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Transaction Costs as Barriers to Economic Integration in Asia: An Empirical Exploration

Prabir De*

Abstract: Recent literature has emphasized the importance of transaction costs and infrastructure in explaining trade, access to markets, and regional cooperation under globalization. For most Asian countries, transaction cost works as a strong barrier to trade integration than import tariff. By estimating a structural model of economic geography using cross-country data on income, infrastructure, transaction costs and trade of selected Asian economies, this paper provides evidence that transaction cost is statistically significant and important in explaining variation in trade in Asia. In addition, the study also finds that port efficiency and infrastructure quality are two important determinants of transaction costs.

1. Introduction

Economies, societies, regions and industries around the world have been fast integrating themselves into the world economy in an unprecedented way during last 15 years than ever before. Not only commodities but also factors of production (capital, labour and materials) and services are becoming more and

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more mobile internationally. Lester Brown's prophesy of a "borderless world" has become an economic reality. If any economy fails to provide a competitive and decent economic environment, it's most cherished human resources along with capital will eventually flight out. In this sense, globalization means increasing access to world resources. It also means "competition" in a world economy. In quantitative terms, it speaks of the "outward orientation" of an economy. In other words, the higher the ratio between trade and GDP, the higher the "openness" or globalization of an economy in contemporary vocabulary.

Integration is the result of reduced costs of transportation in particular and other infrastructure services in general. This is particularly applicable to the case of trading for the vast mass of developing countries. It is directly beneficial to those industries which are efficient; indirectly, it also creates a positive growth chain through higher productivity thereby generating many new economic activities in the domestic economy. In an economy-wide sense, it may work as a poverty removal process too. But in order to reap the benefits of globalization in the present "borderless" world, no country can afford to relax on the overhead development of the chain of necessary infrastructure facilities starting from the production point leading to the shipment point.

Success of globalization in 200 sovereign countries of very diverse dimensions remains to be attained in full.[1] But the process initiated during last decade has explicitly given rise to growing regionalization in all regions of the world with varying success. The growth of regionalism has been one of the major developments in international relations in recent years; all countries are now members of at least one bloc and many belong to more than one.[2] In general, regionalism has shared an objective to reduce trade barriers – quantitative and qualitative. It has moved away from closed model to more open model encouraging greater international commerce rather than controlling it by way of less and less tariffs and quotas. ASEAN is an example of such dynamism. In recognition of importance of faster trade, transport bottlenecks have been narrowing in regional groupings leading to "deep integration" of the economies concerned. Progress made so far in EU is a bright example of such integration in connectivity. Nonetheless, we have found equality in some regionalism, where developed countries and developing countries are equal partners. NAFTA is a case in point of such development.

There are some studies which show that rising regionalism is nothing but marching towards globalism. Okita (1989) spoke eloquently for the inter-dependence of globalism and regionalism. Regionalism has long history and has been around for hundreds of years.[3] In other words, regionalism is part of the process of globalization: a sort of sub-grouping in the broader road towards supra-national integration.

The survival and apparent success of the European Economic Community (EEC) led to a spurt of regionalism between developing countries in the 1960s. Experience with intensive economic cooperation in Asia has never been as rich as we had seen in the case of European Union (EU).[4] At one extreme is EU with a history of complete economic integration, and at the other is Asia with virtual isolation till recently. The spectrum in between is filled by NAFTA, MERCOSUR, CARICOM, SADC, and ASEAN on the progressive side, SAARC, GCC, and CACM on the static side. Naturally, therefore, the world is faced with various types of trade integration such as multilateralism (WTO), regionalism (ASEAN), bilateralism (NAFTA), and in most cases there are overlapping of activities and responsibilities. Quite naturally, objective of free trade has not yet been met with equal intensity across all the major economic regions of the world. In what follows are three important factors, viz. income, infrastructure (including transaction cost) and trade, which have contributed to globalization and specifically to economic integration process in Asia. Globalization is the other name of integration – economic and otherwise. Regional integration is a long-standing concern for Asia.

1.2 Regionalism in Asia

Regionalism in Asia was never as intense as we have seen in Europe. Combined with the pull-factor of successful industrialisation at an accelerated rate for the select group of East Asian economies beyond Japan since the 1970s, plus normalization of the economic relationship with the China in 1970s, and the push factor of EEC, several countries in Asia formed the Association of Southeast Asian Nations (ASEAN) and Asia-Pacific Economic Cooperation (APEC) in 1967 and 1989 respectively. While ASEAN was formed basically due to political compulsions, formation of APEC was mostly based on cohesive trading unity. Down the line, we have seen ASEAN has succeeded in opening a free trade area while APEC has little to its credit in terms of accomplishment even for the effective promotion of an intra-APEC free trade regime (Dutta, 2002). In the same direction, although much late of ASEAN and APEC, South Asian countries formed the South Asian Association

for Regional Cooperation (SAARC) in 1985, only in early 2004, SAARC countries agreed to set up a free trade area with effect from 2006.[5] Regionalism in Asia got further momentum since the 1997 East Asian crisis broke out, and with its varying manifestations regionalism is on the path of rapid spread in Asia.[6] In spite of accession to WTO, countries in Asia are moving with regionalism for closer economic and trade cooperation.

To promote a pan-Asian regionalism, which is quite similar to pan-European experience, there is an urge for systematic development of Asia through Asian Economic Community (AEC), which has for some time been an important consideration for policy makers of many Asian countries.[7]

In spite of having a spread of regionalism of very diverse dimensions in Asia, economic welfare remains to be attained in full. Today, Asia shares 16 per cent of world surface area (22 million sq. km.) which contains half of the world population (3.2 billion in 2001) and one third of the world poor (1.2 billion in 2001).[8] In sharp contrast, Asia produces only 7 per cent of world output, and an Asian citizen earns on an average only 26 per cent of what a rest of world national earns. Yet, it is not easy to think of another region of the world which can surpass Asia in terms of resource endowments - natural and otherwise.[9] Notwithstanding its vast advantages of resource endowments, in terms of per capita income, Asia, on the whole, is still running far behind the developed world in terms of economic wellbeing. Economic disparity among the regions across the world is a common phenomenon but the same also prevails with varied intensity within Asia. For instance, people of South Asia earn much less than what a national from the rest of Asia earns. In terms of social development indicators, South Asia's performance happens to be poor and static; what is more, it has been hovering around the same socio-economic position for a long period of time (Srinivasan, 2002; De and Ghosh, 2003). At the same time, Asia contains world's progressive and developed countries (frontier countries) such as Japan, Singapore and South Korea. Naturally, therefore, one finds regional disparity within Asia: One group of countries is attached with rising hinterland and thereby enjoying rising wealth whereas other group is endowed with relatively poor resources thereby facing burden of inertia in the era of globalization.

Despite the rising levels general prosperity observed in some of the countries in Asia, many changes are taking place which are reshaping

regional integration in Asia in many ways. The real problem that most of the Asian countries are faced with is very much economic in nature: how to ensure best trade for all the countries in the region which are willing to share the benefits of trade. Even the countries which are bound by the same land mass have utterly failed to take advantage of the wave of globalization, though it must be admitted that the Asian environment has become many times more conducive now than what it was a decade ago.The wave of globalization appears to be blowing in Asia.

