's Asian Regional Integration Center (ARIC) revealed that the trade volume of each country in Asia toward Asia as well as toward the world increased dramatically over the last two decades. However, the trends of intra-regional trade are not similar across countries. Section 3 assesses the determinants of intra-regional trade in the region, which finds the positive and significant impacts from FTAs/RTAs with Asian countries, GNI per capita, foreign direct investment (FDI) and urbanization. However, the economic size of the countries or economies has negative and significant impact on intra-regional trade share. Section 4 concludes the paper.

2. Pan-Asian intra-regional and inter sub-regional trade

In terms of population and geographical sizes, Asia is the largest continent. Asia covers 30% of the global terrestrial surface providing shelter for about 60% of global population. Hence, Asia possesses a high degree of sociocultural, developmental as well as political diversity. Thus, there are many sub-regions within Asia involving in sub-regional integration initiatives, such as Association of South East Asian Nations (ASEAN) of 10 countries from Southeast Asia and South Asian Association for Regional Cooperation (SAARC) of 7 countries of South Asia.³ However, broader regional integration initiatives across the sub-regions are underway with little progress. For instance, Regional Comprehensive Economic Partnership (RCEP) widely known as ASEAN plus six, and ASEAN plus three (APT) groupings of integration are

³ Member countries of ASEAN include Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam. Similarly, current member states of the SAARC are Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.

under discussion.⁴ Interestingly, Asian regional integration initiatives broaden its scope bringing its neighboring regions, especially from Oceania and Pacific Islands, in the integration process.

Therefore, Asia is defined in a broader perspectives comprising from East to West Asia, North to South Asia, two Oceanian countries, Australia and New Zealand, and the Pacific Island countries.⁵ All the countries are included as long as data are sufficiently available for analysis. Based on the ADB's country grouping, Appendix 1 shows the list of countries for each group highlighting the countries, which are covered in this study.

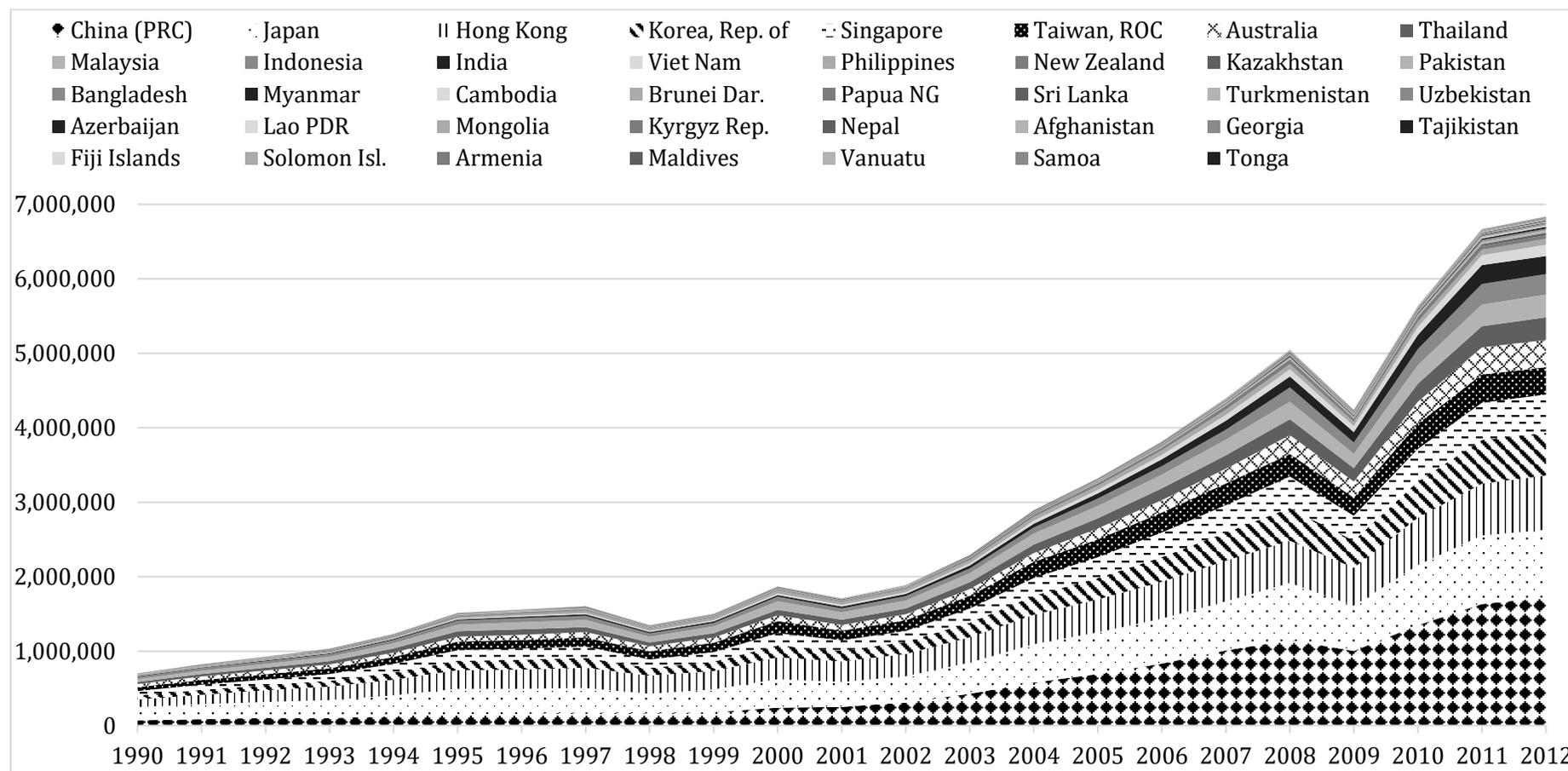
2.1 Intra-regional trade by country/economy

Figure 1 shows the trend of total trade volume of Asian countries to Asia from 1990 to 2012. It clearly indicates the increasing trend of trade volume towards Asia from its member economies; People's Republic of China (PRC), Japan, and Hong Kong remained at the top 1st, 2nd and 3rd rank in 2012, respectively. We can observe the similar trend of total trade volume from Asian economies to the world in Figure 2. Although Republic of Korea (ROK) replaced the 3rd place, the overall trend is mostly similar. In general, the trade volume of Asian countries to Asia as well as to the world increased over the time but rapid growth observed from 2002. Despite a sharp drop in 2009 due to the huge global economic crisis, the trade volume rose sharply thereafter for most of the major economies of Asia in general. As the total trade of Asian economies to Asia and the world follow the similar trend, it cannot point out whether the regional economic integration is advancing within the region vis-à-vis with the world.

⁴ RCEP or ASEAN plus six consist of 10 ASEAN countries plus China, Japan, Republic of Korea, India, Australia and New Zealand. Similarly, ASEAN plus three (APT) includes 10 ASEAN member states plus China, Japan and Republic of Korea.

⁵ ARIC regional integration database of ADB covers 48 countries from Asia, Oceania and the Pacific as a group of Asia. This study follows the same groupings as it uses the ARIC database. It is rationale, indeed, to include Australia, New Zealand, and the Pacific countries because some of these countries are already in the broader Asian integration process.