Another reason for focusing on Asia is also pressing if we look into the region's trade coverage. When most of the Asian economies – either through AFTA (ASEAN Free Trade Area) or through SAFTA (South Asian Free Trade Area) or combination of both[10]-are planning to promote intra-regional trade, integration of the whole region is limited by lack of an integrated and improved transport system – the life blood of the process of globalization in tangible goods. Moreover, given the socio-cultural homogeneity and vast resources of the region, an improved and integrated regional integration process for the whole of Asia is expected to boost up the intra-regional trade when most of the economies have been growing at faster rate during the last few years. Working together for the improvement of infrastructural facilities, an essential element to promote intraregional trade, will pave the way for the region's international market access and through this to higher income.

Although the systematic development of Asia through AEC has for some time been an important consideration, there is clear lack of broader policy framework which is required for long term strategy. Moreover, there is dearth of studies to establish an appropriate causality of factors required for policy framework. The question then arises: how do the non-price determinants of international trade such as infrastructure and transaction costs affect integration of AEC?

To find out the answer to above question, we use a gravity model of trade, controlling for geographic, economic, political factors, transaction costs, and free trade regime coordination. The paper is organized as follows. Section 2 deals with data and methodology. In section 3, we present income, infrastructure and trade profiles of selected Asian economies. Section 4 deals with the gravity results. We seek to establish that improvements in the trading infrastructure can dramatically increase trade in AEC. Section 5 concludes and summarizes our main findings.

2. Data and Methodology

Since its inception in 1940s[11], the Gravity model has been used extensively in social and behavioural sciences. In analogy to the Newtonian gravity model, James Q. Stewart (1947, 1948) found strong correlations for traffic, migration, and communication between two places, based on the product of the population size and inversely related to their distance squared. This model became popular in the hand of Jan Tinbergen (1962) when it was applied to international trade.[12] Since then the gravity equation has become a standard analytical tool for prediction of bilateral trade flows with simultaneous development of its theoretical discourse.[13] Despite a wide range of theoretical derivations of the gravity equation, the majority of the authours do not model transport costs explicitly, exceptions being Bergstrand (1985, 1989), Deardorff (1998), Limao and Venables (2001), Fink *et al.* (2002), Clark, Dollar and Miucco (2004), and Redding and Venables (2004). However, except Limao and Venables (2001), none has incorporated both transport infrastructure and transport costs in the model. More recently, Bougheas *et al*. (1999) have incorporated transport infrastructure in a two-country Ricardian framework and shown the circumstances under which it affects trade volumes.[14]

The classical gravity model relates the size of the international trade flows to the economic size of a pair of countries and their distance in terms of the following multiplicative forms:

$$T_{ij} = CY_i^{\theta 1} Y_j^{\theta 2} D_{ij}^{\theta 3} e_{ij} \qquad (1)$$

where T_{ij} is the international trade flow from country i to country j, C is the constant term, Y_i is the income level of the origin country, Y_j is the income level of the destination country, D_{ij} is the distance between the two countries, e_{ij} is an error term.

We analyse the aforesaid gravity model extended to use data on trade, distances, gross domestic product (GDP), per capita GDP, infrastructure, openness, export and import duties, and exchange rate for 15 Asian economies, viz. Brunei, Cambodia, China, Hong Kong, India, Indonesia, Japan, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, South Korea, Thailand, and Vietnam, which jointly represents ASEAN+4.[15] For the sake of our analysis, we term these countries as AEC.

Bilateral trade data are collected from various issues of *Direction of Trade Statistics Yearbook* (DOTS) of International Monetary Fund (IMF). This dataset

is supplemented, as and when required, by ASEAN trade data.[16] Data on GDP, population, and infrastructure are collected from *World Development Indicators (WDI)* CD ROM 2003 of World Bank.[17] Asian Development Bank's *ADB Key Indicators 2003* was also used as and when felt necessary.[18] In case of calculation of distance between countries, we have used two methods – (a) 'capital to capital' distance using the longitude and latitude when countries share common land border such as Cambodia and Lao PDR,[19] and (b) 'port to port' distance for the rest.[20].

We have also considered inter-country transaction costs, represented by the difference of CIF (cost, insurance and freight) and FOB (free on board) values which are reported in DOTS of IFS, using equation (2).[21] Thus the transaction cost framework is as follows:

$$TC_{ijt} = \left(IM_{ijt} \Big/ EX_{jit} \right) - 1 \qquad (2)$$

Where TC_{ijt} represents transaction costs between country i and j for the period t, IM_{ijt} stands for import (cif price) of country i from country j for the period t, EX_{jit} denotes export (fob price) of country j to country i for the period t. This means that the same items from reverse directions are considered for accounting purpose.

For country characteristics, we have focused on geographical and infrastructure measures. The main geographical measure relating to international trade is whether the countries in trading share common land border. To assess impact of transport infrastructure facilities on bilateral trade, we have constructed transport infrastructure index (TII), comprising rail, road, air and port facilities for each individual country using principal component analysis.[22] Briefly, the TII is a linear combination of the unit free values of the individual facilities such that

$$TII_{ij} = \sum W_{kj} X_{kij} \qquad (3)$$

where TII_{ij} = transport infrastructure development index of the i-th country in j-th time, W_{kj} = weight of the k-th facility in j-th time, and X_{kij} = unit free value of the k-th facility for the i-th country in j-th time point. In subsequent regressions, we prefer to take an inverse measure of TII so that an increase in TII is expected to be associated with an increase in the TC, and vice versa.[23]

To assess impact of exchange rate on trade, we have considered the standard deviation of the bilateral annual official exchange rates for the previous three years as the measure of exchange rate volatility. Besides, openness (as the ratio of trade and GDP) and export and import duties on traded goods were also incorporated into the analysis.

The dataset includes bilateral trade between 15 Asian economies for the year 1999 to 2001. Given the dataset, there are 210 pairs of unidirectional trade and 17 variables (excluding two dummies) which make the dataset as 3570 pooled observations.[24] In order to understand the effects of common border (land) and regional and/or bilateral preferential and/or free trade agreements, we have included two dummies, viz. common border dummy and free trade dummy.

2.1 The Model

Instead of looking directly at trade costs, we look at the trade flows they support by estimating a gravity model including income, infrastructure and host of institutional and economic variables as reported above. There are two important reasons for doing this. First, the variables are identified keeping in mind their importance in influencing bilateral trade. Second, we can estimate elasticity of trade flows with respect to all exogenous variables. Although the gravity equation is the standard analytical framework for the prediction of bilateral trade flows, we restrict ourselves only to comparative static policy simulation rather than extending it for forecasting purposes. The gravity equation which we have estimated in log-linear form is as follows:

$$\begin{aligned} \ln IM_{ij} = a_0 + a_1 \ln GDP_i + a_2 \ln GDP_j + a_3 \ln GDPPC_i + a_4 \ln GDPPC_j + \\ a_5 \ln TII_i + a_6 \ln TII_j + a_7 \ln ONS_i + a_8 \ln ONS_j + a_9 \ln TC_{ij} + \\ a_{10} \ln IMD_i + a_{11} \ln EXD_j + a_{12} \ln ERV_i + a_{13} \ln ERV_j + \\ a_{14} \ln D_{ij} + a_{15} CB_{ij} + a_{16} FTA_{ij} + e_{ij} \end{aligned} \quad (4)$$

where i and j are importing and exporting country respectively, IM_{ij} represents import of country i from country j, GDP is country's gross domestic products, taken at current US $, GDPPC stands for country's per capita gross domestic products, considered in current US $, TII represents country's transport infrastructure index, ONS is country's openness, measured in terms of trade as percentage of country's GDP, TC stands for transaction costs for bilateral trade between countries i and j, IMD and EXD stand for country's import and export duties respectively, calculated separately as percentage of country's total tax

revenue, ERV is exchange rate volatility, D_{ij} is the distance between countries i and j, and e_{ij} is error terms. CB_{ij} stands for common border dummy for bilateral trading between countries i and j (=1 for having land border, 0 otherwise) whereas FTA_{ij} represents Free (preferential) Trade Agreement dummy between countries i and j (=1 for having free or preferential trade agreement, 0 otherwise).[25]

3. Income, Infrastructure and Trade in AEC

3.1 Inequality in Income

There is wide consensus among the proponents of free trade that in the absence of economic regionalization, the paradigm of globalization is likely to be operationally dysfunctional; a small subset of economies commands much larger shares of world output and trade while a large number of economies have rather marginal shares in world output and trade. So, disparity prevails in economy, trade, society and life. This is not desirable from either point of view. An integration process among different economies must reduce disparity among its members over time and space (Georgakopoulos *et al*., 1994). Before we comment whether or not the AEC integration process will bring equality among its partners, we better look into the present economic structure of the members of selected Asian economies. Let us turn to Table 1.

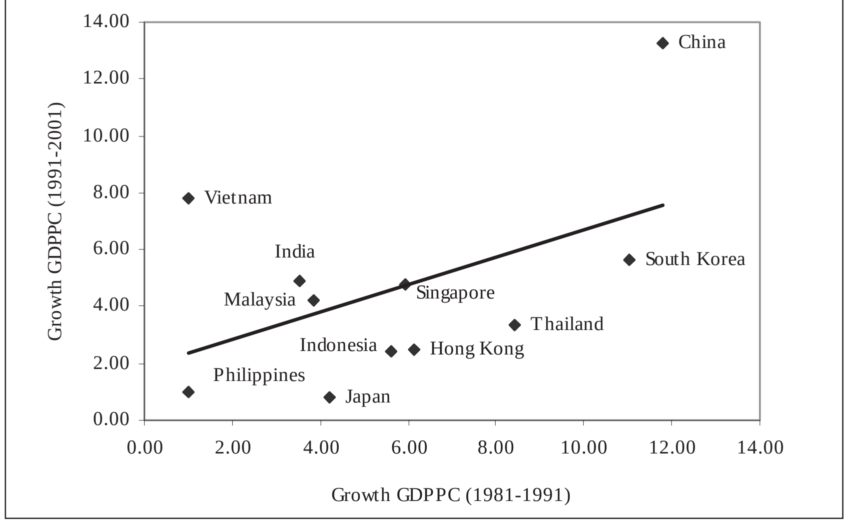
The population dynamics has very nice properties for these economies as can partly be seen from Table 1. Both rising population with resource (man made) limitations and decreasing/static population with abundant resources have been termed as 'threat' towards growth of an economy. The same is reflected here. Interestingly, countries which have registered de-growth in population have been faced with low growth of their economies and thereby income over time. While this may not be unquestionably true across board for most of the countries in Asia, interestingly, this is highly acceptable for the developed economies such as Japan and South Korea. In general, Asia has registered lower growth of population rate during the decade from 1991 to 2001 compared to the previous decade; overall population growth rate has come down from 1.86 per cent to 1.41 per cent. Except Singapore, rest 14 members of AEC have registered lower population growth rate in 1990s, whereas, at the same decade, average per capita income of AEC was grown by lower rate (4.19 per cent) than that of 80s (5.25 per cent). Except China, India, Malaysia and Vietnam, per capita income of rest of the AEC members has registered lower growth rate during this period. Thus, those countries which are placed above the fitted line in Figure 1 appear to have been the newly rising nations in Asia.

Table 1: Population and Income

Countries	Population Density (Pop./Sq. Km)	Population Growth Rate[1] (%)		GDP Per Capita Growth Rate[2] (%)	
	2001	1981-1991	1991-2001	1981-1991	1991-2001
Brunei	60	3.29	2.99	na	0.58
Cambodia	68	3.54	3.00	na	2.69
China	133	1.58	1.05	11.79	13.28
Hong Kong	6238	1.24	1.69	6.12	2.51
India	314	2.33	1.91	3.51	4.89
Indonesia	110	1.98	1.53	5.60	2.44
Japan	336	0.53	0.25	4.22	0.82
Lao PDR	23	2.99	2.75	na	4.65
Malaysia	72	3.23	2.76	3.84	4.19
Myanmar	71	1.98	1.72	na	na
Philippines	261	2.69	2.54	-1.04	0.99
Singapore	6663	2.38	3.17	5.95	4.79
South Korea	477	1.17	0.94	11.04	5.66
Thailand	119	1.84	0.84	8.44	3.36
Vietnam	240	2.35	1.76	1.02	7.79
Average AEC	169	1.86	1.41	5.25	4.19

Notes: [1] Average annual. [2] GDP Per Capita taken at constant 1995 US $ [3] na means not available
Data Source: *World Development Indicators 2003 CD ROM*, World Bank.

Figure 1: Decadal Growth Rates of GDP Per Capita



Note: GDP Per Capita taken at constant 1995 US $.

Figure 1 also brings enough justification for opening a regionalization process for the entire Asia. In last two decades, only four countries, viz. China, India, Malaysia and Vietnam, have done well in raising their per capita incomes. Interestingly, these are the nations (except Malaysia) along with Cambodia, Lao PDR and Myanmar who happen to be relatively poor compared to the rest. Hence the emerging tendency coming out of Figure 1 is a bit encouraging for Asia's economic future.