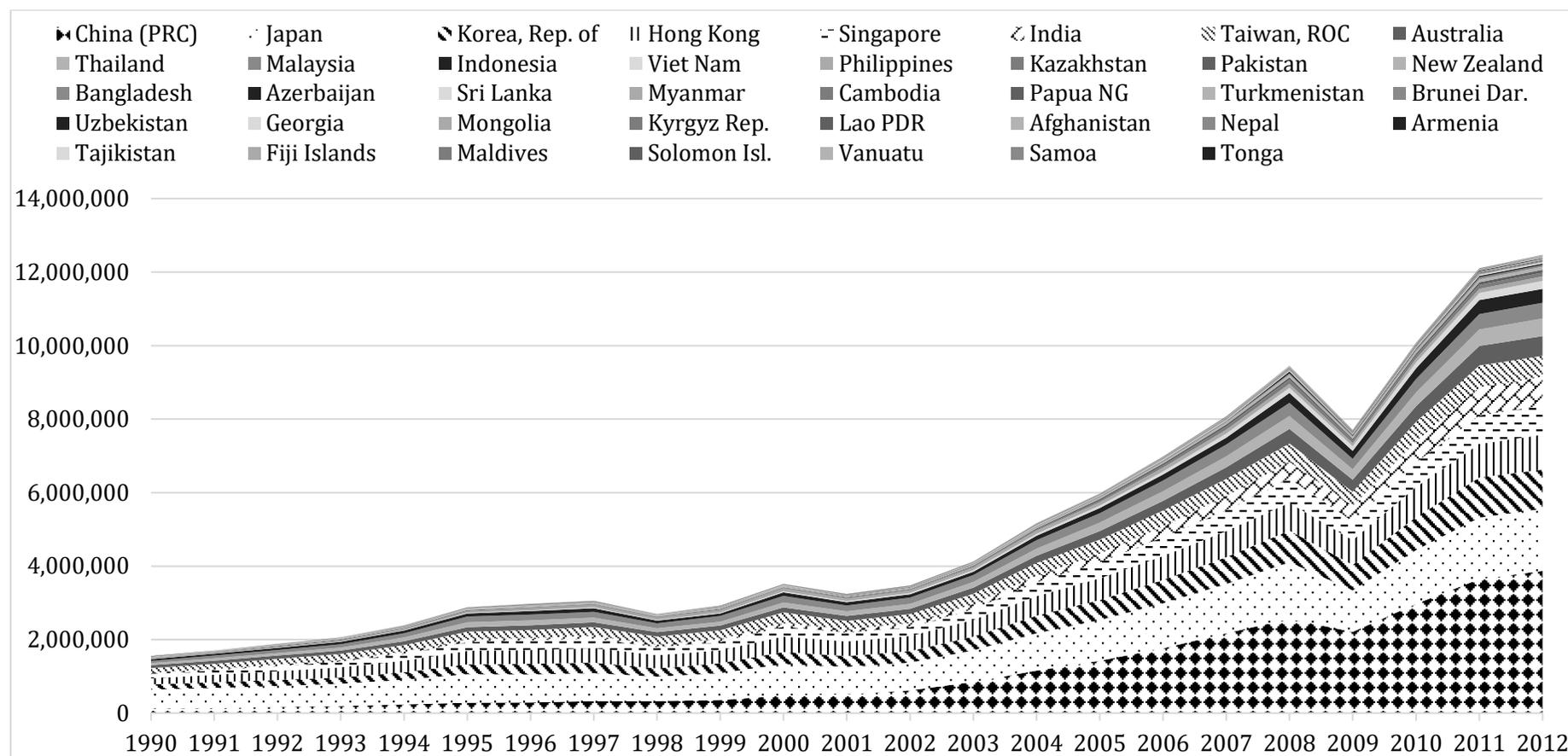
Figure 1. Total trade volume from Asian countries to Asia, 1990-2012 (million US\$)



Notes: PRC=People's Republic of China, Rep.=Republic, NG= New Guinea, ROC=Republic of China, Dar.= Darussalam, Isl.=Island

Source: The author using the data from ARIC Regional Integration Indicator database, available at: <http://aric.adb.org/integrationindicators>, accessed: March 7, 2015.

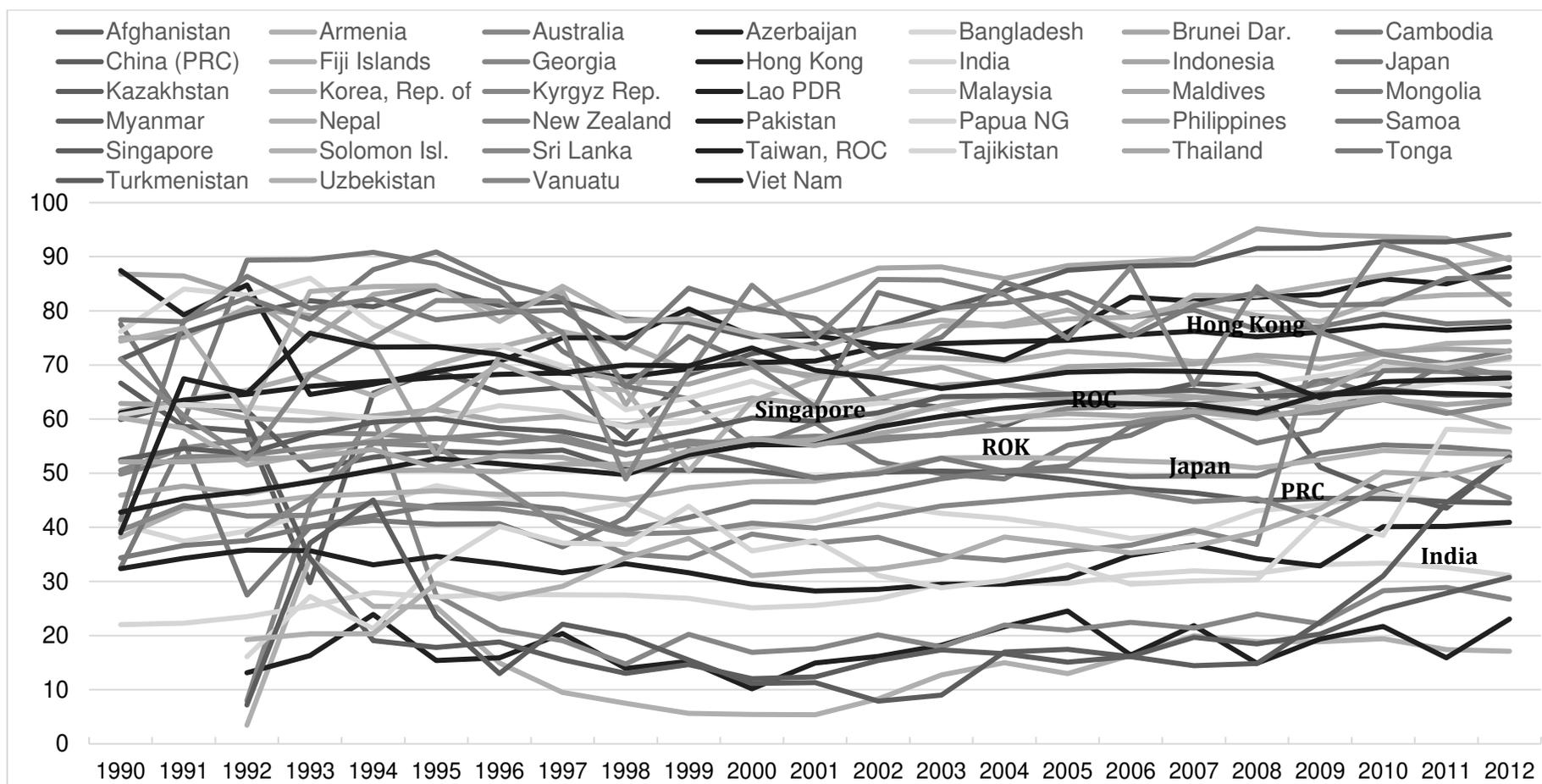
Figure 2. Total trade volume from Asian countries to the world, 1990-2012 (million US\$)



Notes: PRC=People's Republic of China, Rep.=Republic, NG= New Guinea, ROC=Republic of China, Dar.= Darussalam, Isl.=Island

Source: The author using the data from ARIC Regional Integration Indicator database, available at: <http://aric.adb.org/integrationindicators>, accessed: March 7, 2015.