In Figure 2(a, b), we present evidence on the lack of heavy cross-country convergence in these economies. From the first diagram it appears to be quite obvious that the relative positions of these countries have not changed at all over last three decades. In terms of cross-country growth experiences as discoursed by Barro and Sala-i-Martin (1995), this phenomenon has tremendous economic implications for Asian economic cooperation. For the simplest test of such phenomenon let us turn to Figure 2 (b) which presents base period GDPPC and long period growth rates of GDPPC. As is obvious from this figure, divergence is not the general outcome for the economies under discussion with Japan and China taking the two clear extremes in a very understandable way like a European cluster. Moreover, South Korea, Singapore and Hong Kong take the

Figure 2(a): Income Inequality in AEC: 1971-2001

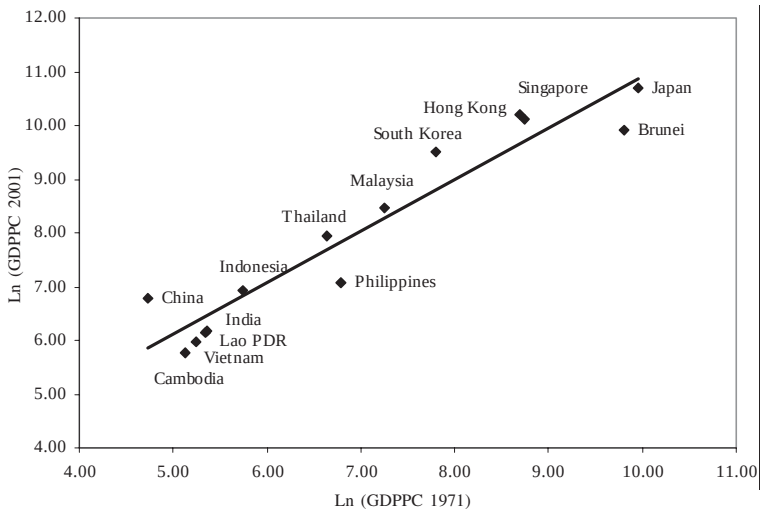
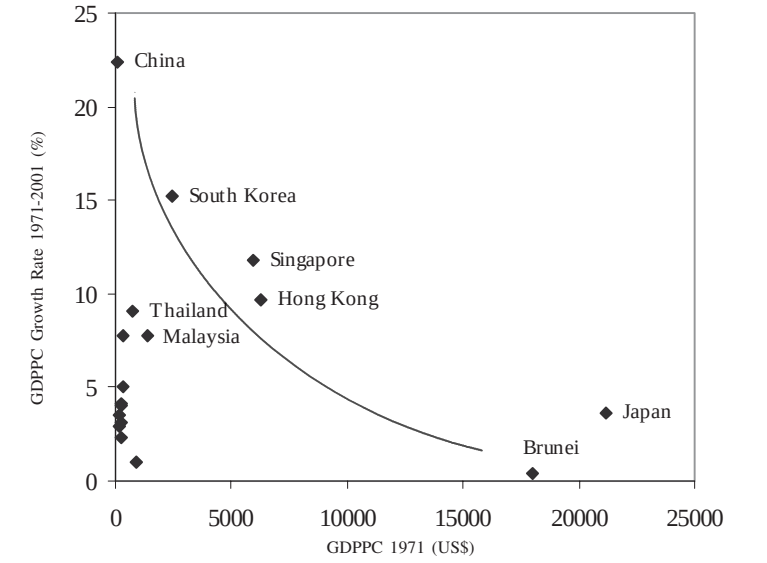


Figure 2(b): Countries in GDP Per Capita: 1971-2001



three intermediate positions in a predictable fashion. Hence, there appears to be a desirable very slow long run tendency towards convergence in this part of Asia as the countries are posited in the shape of a rectangular hyperbola notwithstanding congestion close to the origin. But given the high variations of these economies in terms of level of development, it will take a long time to come closer, if at all. But conventional wisdom in cross-country growth regression fails to incorporate the impact of either policy induced changes, or trading behaviour or the role of strategic factors under globalization. Hence given the aforesaid tendency towards convergence, further income generating activities through trade among the partners would be beneficial to the countries under discussion.

3.2 Inequality in Infrastructure

Change in public capital structure is one of the important factors affecting the long-term economic development of any nation (Aschauer, 1989a). This is more so for the developing world.[26] Beyond the neo-classical simplification of classifying different factors into only capital and labour, an economy's infrastructure network, broadly speaking, is the very socio-economic climate created by the institutions that serve as conduits of commerce. Some of these institutions are public, others private. In either case, their roles can be conversionary-helping to transform resources into outputs - or diversionary – transferring resources to non-producers. The dominant presence of the public sector in generating infrastructure services is guided by two fundamental motives of the welfare state: social equalizer and market failures. Infrastructure is a social concept of some especial categories of inputs external to the decision-making units (DMU) which contribute to economic development both by increasing productivity and by providing amenities which enhance the quality of life. Absence of such facilities in an economy or in a region may result in lower "productive efficiency" of the population. According to Hall and Jones (1996), these characteristics are substantial enough to explain most, if not all, of the differences in prosperity that separate nations today.

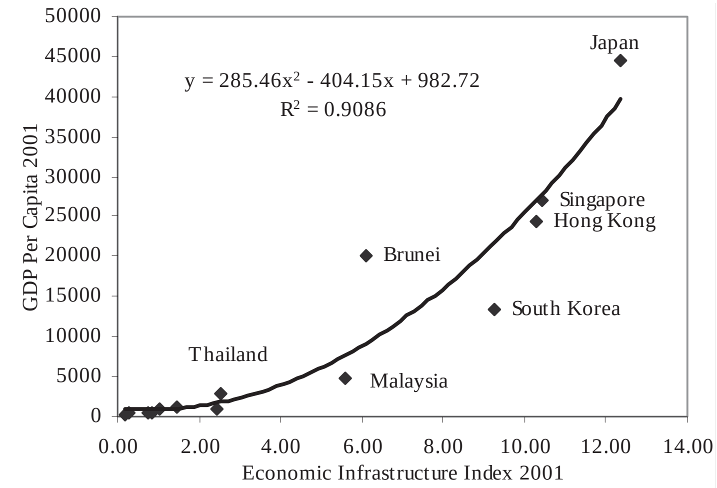
The linkage between infrastructure and economic growth is multiple and complex, because not only does it affect production and consumption directly, but it also creates many direct and indirect externalities, and involves large flows of expenditure thereby creating additional employment. Most of the studies on macroeconomic impact were generated after the 1980s. These studies suggest that infrastructure does contribute towards a hinterland's output, income and employment growth, and quality of life.[27]

Table 2: Infrastructure in AEC in 2001

Countries	AII[1]		EII[2]		SII[3]		TII[4]	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Brunei	1.59	9	6.09	5	13.43	3	2.09	7
Cambodia	0.38	15	0.17	15	8.02	15	0.24	13
China	2.34	5	2.46	8	11.82	6	3.12	5
Hong Kong	1.76	7	10.27	3	13.34	4	4.28	4
India	1.83	6	0.84	11	9.73	13	2.20	6
Indonesia	0.86	14	1.05	10	10.46	12	0.59	12
Japan	6.33	1	12.37	1	15.82	2	8.08	1
Lao PDR	0.97	11	0.27	14	8.05	14	0.23	14
Malaysia	0.95	12	5.60	6	10.67	10	1.40	10
Myanmar	1.01	10	0.41	13	10.48	11	0.11	15
Philippines	0.91	13	1.44	9	11.51	8	0.67	11
Singapore	5.14	2	10.43	2	12.80	5	7.57	2
South Korea	4.17	3	9.27	4	16.12	1	5.95	3
Thailand	1.63	8	2.53	7	11.70	7	2.06	8
Vietnam	2.55	4	0.74	12	10.93	9	1.42	9

Notes: 1. Agriculture Infrastructure Index, 2. Economic Infrastructure Index, 3. Social Infrastructure Index, and 4. Transport Infrastructure Index.

Table 3 (a): Income-Economic Infrastructure Relationship in AEC in 2001



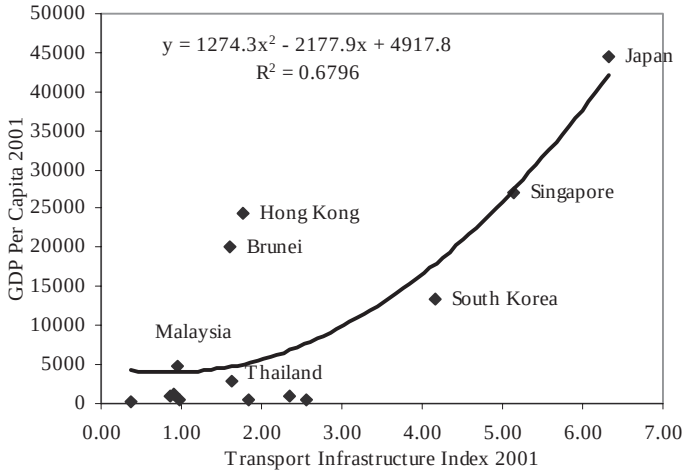
In order to understand the impact of trading infrastructures on the trading behaviour of the major Asian nations we have segmented the infrastructure sector in four broad categories, viz. agriculture infrastructure (access to fertilizer consumption, irrigated land and agricultural machinery), economic infrastructure (access to electricity, telephones, personal computer, banking facility, and internet), social infrastructure (access to health facility, media, education, drinking water), and transport infrastructure (access to roadways, railways, airways and ports). We have normalized all infrastructure facilities across the countries in terms of either population or geographical area.

Instead of making a composite index of infrastructure services for the countries in AEC, following equation (3), we have tried to develop four indices for each of the category. These infrastructure development indices are given in Table 2.[28] A look at this table helps us understand some interesting phenomena about the relative positions of the individual countries in infrastructure sector. A detailed scrutiny of the individual rankings bears a clear testimony to the prevalent consensus between popular belief and academic findings towards intense and rising regional imbalance in basic infrastructures in AEC.

As expected, Japan, Singapore, Hong Kong and South Korea, have ranked higher positions in most of the infrastructure indices. On the other hand, LDCs in AEC have represented the lowest profile of infrastructure facilities. Thus, the overall picture of income growth is more or less maintained in infrastructure with some additional features. Here, Japan has consistently recorded the top most performance in all the four areas of infrastructures with South Korea, Singapore, and Hong Kong also achieving higher levels of infrastructure development.

For better understanding of the nature of the relationship between infrastructure facilities on one hand, and per capita income on the other, we have presented two scatter points in Figure 3(a, b). They suggest some preliminary configurations regarding the way each category of infrastructures is related to per capita income. Even in such a cross-country framework, infrastructure and income are clearly related in a polynomial way thereby making the role of infrastructure all the more important. It is evident from these scatter diagrams that developed countries are comparatively better endowed with infrastructure facilities. In both the figures, Japan, Singapore, Hong Kong and South Korea occupy the top right positions, and India, Cambodia, Laos, China, Vietnam and the Philippines the bottom left. Indonesia, Thailand, and Malaysia

Table 3 (b): Income-Transport Infrastructure Relationship in AEC in 2001



reserve the middle positions. Another observation is that the scatter points are stretched from down left to top right direction thereby implying a clear positively sloped relationship.

In view of the above, it may be concluded that countries in AEC are endowed with heterogeneous level of infrastructure facilities which shows unbalanced regional development. Thus, to attain any meaningful integration, emphasis should be given on augmenting infrastructure endowment of the required kind in order to utilize the benefits of free trade.

Having seen the present income earning status and infrastructure profile of AEC countries, let us now turn to its trade profile and the barriers which are pulling down intra-and inter- regional trade.

3.3 Intra-regional Trade in AEC

It is interesting to note that most of the countries in AEC (except those in South Asia) have been export hawks. In terms of trade policies, most of the countries in AEC have been more liberal than South Asian countries though vast differences exist among countries within each region, especially Southeast and East Asia. Before we turn to measures of trade liberalization, it is useful to know whether or not these countries are engaged in higher trading among each other in past. Let us turn to Table 3 (a, b).

Table 3(a) reports the country-wise intra-regional trade during 1991 and 2001. A close review of Table 3(a) will point to the fact that all the countries in AEC have registered higher exports to each other in 2001, compared to 1991. In regard to import, except Thailand, rest 14 countries have also witnessed rising imports in 2001. From the same table, a link between intra-regional trade growth and openness can be established for the countries lying on extremes. The highly open economies of Hong Kong and Singapore have grown consistently and engaged in more trading rapidly while the least open economy, like India (and partly Japan), has traded lower volumes. In the middle of these two extremes, we have countries such as South Korea, Malaysia, and Thailand, which have grown consistently rapidly and, at least in terms of trade-to-GDP ratio, appear highly open. These countries are not only open to countries in AEC but also to rest of the world. Free trade area for a region cannot be functionally operational until and unless there is rise in intra-regional trade. Interestingly, Table 3(b) indicates the fact that with 12.76 per cent average annual trade growth during 1991 to 2001, which was comparatively higher

Table 3(a): Intra-Regional Trade in AEC

Countries	Exports to AEC[1] (%)		Imports from AEC[2] (%)		Openness[3] (%)	
	1991	2001	1991	2001	1991	2001
Brunei	67.20	81.04	57.34	74.94	101.50	79.20
Cambodia	7.88	8.82	56.45	64.04	28.04	91.72
China	38.67	46.71	51.22	66.52	15.85	44.32
Hong Kong	36.43	43.24	67.13	72.20	235.44	124.78
India	18.71	22.43	14.07	27.33	14.31	19.53
Indonesia	46.33	54.38	44.79	58.56	42.92	60.07
Japan	29.39	33.39	26.78	38.10	15.84	18.17
Lao PDR	31.15	47.87	83.77	91.20	25.99	50.38
Malaysia	49.28	52.52	54.00	54.64	144.50	184.01
Myanmar	39.66	54.35	78.46	86.14	4.43	1.01
Philippines	36.91	42.09	41.67	72.27	47.69	88.87
Singapore	30.22	33.74	54.35	59.13	291.90	277.59
South Korea	39.84	41.35	39.24	41.36	51.96	69.06
Thailand	40.90	41.52	53.67	50.86	67.18	110.89
Vietnam	41.11	44.03	54.65	66.18	46.03	93.64

Notes: 1. As percentage of total exports. 2. As percentage of total imports. 3. Trade as percentage of GDP.