Figure 3. Trade share of Asian countries to Asia, 1990-2012 (percentage of total trade volume of the country)



Notes: PRC=People's Republic of China, Rep.=Republic, NG= New Guinea, ROC=Republic of China, Dar.= Darussalam, Isl.=Island

Source: The author using the data from ARIC Regional Integration Indicator database, available at: <http://aric.adb.org/integrationindicators>, accessed: March 7, 2015.

In order to examine the depth of regional economic integration in Asia, Figure 3 shows the trade share of Asian economies to Asia.⁶ Unlike the trend of trade volume, trade share to Asia of its countries and economies are not similar. For example, trade share to Asia is growing slowly for Japan, Hong Kong, Taiwan, ROK, and Singapore; whereas, it is declining for PRC, and some Central Asian and the Pacific countries. Interestingly, the trade share of Hong Kong to Asia remained more than 75%, Taiwan and Singapore remained more than 60%, and Japan and ROK remained more than 50% in 2012. In the same year, trade share to Asia remained at 44.5% and 31.13% for PRC and India, respectively.

These trends indicate that trade integration in Asia is not progressing significantly over the last two decades as some countries' Asian trade share is declining where as it is increasing or remained stable for other countries. Huge diversity, prolonged territorial disputes among major economic powers,⁷ and relatively cold bilateral relations among neighboring countries are hindering the regional integration process.

2.2 Intra-regional trade by sub-region

Figure 4 presents the trend of intra-regional and intra sub-regional trade share in Asia. Sub-regions of Asia and the list of countries for each sub-region are presented in Appendix 1. It shows gradual but slow increasing intra-East Asian and intra-Southeast Asian trade share. Intra-regional trade in East Asian rose from 28.58% in 1990 to about 40.6% in 2004, which declined to 35.87% in 2012. Intra-regional trade in Southeast Asia rose from nearly 17% to 24.56% from 1990 to 2012, respectively.

However, there is rather a stable trend for South Asia, whose intra-regional trade share remained around 2% to 3% over the period of 1990 to 2012. Other sub-regions; the Pacific,

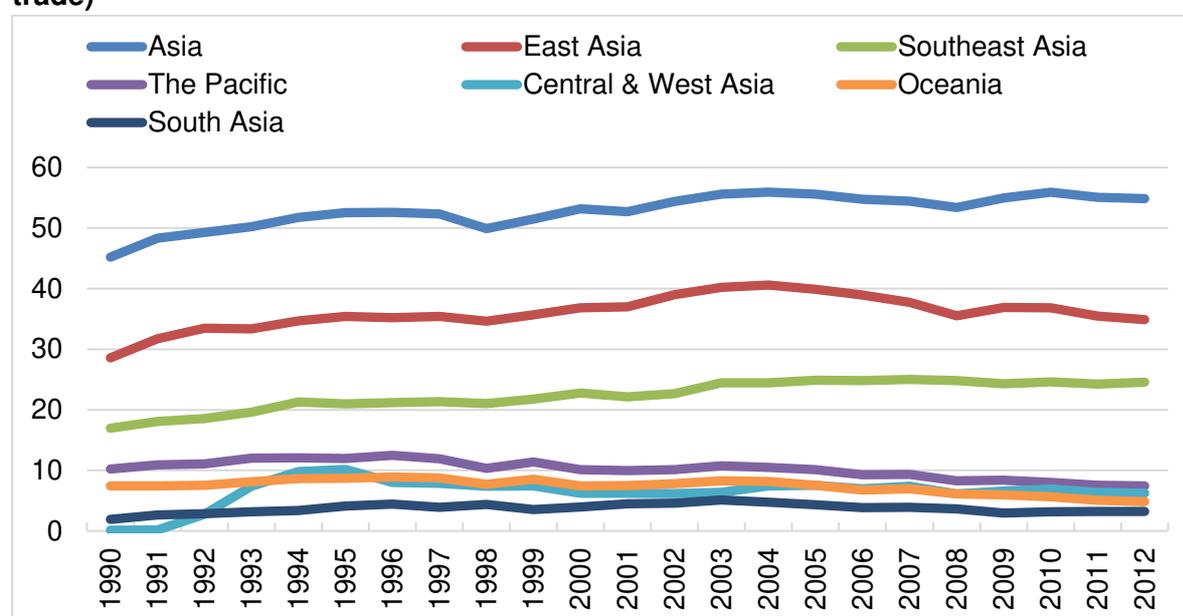
⁶ As defined by ADB, "trade share is the percentage of trade with a partner to the total trade of a country/region. It is computed as the dollar value of total trade of country/region *i* with country/region *j* expressed as a percentage share of the dollar value of total trade of country/region *i* with the world. A higher share indicates a higher degree of integration between partner countries/regions" (Available at: <http://aric.adb.org/integrationindicators/technotes>, Accessed: March 18, 2015).

⁷ In Asia, PRC, Japan, ROK, and India are among the major economic powers having problems in their bilateral relations

Oceania, and Central & West Asia experienced even decreasing trend (especially from around 1995).

Intra-regional trade in Asia, however, increased (slowly though) from 45.2% in 1990 to 55.94% in 2010. Then, the region experienced slowdown marginally reaching 54.85% in 2012. The trend also clearly indicates the adverse effect of regional and global financial crisis on regional economic integration process as the trend are declining around 1997-98 and 2008-09 when the region was suffered severely from the Asian financial crisis and global financial crisis respectively.

Figure 4. Intra-regional trade share of Asia and its sub-regions, 1990-2012 (% of total trade)



Source: The author using the data from ARIC Regional Integration Indicator database, available at: <http://aric.adb.org/integrationindicators>, accessed: March 7, 2015.

In the context of growing efforts on pan-Asian integration, there is increasing interest on inter sub-regional trade flows in Asia. To detect such flows in relation to global trade, trade intensity index (TII) is used. TII shows the relative importance of trade of a region with another region vis-à-vis global trade.⁸ Specifically, as defined in the Integration Indicators technical

⁸ The original definition of TII is available at: <http://aric.adb.org/integrationindicators/technotes>, accessed: March 20, 2015.

notes of ARIC home page, TII of region A to region B is the ratio of the proportion of trade from region A to region B with region A's total trade with the world and the global trade share to region B. Specifically, TII from region A to region B (TII_{AB}) is calculated as:

$$TII_{AB} = \frac{t_{AB}/T_{AW}}{t_{WB}/T_{WW}}$$

where, t_{AB} is the amount of total trade of region A with region B, T_{AW} is the amount of the total trade of region A with the world, t_{WB} is the amount of world trade with region B, and T_{WW} is the total dollar value of world trade.

The TII_{AB} value exceeding one means the trade flow between the region A and region B is more than expected given their importance in the world trade. TII for Asia and some of the sub-regions over the period of 1990 to 2012 are presented as follows.

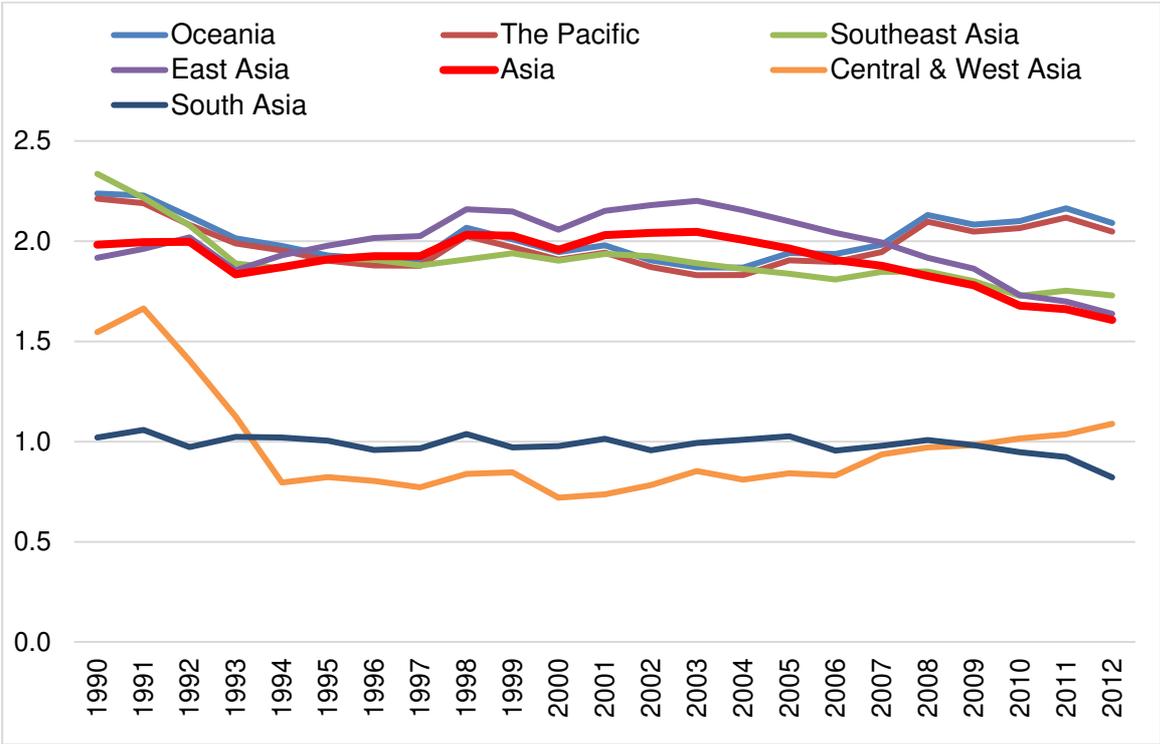
Figure 5 presents the TII of East Asia with Asia and its other sub-regions from 1990 to 2012. TII with Oceania, the Pacific, Southeast Asia and East Asia itself remained around 2 with small fluctuation during the period. Surprisingly, TII for East Asia, and with Southeast Asia is declining since 2003 indicating the reducing relative trading importance with the region. In fact, efforts and discussion of pan-Asian integration are concentrated on Association for South East Asian Nations (ASEAN) plus frameworks that primarily includes China, Japan, ROK and all the economies of Southeast Asia. It is also troublesome that East Asian TII with overall Asia is declining sharply from 2.05 to 1.61 from 2003 to 2012, respectively.

Interestingly, the relative importance of East Asian trade with the Pacific and Oceania is not only remained high with TII more than two since 2007 but also increasing since 2004. Thus, it is worthwhile including these regions in overall Asian integration.

On the other hand, TII value of East Asia remained about one for South Asia until 2008, but declined to 0.82 in 2012. It indicates that East Asia should develop strategies to increase trade with South Asia to increase the gain from pan-Asian integration. It is encouraging for

East Asia that the TII with Central and West Asia is climbed over one in 2010 and sharply increasing since then as well.

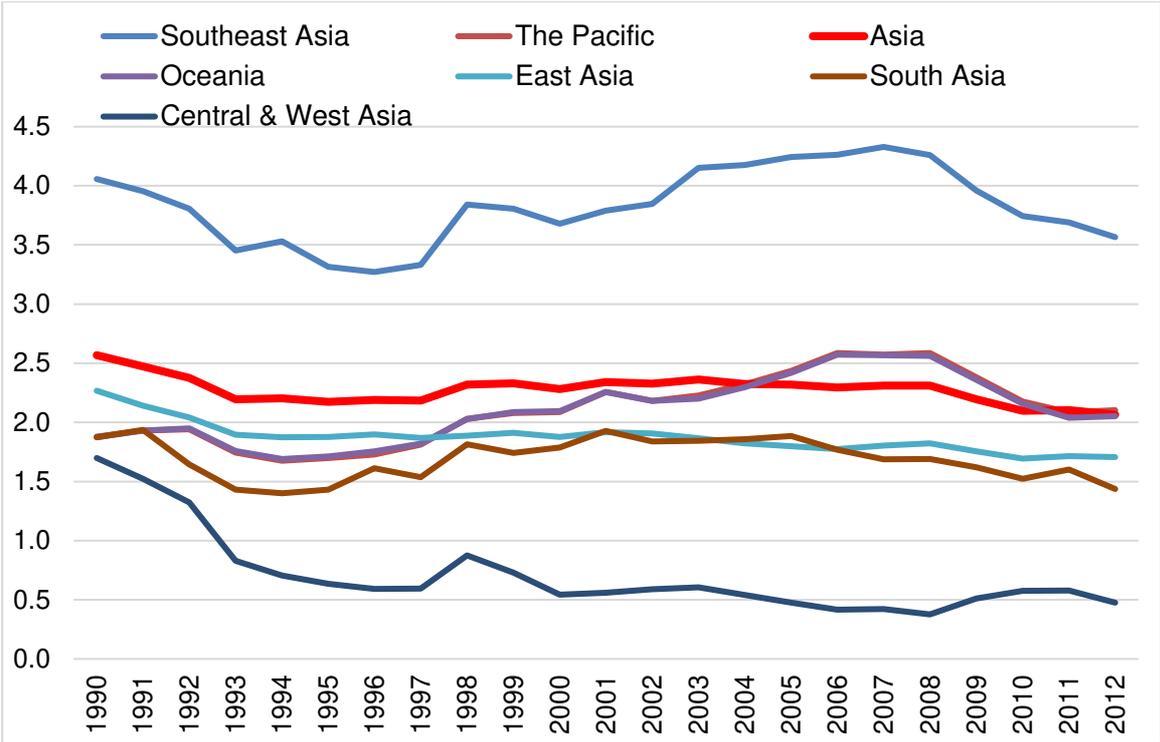
Figure 5. TII of East Asia with other Asian sub-regions, 1990-2012



Source: The author using the data from ARIC Regional Integration Indicator database, available at: <http://aric.adb.org/integrationindicators>, accessed: March 7, 2015.

Figure 6 presents TII of Southeast Asia with Asia and its other sub-regions from 1990 to 2012. TII with the own region, Southeast Asia, remained highest around four, but it fluctuated sharply reaching the lowest of 3.27 in 1996 and reached the highest of 4.33 in 2007. However, it declined sharply since then and reached 3.57 in 2012. TII with East Asia declined from 2.27 to 1.71 during the period. Similarly, TII with South Asia also declined particularly from 2002. Although TII with Oceania increased up to 2006 reaching 2.57, it declined sharply since then. TII with Central and West Asia showed the worst record, which declined from 1.7 to 0.47 during the period. These results indicate that Southeast Asia need to revise its trade policy towards its neighboring regions in Asia if they aspire to be the key player in Asian integration.