Table 3(b): Intra-Regional Trade in AEC

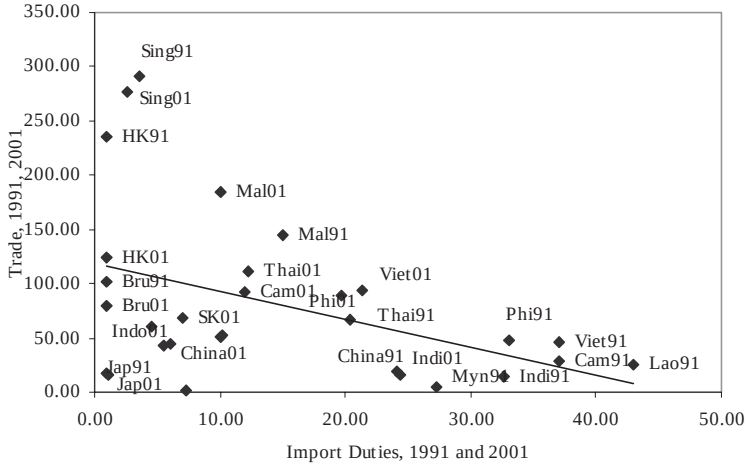
Categories	Intra-AEC Trade[1] (%)		Intra-AEC Trade Growth[2] (%)	World Trade Growth[2] (%)
	1991	2001	1991-2001	1991-2001
Export	7.91	9.55	11.20	7.55
Import	8.09	11.20	14.23	7.49
Total	8.00	10.39	12.76	7.52

Notes: 1. As percentage of world trade. 2. Average annual growth rate.

than the world average, AEC countries did engage in more intensified trading among each other for which the region's intra-regional (intra-AEC) trade has grown up from 8 per cent in 1991 to 10.39 per cent in 2001.

However, AEC's trade base will merit much discussion. Hence, the immediate concern for rising intra-regional trade is various trade barriers. There is ample evidence to show that an economic integration can only take place when intra-regional trade among the members are high (Ben-David, 1996). Question raised

Figure 4: Barriers to Intra-Regional Trade in AEC during 1991-2001

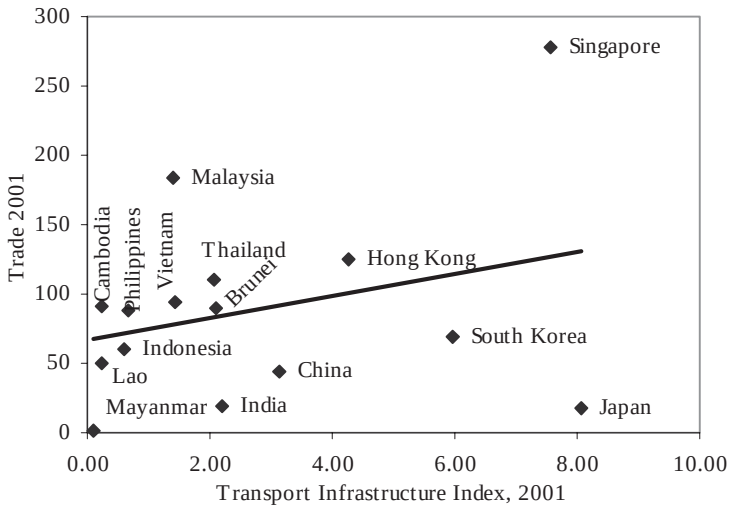


Notes: 1. Import duty calculated as percentage of total tax revenue collected by individual countries. 2. Trade is considered as percentage of GDP
Data Source: World Development Indicators 2003 CD ROM, World Bank.

on the needs and availabilities of the required commodities from the respective members of AEC is not really a valid one. For, first of all, commodity production statistics among the members invalidate such logic. Secondly, it is the lack of strategic linkage or non-price barriers which play the major role for lower traded volume over and above diplomatic intricacies. To attain higher intra-regional trade with a rapid pace, we need to encourage trade facilitation catalysts such as minimisation of trade barriers like transaction cost in the era of globalization. Even if a region witnesses rising intra-regional trade, benefits arising out of such rising trade will evaporate until and unless barriers to trade are completely minimized. Although AEC countries are opening up fast, barriers to trade still persist. A point can be made here with regard to import duties which often act as deterrent to trade. Let us turn to Figure 4, where scatters for the years 1991 and 2001 clearly show that barriers to trade (measured by import duties) have been working against total trade of the countries in AEC.

Again if we consider poor trading infrastructure facilities (poor quality of such facilities works against trade), we find that countries which are running with a fairly well developed transport infrastructure facilities have gone much

Figure 5: Transport Infrstructure and Trade in AEC in 2001



Notes: 1. Trade is taken as percentage of GDP. 2. Transport infrastructure index is taken from Table 2.

ahead of others in reaping the benefits from export market such as Singapore, Hong Kong, etc. Scatters plots reported in Figure 5 have captured this feature, where we find some indication towards a positive relationship between country's exports with its transport infrastructure facilities. Thus strengthening trading infrastructure is equally important while mooting up plan to promote AEC. Hence, to achieve the Asian Economic Community objective, we need to focus on the urgency of eliminating the crucial barriers to trade – quantitative and qualitative.

4. Impact of Infrastructure, Income and Transaction Costs on Trade in AEC

Having discussed the interdependence of AEC countries in income, infrastructure and trade, let us turn to see their impact on bilateral trade with the help of the regression results. To assess such impact, as described in Section 2, we have used an extended Gravity model.[29] The least-square estimates are provided in Table 4. Most of the variables do have expected signs as usual in the gravity equations. As variables are used in natural logarithms except for dummies, estimated coefficients show elasticity. F statistics indicate that all the

estimated equation forms (1 to 5) are significant at the 1 per cent significance level. All the models (1 to 5) explain 63 per cent to 68 per cent of the variations in direction of trade flows. The most interesting result is the strong influence transaction costs had on trade (at 1 per cent level): the higher the transaction cost between each pair of partners, the less they trade. In other words, reduction in transactions costs between the trading partners will certainly raise trade by a very large proportion. As can be seen from the table, TC is included in three cases, Models 1, 4 and 5; in all the cases, its coefficients are statistically most significant (along with the GDP factor) and always negative; for example, in the final case, the t-value is (-5.785) with an elasticity of 93 per cent.

Next most important factor is GDP for both exporting and importing countries. But this is a rather common phenomenon as we are dealing with aggregate behaviours. As we have already seen that the rising openness is a necessary condition for speeding up the integration process, in our study openness of the exporting country has significant positive effect (at 1 per cent level) on bilateral trade in all the models. A 1 per cent increase in exporting country's openness will bring 2.07 per cent increase in trade (Model 2). Importing country's openness has also come out to be important but not as strong as the former.

Quite consistent with the behaviour of transaction cost, exporting country's transport infrastructure produces a significant positive effect on bilateral trade with the highest elasticity reaching in Model 4 (at 1 per cent level). The idea behind this result is that if exporting country strengthens its transport infrastructure (viz. railways, roadways, port facility and airways) then bilateral trade gets increased even without much compulsion on importing country's infrastructure as sending the goods is much more important than distributing them. But if the latter were also strengthened, there must be higher impact on traded volumes. Hence, strengthening transport infrastructural facilities should be given utmost priority, which, *inter alia*, will increase intra-regional trade and speed up the integration process.

Distance between any two partners of trade is certainly an important factor in determining the volume of trade for any bilateral transaction. As per expectation in an age in which "distance" does not matter much, the signs are borne out to be negative but none is statistically significant except partly Model 3. In all other cases distance has not produced any significant impact on trade. Statistically speaking, this may be due to the fact that distance and

Table 4: Gravity Estimates

Variable	1	2	3	4	5
Importing countries GDP	0.851*	1.542*	1.618*	0.778*	
	3.223	***6.537***	***6.817***	***3.012***	
Exporting countries GDP	1.499*	2.438*	2.477*	1.441*	
	5.393	***10.807***	***11.017***	***5.245***	
Importing countries per capita income					0.676*
					1.199
Exporting countries per capita income					1.385*
					2.983
Importing countries transport infrastructure	0.469	0.111	0.186	0.434	0.449
	0.993	***0.220***	***0.370***	***0.918***	***0.674***
Exporting countries transport infrastructure	1.473	1.203	1.176	1.499	1.607
	3.322	***2.542***	***2.502***	***3.380***	***2.418***
Importing countries openness	0.624*	0.888*	0.901*	0.606*	0.496*
	1.936	***2.596***	***2.653***	***1.880***	***1.550***
Exporting countries openness	1.661*	2.070*	2.031*	1.671*	1.478*
	4.962	***5.880***	***5.801***	***4.988***	***4.220***
Transaction costs	-0.870*			-0.900*	-0.926*
	-5.378			***-5.619***	***-5.785***
Importing countries import duties	-0.137	0.111	0.022	-0.088	-0.192
	-0.463	***0.356***	***0.070***	***-0.301***	***-0.409***

Table 4 continued

Table 4 continued

Variable	1	2	3	4	5
Exporting countries export duties	-0.204*	-0.236*	-0.222*	-0.212*	-0.186*
	-1.051	***-1.131***	***-1.070***	***-1.090***	***-0.945***
Importing countries population strength					0.802*
					2.814
Exporting countries population strength					1.467*
					4.759
Importing countries exchange rate volatility	0.344	-2.124	-1.082	-0.237	-0.421
	0.060	***-0.347***	***-0.177***	***-0.041***	***-0.071***
Exporting countries exchange rate volatility	-13.180*	-11.342*	-10.321*	-13.898*	-15.495*
	-2.271	***-1.830***	***-1.671***	***-2.402***	***-2.600***
Distance	-0.757		-1.224**		-0.760
	-1.284		***-1.963***		***-1.267***
Common border dummy	0.766**	2.341*	1.650*	1.152**	0.670
	1.023	***3.336***	***2.115***	***1.680***	***0.868***
Free trade dummy	1.167**	0.841**	0.026	0.682	1.055**
	1.482	***1.228***	***0.033***	***0.985***	***1.230***
Pooled observations	3780	2550	2520	2520	3780
F-statistics	32.947	30.770	29.111	35.238	28.117
Adjusted R^2	0.682	0.631	0.636	0.680	0.675
DW	1.953	1.911	1.912	1.957	1.975
Serial Correlation	0.001	0.027	0.028	0.002	0.012

Note: The dependent variable is Ln Import * Denotes statistical significance at 1% level. ** Denotes statistical significance at 10% level

transaction cost partly work in the same direction. On the other hand, exchange rate volatility of the exporting country shows a significant (at 1 per cent level) negative effect on trade during the period 1999-2001. While it reveals the strong presence of exchange volatility, a lowering of the exchange rate fluctuations by 1 per cent will have a much stronger impact on trade (15 per cent is the highest figure of Model 5). On the cynical side, this means that actual value of trade in the world is still a phenomenon which is more driven by exchange rate manipulation than by pure competitiveness (Krugman, 1994).

The importance of common land border in AEC is also shown in Table 4. Except Japan and the Philippines, rest of the AEC members do enjoy some natural geographical overland connectivity, very similar to that we see in case EU and NAFTA. This is a great advantage for the developing AEC partners to facilitate higher intra-regional trade and mobility of skilled labour. Finally, total population (of both exporting and importing country) has come out to exert a statistically significant positive impact on AEC trade through the chain of effective demand. Needless to mention that the rest of the variables have also produced the desired signs, but none of them has emerged as significant. On the whole, therefore, the regression results are sufficiently robust for all the five alternative combinations of the Gravity model.

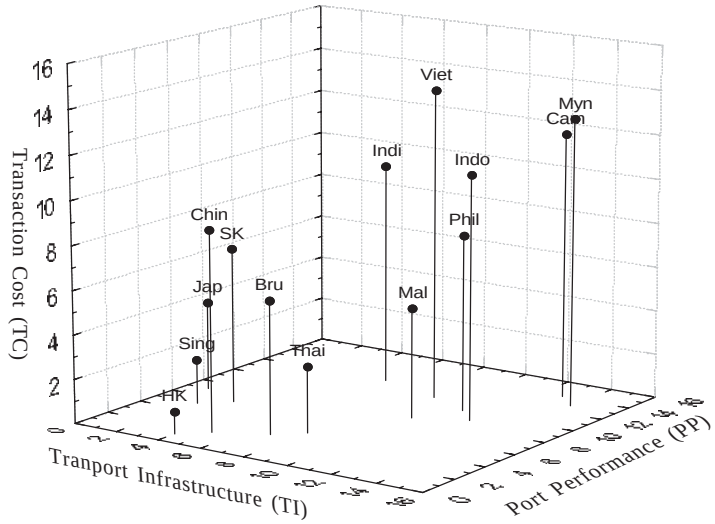
Figure 6 portrays the main conclusion of this paper. This 3D graph clearly tells us that countries which are poor in transport infrastructure have encountered with poor port performance thereby paying substantial amount for high transaction costs, and naturally, therefore, they are failing to reap the full benefits of globalization (integration) process. Hence, in order to generate a process for pan-Asian economic integration, countries in Asia should take into account transaction costs and strengthen infrastructural facilities seriously.

Besides distance and some other variables that are linearly given, an important determinant of rising intra-regional trade is openness. We have found that the lesser the barriers between countries, the higher the expected trade. Hence, countries need to speed up their openness towards the integration process.

5. Conclusions and Limitations of the Study

A country or a region's trade volumes depend on many complex details of history, geography, income, infrastructure, administrative barriers, and the structure of demography. In this paper we have found evidences towards explaining trade flows in terms of geography, trading costs, infrastructure,

Figure 6: Causes of Transaction Costs in AEC in 2001



Notes: 1. Countries were placed based on their respective ranks. 2. Rank correlations between TC and TI, TII and PP, and TC and PP are 0.66, 0.65, and 0.75 respectively and correlation coefficients are significant at 5% level. 2. PP means port performance, measured in terms of congestion of the container ports of individual countries.

population and income of trading countries. Increasing integration of world goods and services are happening at rapid pace in an unprecedented way during last one decade than ever before. Countries which have successfully integrated themselves have gone far ahead in reducing costs of transportation in particular and other infrastructure services in general over time and space. EU is a clear example of such process. As liberalization continues to reduce artificial barriers, the effective rate of protection provided by costs of transportation and infrastructure services is now in many cases higher than the one provided by tariffs.