Figure 6. TII of Southeast Asia with other Asian sub-regions, 1990-2012

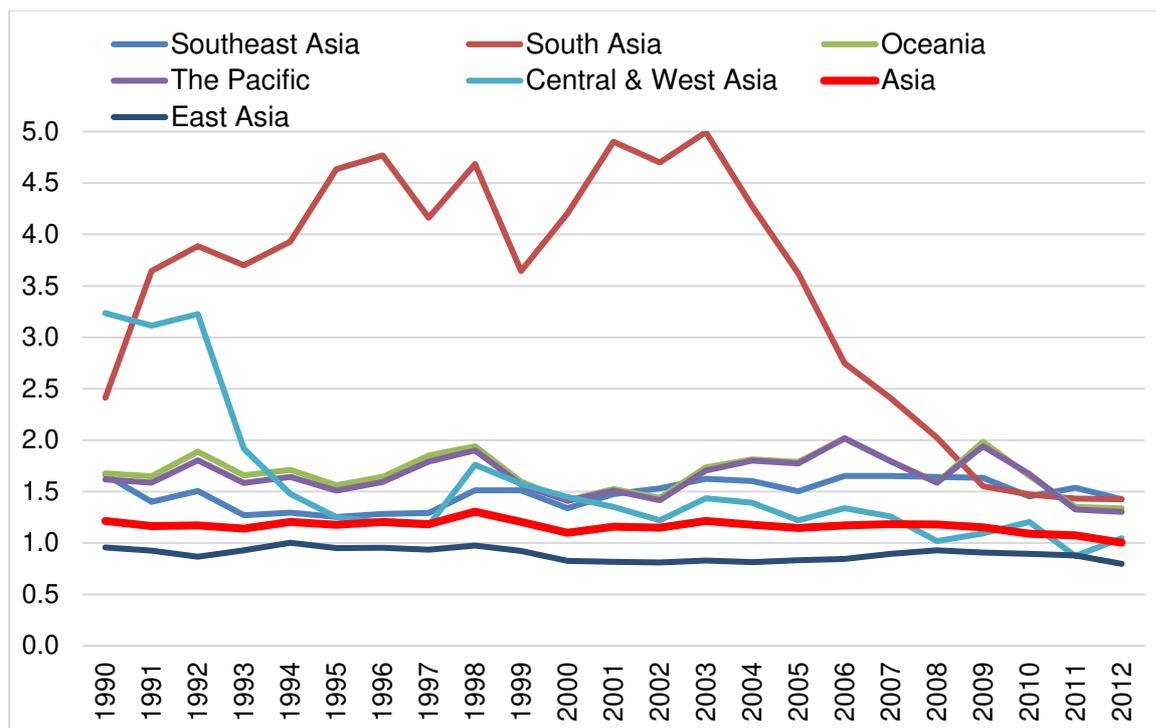


Source: The author using the data from ARIC Regional Integration Indicator database, available at: <http://aric.adb.org/integrationindicators>, accessed: March 7, 2015.

Similarly, although TII with overall Asia remained over two during the period, the trend is declining from 2.57 to 2.07 over the period. It indicates Southeast Asia will face more challenges to play the key role in pan-Asian integration. However, as the most integrated sub-region in Asia with stronger institutional setup compared to other sub-regions, ASEAN is expected to play a key role in the pan-Asian integration process (Kurlantzick 2012).

Figure 7 presents the TII of South Asia with Asia and its other sub-regions from 1990 to 2012. TII with the own region, South Asia, remained highest until 2008 reaching the apex to nearly five but it dropped sharply right after that and reached the lowest point at 1.42 in 2012. The relative importance of trade to East Asia remained at the lowest level, which mostly remained below one, and the trend is declining over the period.

Figure 7. TII of South Asia with other Asian sub-regions, 1990-2012



Source: The author using the data from ARIC Regional Integration Indicator database, available at: <http://aric.adb.org/integrationindicators>, accessed: March 7, 2015.

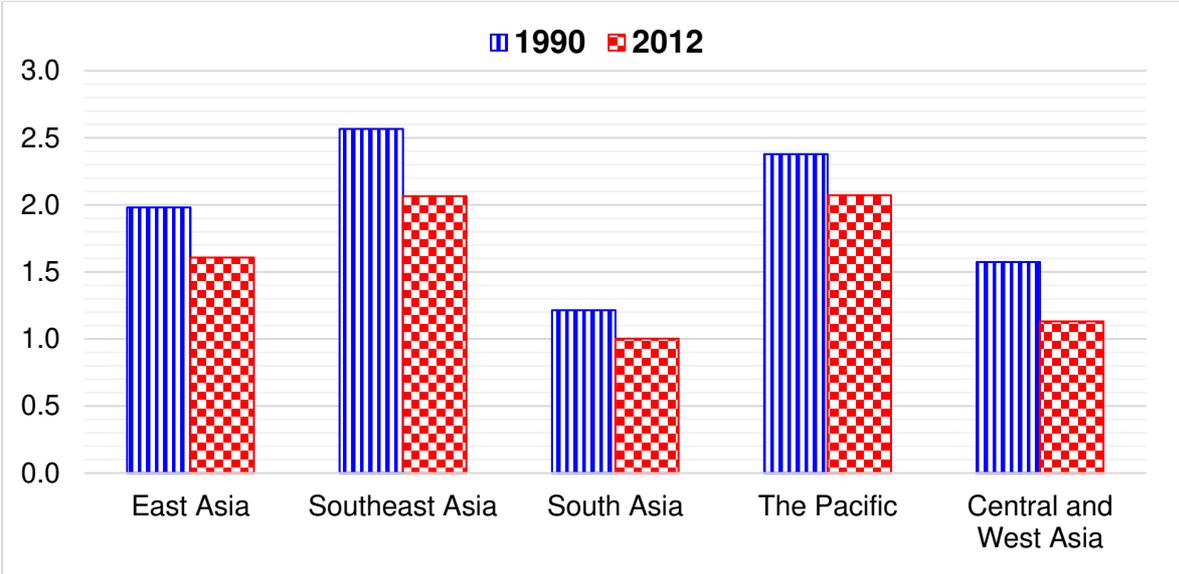
However, the TII value for other regions remained more than one but the trends are declining in general. Similarly, TII with overall Asia declined and remained marginally over one, which was declined gradually from 1.21 to 1.0 during the period. These results indicate that South Asia need to improve its trade policy with its neighboring regions in order to play a significant role in pan-Asian integration.

TII of Central and West Asia, Oceania, and the Pacific are presented in Appendix 2a to 2c. In case of Central and West Asia, TII for South Asia has is more than one since 1990; however, it is declining. TII with the own region, Central and West Asia, remained very high at 24.31 in 1995. However, it continuously declined and reached 7.58 in 2012 (Appendix 2a). TII of Oceania with the Pacific remained highest among with other sub-regions over the period, which reached the top at 7.66 in 1995. However, the trend declined sharply since 2003 reaching 3.88 in 2012 (Appendix 2b). Except for Central and West Asia, TII for other sub-regions is around two over the period indicating the key importance of Asia for the region. A similar trend can be observed for the TII of the Pacific with other sub-regions (Appendix 2c).

In overall, despite having the high importance of trade among sub-regions and the Asia as a whole, the importance is decreasing, which arguably reduces the motives for pan-Asian economic integration. The declining importance can also observe through the declining TII of Asian sub-regions with Asia as a whole as shown in Figure 8.

In order to examine the importance of whole Asian trade with its sub-regions, Figure 9 presents the TII of Asia as a whole with Asia and its sub-regions from 1990 to 2012. Interestingly, the TII for all the sub-regions are more than one, which indicates the greater importance of trade flows with its sub-regions vis-à-vis with the world. Among the sub-regions, TII with Southeast Asia remained highest around 5, but fluctuating in between 4.4 and 5.8 during the period. The Pacific and Oceania follows the similar trend ranging from 2.4 in 1990 to 2.1 in 2012. The similar trends of TII follow with Asia as whole itself and East Asia, which also declined from about two to about 1.6 respectively during the same period. South Asia and Central & West Asia remained at the bottom with TII about one.