In order to attain any positive achievement towards this pan-Asian integration process, policy planning should emphasize on (i) strengthening infrastructural facilities, particularly transport infrastructure, and (ii) minimization of transaction costs. In doing so, we will be able to intensify our intra-regional trade, failing which rest of the world will beat AEC in integrating their economies at much faster pace. However, we will have to see whether or

not removing the barriers to trade and common border will raise income per capita of the smaller low-income developing countries.[30]

It goes without saying that the present paper suffers from some limitations. First, it fails to synchronise conceptual economic integration process with pure trade theory. The question is: whether transaction cost covered for various countries in this paper has nicely captured the actual costs. While an aggregate cost is useful in evaluating the effectiveness of a particular trade policy programme in a situation of tremendous resource scarcity and unequal distribution, it may still beg some fundamental groundwork for defining an appropriate pragmatic framework for ushering into the AEC journey in the new millennium. Second, it fails to incorporate institutional factors representing political will, work ethics and informational networking by which to judge the quality of life, rule of law, motivation for trade related development and economic reasoning on the part of both government and the people. Finally, sophisticated dynamic analysis using panel data on disaggregated commodity-wise trade (with actual cif and fob prices) should be tried to verify the findings of this paper.

Endnotes

1 See, for instance, Dutta (2002) for a comprehensive review on globalism. See, also Stiglitz (2003).

2 Regional Integration Agreements (RIAs) have been around for long period of time since 1664 when a custom union of the provinces of France was proposed. As on May 2003, over 265 RIAs had been notified to the WTO, 107 dated from 1990 or after (Schiff and Winters, 2003). About 90 per cent of the RIAs are in the form of free trade arrangements (FTAs) and only 10 per cent are customs unions. WTO has allowed member countries to conclude custom unions and free-trade areas, as an exception to the fundamental principle of non-discrimination set out in the MFN Clause of GATT's Article 1.

3 For example, a customs union of the provinces of France was proposed in 1664; Austria signed free trade agreements with five of its neighbours during the 18th and 19th centuries; and the colonial empires were based on preferential trade arrangements (Schiff and Winters, 2003).

4 Today's EU was created as European Economic Community (EEC) way back in 1957, and before that there was European Coal and Steel Community (ECSC) in 1951.

5 Most of ASEAN countries have sailed through the severity of the crisis and started to ponder again about the process of their own integration within the regional and global context (Chirathivat, 2001, 2002). South Asian countries had severe geo-political differences for a long time, but they have now realised the importance of regional integration process, and finally, have signed the long-standing Free Trade Agreement at the SAARC Summit held in Islamabad in January 2004.

6 Such as BIMST-EC (Bangladesh, India, Myanmar, Sri Lanka and Thailand-Economic Cooperation), Greater Mekong Subregion (comprising Cambodia, Lao PDR, Myanmar, Vietnam, Thailand and Yunnan province of China), etc. in the last few years.

7 See, for instance, Kumar (2002), Dutta (2002), Agarwala and Prakash (2002), RIS (2003), Angresano (2004).

8 In this paper, by Asia we mean countries of South, Southeast and East Asia only.

9 Asia produces one-third of world's commercial energy (2001), reserves half of the world's coal and limestone, and one-third of world's oil and natural gas (2001), and preserves world's one-third forest area (2000). For detailed statistical information on Asia's endowments vis-à-vis other regions, see World Resource Institute (2003), and United Nations (2000). See, also UNESCAP (2002) for a detailed survey of the natural resource endowments of Asia.

10 Such as ASEAN-China FTA signed in 2002, BIMST-EC FTA signed in 2004, etc.

11 The gravity model was first developed by the Princeton astronomer James Q. Stewart (Brakman. Garretsen and Marrewijk, 2001).

12 For further details, one can refer Poyhonen (1963) and Linneman (1966).

13 Although there is debate about its theoretical support, the gravity equation is one of the most empirically successful in economics. It relates bilateral trade flows to GDP, distance, and other factors that affect trade barriers. It has been widely used to infer trade flow effects of institutions such as customs unions, exchange-rate mechanisms, ethnic ties, linguistic identity, international borders, and so on and so forth. See, for example, Anderson (1979), Deardoff (1998), and Glick and Rose (2002). There are also counter arguments. According to Anderson and Wincoop (2003), which is contrary to often stated, the conventional empirical gravity equations do not have a theoretical foundation.

14 Bougheas *et al.* (1999) have estimated augmented gravity equations for a sample limited to nine European countries. They included the product of partner's kilometres of motorway in one specification and that of public capital stock in another and found that these have a positive correlation with bilateral exports.

15 ASEAN includes Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. For the sake of analysis, Hong Kong has been treated as separate economy in this paper.

16 Available on-line at http://www.aseansec.org/home.htm

17 Although most of the data series was collected from World Bank Indicator CD-ROM 2003, some part of the data series relating to port and shipping was collected by the author from port-related sources such as Containerisation International Year Book.

18 Available on-line at http://www.adb.org/Documents/Books/Key_Indicators/2003/default.asp

19 Obtained from http://www.indo.com/distance

[20] Calculated using SUDist Version 1.0, available at http://www.shipanalysis.com

[21] Many measures have been constructed to measure transaction (transport) cost. The most straightforward measure in international trade is the difference between the so-called cif and fob quotations of trade. The difference between these two values is a measure of the cost of getting an item from the exporting country to the importing country. See, Brakman. Garretsen and Marrewijk (2001) for further details.

[22] A basic limitation of the conventional method of indexation is that while combining the actual facilities it gives ad hoc and fixed weights to different facilities that may actually vary over time and space depending on their significance. To overcome this limitation we have employed here the well-known multivariate technique of factor analysis or principal component analysis, PCA (Fruchter, 1967).

[23] Due to limitation of space, we are avoiding placing details on the construction of the infrastructure indexes along with respective weights derived from principal component analysis, which will be available on request from the authour.

[24] Interested readers may get in touch with the authour if they would like to use this database for further studies.

[25] Note that since a few observations are with zero trade, the dependent variable is the log of 1 plus imports. Having censored data normally requires Tobit estimation, but for gravity models this has typically made little difference (Eichengreen and Irwin, 1998).

[26] To be more specific, Aschauer (1989a, 1989b, 1989c) set off a long overdue dialogue between economists and politicians: decline in US productivity in 80s was preceded by lower infrastructure investment. The works of Munnell (1990) confirmed these results.

[27] For a review of studies on infrastructure impact on income, see Ghosh and De (2004).

[28] Due to limitation of space, we avoid placing the concerned weights, which were derived from PCA. Interested readers may contact authour for further details.

[29] In spite of the high associations between some of the indicators such as importing countries GDP with its GDP per capita, the model that we have employed do not appeared to suffer from multicollinearity. Moreover, high inter-correlations among some of the explanatory variables by themselves need not necessarily cause any problems in inference as because magnitude of the error variance and the variances of the explanatory variables are sufficiently small. Owing to limitation of space, we have omitted placing partial correlations table and corresponding t-values of 17 variables, which would be made available to the interested readers on request.

[30] See, for instance, Redding and Venables (2004) which shows that removing common borders between Germany and Czech, and also between the United States and Mexico have substantial effects on predicted income per capita in the smaller countries; income per capita of Czech and Mexico have gone up by 26 per cent and 27 per cent respectively presumably as a result of integration.

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