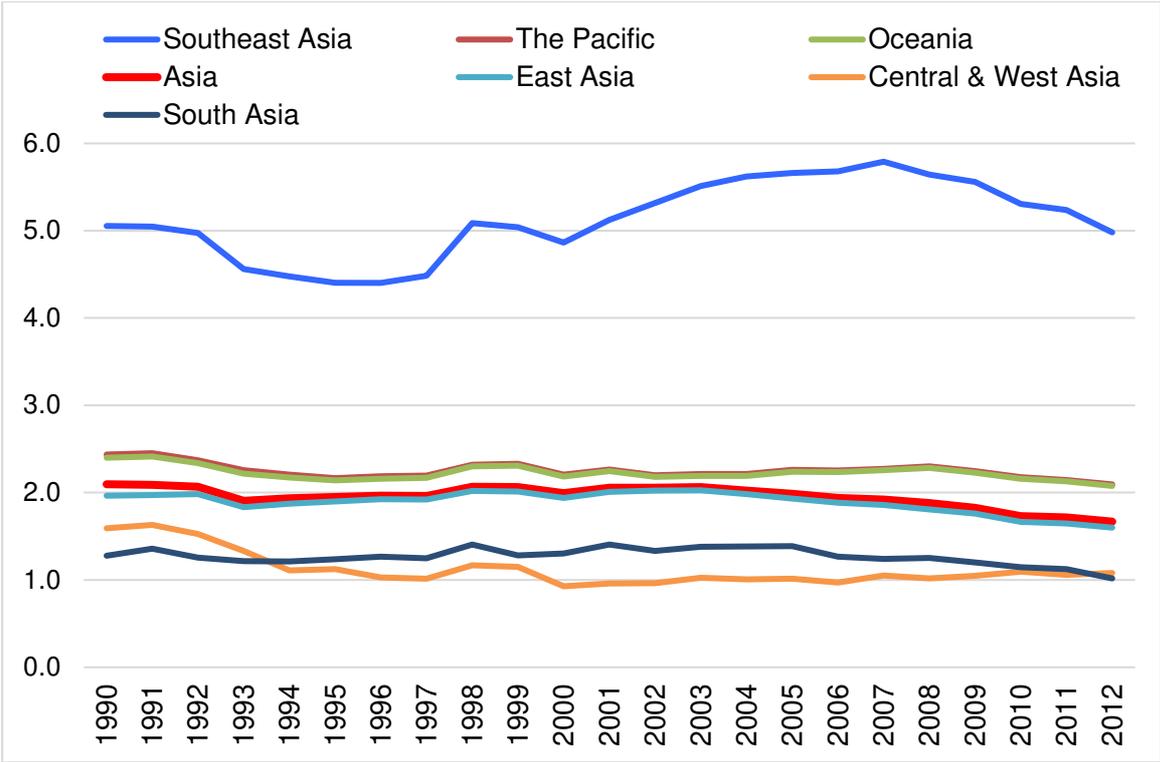
Figure 8. TII of sub-regions with Asia, 1990 and 2012



Notes: There is no data for Oceania

Source: The author using the data from ARIC Regional Integration Indicator database, available at: <http://aric.adb.org/integrationindicators>, accessed: March 7, 2015.

Figure 9. TII of Asia with its sub-regions, 1990-2012



Source: The author using the data from ARIC Regional Integration Indicator database, available at: <http://aric.adb.org/integrationindicators>, accessed: March 7, 2015.

The TII of Asia as a whole to its sub-regions indicates that the relative importance of trade within the region is greater than with the world. A similar conclusion can be drawn from the TII of Asian sub-regions discussed above. These results signify a strong desirability of pan-Asian economic integration, which supports the enormous benefits that showed by many empirical assessments.

However, it is not welcoming results that the TII trends are decreasing for most of the sub-regions, and the Asia as a whole as well. It is more worrisome that the declining trend is sharper in recent years for most of the sub-regions. This might be due to the faster pace of growth in global trade integration compared to the regional trade integration.

Thus, what determines the pace of regional economic integration in general and intra-regional trade, in particular, is one of the main concerns for regional integration efforts. Next section explores major determinants of intra-regional trade in Asia.

3. Determinants of intra-regional trade share

3.1 Model specification

In order to find out the determinants of intra-regional trade share of Asian countries and economies, we employ the dynamic panel data model implemented by Roodman (2005), which is explained in detail by Roodman (2009) in Stata. The intra-Asian trade share of each of the 39 selected countries is the dependent variable.⁹ The annual data from 1990 to 2012 is used which is mainly taken from two online databases namely ADB-ARIC Integration Indicators and the World Development Indicators (WDI).¹⁰ As trade share of each country in Asia changes slowly over time and current level of intra-regional trade share also depends on their past level of intra-regional trade share. Thus, the lagged dependent variable is also included in the explanatory variables as one of the major determinants. However, this creates a dynamic structure of the model hence fixed country effects, and the OLS estimator becomes biased and inconsistent in short panels (Nickell, 1981). In order to overcome such problems, Arellano and Bover (1995) and Blundell and Bond (1998) suggested system generalized method of moments (GMM) estimator (Sapkota 2014). The model is specified as follows:

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

where; Y_{it} represents the dependent variables of country i at year t . Y_{it-1} is one period lag of the dependent variable, X_{it} represents the set of determinants of intra-regional trade share, η_i is the country fixed effect, η_t is the time-varying effect, and ε_{it} is an error term. β_1 and β_2 are the coefficient of each explanatory variable, which are the parameters of interest. α is the constant term. The correlation matrix and the summary statistics of the dependent and independent variables are given the appendix 3a and 3b.

GMM is appropriate for our data for several reasons. Firstly, if the independent variables and the error term " ε_{it} " in the model are not independent, unobserved variables can

⁹ Selected countries are listed in Appendix 1.

¹⁰ The ADB-ARIC Integration Indicators is available at: <http://aric.adb.org/integrationindicators> and the World Development Indicators (WDI) is available at: <http://data.worldbank.org/data-catalog/world-development-indicators>

affect both the outcome variable and independent variable, so the estimated coefficients can be biased. Such problem of endogeneity can be partially solved by controlling fixed effects and time trend, but if some unobserved variable changes over time and across the countries, this problem will remain in the error term. GMM deal with this problem (Blundell and Bond 1998). Secondly, GMM is also appropriate for fixed individual effect (in our case, the country-specific effect), and heteroskedasticity and autocorrelation within individuals but not across them (Roodman 2009).

Several trade-related variables are considered as the major determinants of intra-regional trade share. Apart from the lag dependent variable, we consider each country's number of Free Trade Agreements (FTAs) or Regional Trade Agreements (RTAs), which are in effect with the Asian countries or sub-regions. Although the quality of FTAs and RTAs are different, gravity model revealed that FTAs/RTAs brings trade creation effect, and trade diversion effect is far limited in general (Urata and Okabe 2010). Similarly, countries' trade as a percentage of GDP is considered to examine whether the countries with more trade dependence trade more within the region.

Gross Domestic Product (GDP) in purchasing power parity (PPP) term is considered as one of the determinants of intra-regional trade because the traditional gravity model of trade considers size of economy and distance between trade partners as the major determinants of trade between them (Helpman, Melitz and Rubinstein 2008). It is expected that the bigger economy in Asia trade proportionately more within the region as Thornton and Goglio (2002) found the same in the case of Southeast Asia. The distance is ignored as this study uses intra-regional trade as the dependent variable instead of bilateral or inter-regional trade.

Gross National Income (GNP) per capita is considered another determinant of intra-regional trade share. GNP per capita is one of the widely used measures of the level of economic development, and it is expected to make positive impacts on intra-regional trade (Sharma and Chua 2000).

Similarly, foreign direct investment (FDI) stock as a percent of GDP is considered as another determinant. The literature, including Bilas and Franc (2010), suggest that the foreign

capital creates dynamic, positive effects on regional economic integration. In addition, mobile cellular subscriptions (per 100 people) is included because mobile technology boost environment for international interaction and networking that helps to increase intra-regional trade (Bankole, Osei-Bryson and Brown 2013).

We also include urban population growth as a prospective determinant of intra-regional trade. Brakman and Marrewijk (2013) suggest that trade patterns may also depend on the level of urbanization between countries. Finally, value added from the service sector to GDP is considered as another determinant. As the service sector contribution to GDP increase along with human resource and other forms of development (Wagner 2012), service sector growth is expected to generate a positive effect on intra-regional trade.

System GMM uses a large matrix of available instruments and weights them properly to overcome endogeneity problem. We assumed only trade-related variables, such as lag dependent variable, total trade as percentage of GDP, and number of FTAs as endogenous variable, and used as *gmmstyle* instruments in *xtabond2* command in Stata as suggested by Roodman (2009). Rests of the variables are used as *ivstyle* instruments. The Sargan/Hansen test supports the joint validity of the instruments.

3.2 Results and Discussion

Table 1 presents the results. The asterisk (*) indicates the level of significance, where one asterisk (*) means 10% level of significance, two asterisks (**) means 5% level of significance, and three asterisks (***) means 1% level of significance. No asterisk means no significant effect. The sign of the coefficients indicates the direction of effect.

Among the trade-related variables, lag dependent variable and number of FTAs/RTAs are found highly significant at one percent level to increase intra-regional trade share of countries in Asia. While it is intuitive that past level affects the current level of intra-regional trade, the positive and significant effect of FTAs is consistent with the existing literature as Baier and Bergstrand (2007) empirically argued that bilateral FTA approximately doubles the trade between the members. Ghosh and Yamarik (2004) also found the trade-creating effect

of RTAs as well. However, total trade and service sector value added both as a percent of GDP are found insignificant indicating that the trade dependence and service sector growth do not affect intra-regional trade. The reason behind these results needs further investigation.

Table 1. Determinants of intra-regional trade in Asia, 1990-2012

Dynamic panel-data estimation, two-step system GMM

Dependent variable: intra-regional trade with whole Asia (%)

Explanatory variables	
Trade Share (%) with the partner to whole Asia in prev. year	0.402*** (0.035)
Trade (% of GDP)	0.003 (0.009)
Number of FTAs/RTAs with Asian countries or sub-regions	0.476*** (0.133)
Log of GDP, PPP (current in Billions \$)	-2.240*** (0.217)
Log of GNI per capita, Atlas method (current US\$)	2.161*** (0.444)
FDI stock (% of GDP)	0.022*** (0.005)
Mobile cellular subscriptions (per 100 people)	0.014* (0.007)
Urban population growth rate (annual %)	3.213*** (0.254)
Services (% of GDP)	0.009 (0.033)
Constant	16.38*** (4.709)
Observations	858
Number of countries	39

Notes: *** p<0.01, ** p<0.05, * p<0.1; Standard errors in parentheses; all data are annual. GDP and GNI per capita are in natural logarithm, because these two variables are in natural numbers, not in percent form.

Source: Data for dependent variable, FDI stock and number of FTAs/RTAs of all countries are taken from ARIC Regional Integration Indicator database of the Asian Development Bank available at: <http://aric.adb.org/>. Data for the remaining variables (except for Taiwan) are taken from the World Bank's WDI online database, available at: <http://databank.worldbank.org/Data/Databases.aspx>. Data for Taiwan are taken from the ADB's Statistical Database System available online at: <https://sdfs.adb.org/sdfs/index.jsp>.

The level of development measured by the log of GNI per capita is highly significant to increase intra-regional trade. It indicates that countries level of development boosts their trade capacity. However, the size of the economy measured by the log of GDP has significant negative impact on intra-regional trade in Asia. It captured the fact that bigger economies, such as China, trade more outside Asia than inside the region (Gaulier, Lemoine and Deniz 2007).

FDI, measured as the percent of GDP, is also highly significant to increase intra-regional trade in Asia. It is consistent with the existing literature that FDI has been instrumental for production fragmentation especially in East and Southeast Asia, which contributes increasing trade of parts and components within the region (Fukao, Ishido and Ito 2003).

Similarly, technological advancement also has significant positive impact on intra-regional trade. The results show that mobile cellular subscription per 100 people is significant at 10% level to increase intra-regional trade in Asia. The result is consistent with the recent findings of Bankole, Osei-Bryson and Brown (2015) as they found a significant positive impact of ICT on intra-African trade. Moreover, we found a significant positive impacts of urbanization measured by urban population growth on intra-regional trade in Asia. Urbanization can contribute intra-regional trade through increasing cross-border movement of people (Skeldon 2006) and promoting international networks (Smart and Smart 2003). Thus, results are firmly consistent with the existing literature.

4. Conclusion

In the context of growing interest and efforts on pan-Asian integration, this paper examines the trends of pan-Asian intra-regional trade by countries/economies and by sub-regions. ADB's ARIC database revealed that despite the rapid increase in intra-Asian trade volume of all countries from 1990 to 2012, the trends of intra-regional trade share are found different for different countries. For instance, during the same period, intra-Asian trade share increased significantly for Taiwan from 42.79% to 64.41% and for Japan from 34.38% to 53.95%. The intra-Asian trade share is moderately increased for India from 22.03% to 31.13% during the

period. However, some countries intra-Asian trade even declined considerably, such as China from 59.9% to 40.5% during the period. These mixed results indicate that countries in the region are functioning independently, and stronger economic tie is yet to build. Furthermore, despite institutionalized regional integration efforts within the Asian sub-regions, the importance of trade within the region is declining for all the sub-regions in Asia (Figure 8). It indicates that as countries trading capacity grows they tend to trade globally rather than regionally. This is also the impact of open regionalism that all the regional integration institutions in Asia are following.

Employing the dynamic panel data approach, this paper also found that FTAs/RTAs are one of the main determinants of growing intra-Asian trade share. Other determinants are countries' level of economic development, FDI stock, urban population growth and access to ICT. Thus, it is argued that active participation in FTAs/RTAs, open FDI policy, urbanization and technological development of Asian countries create enabling environment for pan-Asian economic integration.

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[Appendices follow]

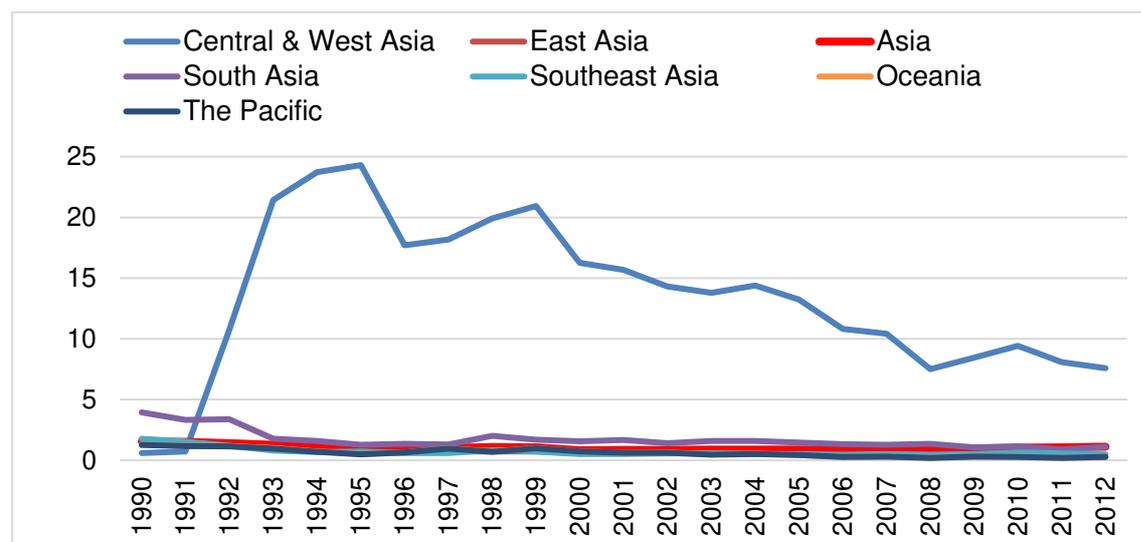
Appendices

Appendix 1. List of countries (underlined included in the analysis) with sub-regional grouping as per the ADB

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

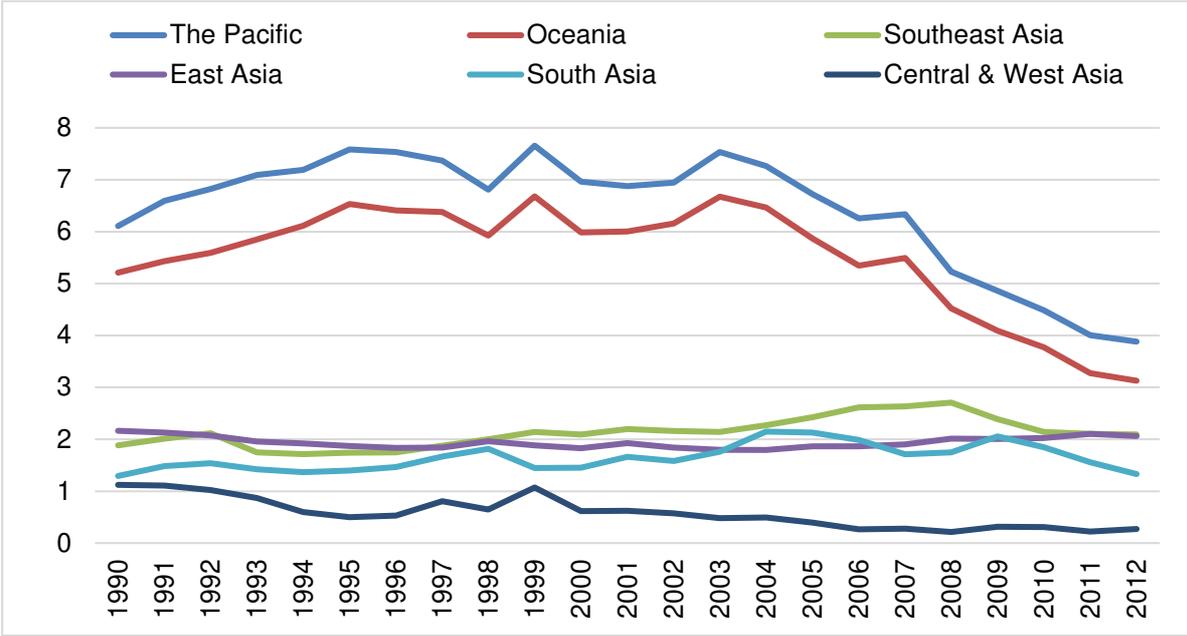
Source: Integration Indicators groupings of ADB's ARIC database, available at <http://aric.adb.org/integrationindicators/groupings>, accessed: March 17, 2015.

Appendix 2a. TII of Central and West Asia with other Asian sub-regions, 1990-2012



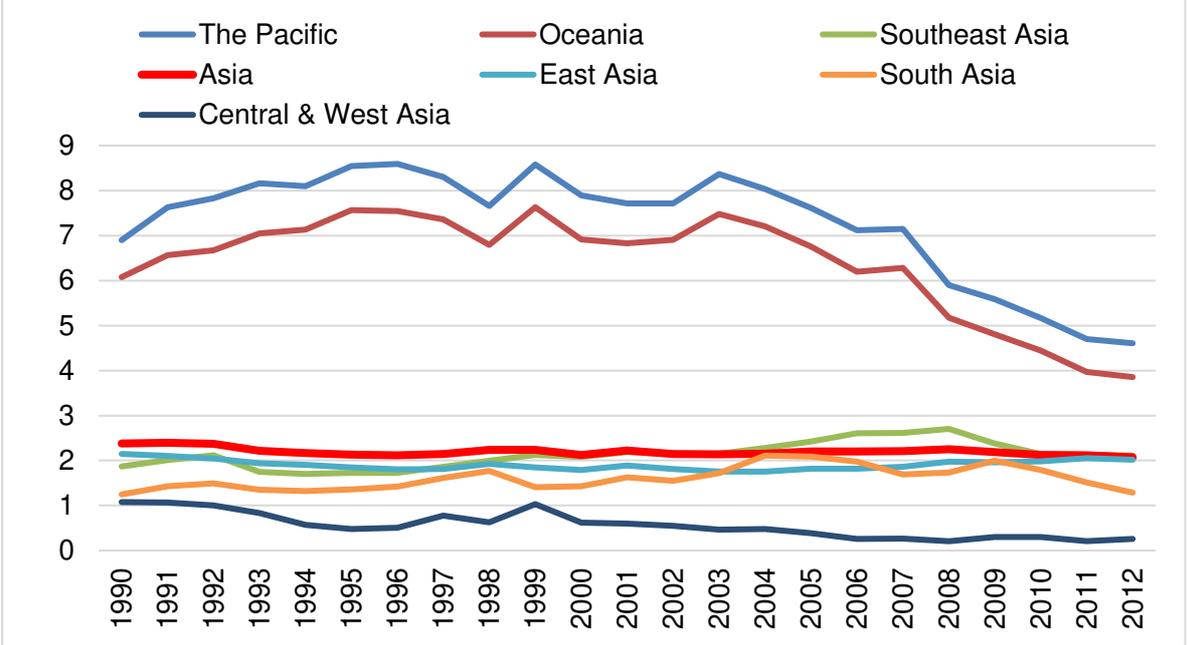
Source: The author using the data from ARIC Regional Integration Indicator database, available at: <http://aric.adb.org/integrationindicators>, accessed: March 7, 2015.

Appendix 2b. TII of Oceania with other Asian sub-regions, 1990-2012



Source: The author using the data from ARIC Regional Integration Indicator database, available at: <http://aric.adb.org/integrationindicators>, accessed: March 7, 2015.

Appendix 2c. TII of the Pacific with other Asian sub-regions, 1990-2012



Source: The author using the data from ARIC Regional Integration Indicator database, available at: <http://aric.adb.org/integrationindicators>, accessed: March 7, 2015.

Appendix 3a: Correlation Matrix

	tras	trade	ftas	gdp	gnipc	fdi	mob	pop	ser
Intra-regional trade in Asia (tras)	1								
Trade (% of GDP)	0.17	1							
No. of FTAs/RTAs within Asia (ftas)	-	0.07	1						
GDP, PPP (current in Billions \$) (gdp)	-0.12	-0.17	0.26	1					
GNI per capita, (current US\$) (gnipc)	0.15	0.28	0.19	0.20	1				
FDI stock (% of GDP) (fdi)	0.20	0.73	0.14	-0.09	0.47	1			
Mobile subscriptions (per 100 people) (mob)	0.14	0.32	0.47	0.15	0.54	0.49	1		
Urban population growth (annual %) (pop)	0.38	0.03	-0.13	0.03	-0.19	-0.10	-0.13	1	
Services value added (% of GDP) (ser)	0.14	0.13	0.02	0.10	0.45	0.32	0.40	-0.20	1

Source: Data for Intra-regional trade in Asia, FDI stock and number of FTAs/RTAs of all countries are taken from ARIC Regional Integration Indicator database of the Asian Development Bank available at: <http://aric.adb.org/>. Data for the remaining variables (except for Taiwan) are taken from the World Bank's WDI online database, available at: <http://databank.worldbank.org/Data/Databases.aspx>. Data for Taiwan are taken from the ADB's Statistical Database System available online at: <https://sdbs.adb.org/sdbs/index.jsp>.

Appendix 3b: Summary Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
Intra-regional trade in Asia	897	54.636	21.161	2	95.171
Trade (% of GDP)	897	93.759	72.416	0.1	449.99
No. of FTAs/RTAs within Asia	897	2.295	2.210	0	13
GDP, PPP (current in Billions \$)	897	467.488	1305.829	0.22	14790.12
GNI per capita, (current US\$)	897	5981.52	10276.17	110	59770
FDI stock (% of GDP)	897	32.932	57.939	0	579.78
Mobile subscriptions (per 100 people)	897	29.753	42.065	0	229.24
Urban population growth (annual %)	897	2.291	1.861	-3.103	10.92797
Services value added (% of GDP)	897	47.980	15.349	6.7	93.115

Source: Data for Intra-regional trade in Asia, FDI stock and number of FTAs/RTAs of all countries are taken from ARIC Regional Integration Indicator database of the Asian Development Bank available at: <http://aric.adb.org/>. Data for the remaining variables (except for Taiwan) are taken from the World Bank's WDI online database, available at: <http://databank.worldbank.org/Data/Databases.aspx>. Data for Taiwan are taken from the ADB's Statistical Database System available online at: <https://sdbs.adb.org/sdbs/index.jsp>.