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Trade in Northeast Asia: why do trade costs matter?

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REGIONAL TRADE IN NORTHEAST ASIA: WHY DO TRADE COSTS MATTER?

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REGIONAL TRADE IN NORTHEAST ASIA: WHY DO TRADE COSTS MATTER?

Abstract

Trade costs are often cited as an important determinant of the volume of trade. This paper provides enough evidences to ascertain that today's trade issues in Northeast Asia go beyond the traditional mechanisms of tariffs, and include "behind-the-border" issues. By estimating a modified gravity equation, controlling for endogeneity and remoteness, we find that variations in transaction costs along with trade infrastructure facilities have significant influence on regional trade flows in Northeast Asia. On average, 10 percent saving in transaction costs increases imports by about 5 percent in Northeast Asia. This paper concludes that when tariffs tend to become low in Northeast Asia, the economies in this region could potentially benefit substantially from higher trade provided trade costs are well controlled.

JEL Code: F02, F10, F15.

Keywords: trade costs, transaction costs, infrastructure, regional trade, tariff.

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1. Introduction

A growing literature has documented the impact of trade costs on the volume of trade.¹ Most of these studies show that integration is the resultant of reduced costs of transportation in particular and other infrastructure services in general.² The shared objective of economic integration, in general, is to reduce trade barriers – visible and invisible.³ Direct evidence on border costs shows that tariff barriers are now low in most countries, on average (trade-weighted or arithmetic) less than 5 percent for rich countries, and with a few exceptions are on average between 10 to 20 percent for developing countries (Anderson and van Wincoop, 2004). Poor institutions and poor infrastructure penalize trade, differentially across countries. Therefore, today's trade strategy goes beyond the traditional mechanisms of tariffs and quotas and includes "behind-the-border" issues, such as the role of infrastructure and governance in supporting a well-functioning trading economy.⁴ The attention is now being focused on minimization of trade costs through facilitation of merchandise and services trade logistics, both inbound and outbound. Given this awareness, trade costs are, therefore, cited as an important determinant of the volume of trade.⁵

In our particular case, the three Northeast Asian countries, namely, China, Japan and Korea, together contain more than 1.46 billion population (23 percent of world population), and boast a GDP of US\$ 6.32 trillion (17 percent of world GDP) in 2005. Japan and Korea are termed as high-income economies, whereas China is seen as lower middle-income country.⁶ While Korea is becoming a mature economy, catching up Japan, China, on the other, has emerged as an engine of growth, not only for the Northeast Asia, but also for the entire world. The extensive trade among China, Japan and Korea has demonstrated broader prospects for regional cooperation. In 2005, China has become the largest trading partner of Korea and second largest trading partner of Japan. A remarkable growth in China's two-way trade with Korea and Japan has resulted in robust growth of the economies in Northeast Asia. However, Northeast Asia is still characterized by its low level of regional integration, despite the fact that the economies in the region are complementary to a large extent and could potentially benefit substantially from deeper economic integration.⁷

¹ Refer the study Anderson and van Wincoop (2004), which has elaborately covered the major studies carried out on this subject.

² In traditional trade theory it is customarily assumed that trade takes place between countries which have no spatial dimensions. Correspondingly, locational problems have also been neglected in the theory of customs unions. In 1961, Bella Balassa, the then associate professor at the Yale University, published a book entitled *The Theory of Economic Integration*. Even though very few are aware of it, this book, which is very popular till today, propounded the view that success of global trade is characterized by 'economic distances' among the trading pairs. This is not to deny whole set of other works started with Paul Samuelson in 1952 till Andrew Rose in 2006. All these led to generate a new chapter in international trade theory, in which the success of trade liberalisation can only be attained if countries control 'non-price factors' of trade, or alternatively 'trade costs'.

³ One set of 'invisible' barriers are dealt through measures in trade and business facilitation. The 'visible' set of barriers, which are often cited as physical or infrastructure barriers, are dealt through transport facilitation measures.

⁴ For instance, many studies show that liberalisation of international transport services foster international trade very much the same way as tariff liberalization does (Baier and Bergstrand, 2001; Andriamananjara, 2004).

⁵ The costs appearing from the barriers in trade can be termed as 'trade costs', which is measured as the mark-up between export and import price, where this mark-up is roughly indicate the relative costs of transfer of goods from one country to another thereby can be commented as an approximation to indicate the Balassa's 'economic distance'.

⁶ According to World Bank (2005)

⁷ Progress towards forming regional economic bloc in Northeast Asia has always been very slow since its inception. According to Yip (2001), Northeast Asian regionalism has been delayed owing to political factors rather than economic reasons.

In recent years, Northeast Asia has received growing attention as a region that has successfully begun the process of integration into the global as well as neighbouring regional economies.⁸ Considering the increase in trade interdependency of the three economies in Northeast Asia⁹, the need for an FTA in the region has gained high momentum in recent years. This has been reflected in a growing number of studies conducted in last few years aiming to find out the feasibility of an FTA in Northeast Asia.¹⁰ Latest is Lee (2005), which using CGE Model, shows that the integration through trade (read, FTA) in Northeast Asia would lead to GDP growth of 5.15 percent for Korea, 1.54 percent for China and 1.21 percent for Japan, and all taken together is likely to generate economic welfare of US\$ 30 billion in the region (Lee, 2005).

The noticeable development is that without having any regional trade agreement (PTA or FTA), the tariff barriers among the three countries in Northeast Asia have become low; weighted average tariff in 2004 of the three economies was less than 6 percent, as compared to more than 20 percent in 1991, with a few exception of China's average 40 percent tariff on imports from Japan and Korea in 1991. Over time, tariff has been reduced to a great extent in this region such that the regional trade volume in Northeast Asia increased from US\$ 56 billion in 1991 to US\$ 325 billion in 2004.¹¹ However, despite higher intraregional trade observed in Northeast Asia, there is no evidence towards lowering costs of trade in the region. For example, bilateral transaction costs between China and Japan has been hovering around 27 - 28 percent for the last one and half decade, while the same between Korea and Japan is found to be around 2 - 4 percent.¹² Apparently, it seems that the regional trade would have been much higher had the costs of trade among the three countries were low along with reduced tariffs.

Some studies have indicated that the cost of trade facilitation, specifically trade documentation and procedures, is high, between 4 to 7 percent of the value of goods shipped. In 1996, APEC conducted a study that highlighted the gain from effective trade facilitation. For example, the gains from streamlining customs procedures exceeded those resulting from trade liberalization, such as tariff reduction. Gains from effective trade facilitation accounted for about 0.26 percent of real GDP of APEC members (about US\$ 45 billion), while the gains from trade liberalization would be 0.14 percent of real GDP (about US\$ 23 billion).¹³ According to World Bank, raising performance across the region to halfway up to the level of the APEC average could result in a 10 percent increase in intra-APEC exports, worth roughly US\$ 280 billion (World Bank, 2002). In a different way, Djankov *et al.* (2006) indicated how

⁸ In view of recently concluded East Asia Summit 2005, Northeast Asian countries are now looking towards deeper trade integration with ASEAN. An FTA among ASEAN+3 will lead to welfare gain of approximately US\$ 129 billion (Yungling, 2005).

⁹ For a detailed study on trade interdependency in Northeast Asia, refer Lee (2005). According to Lee (2005), trade concentration ratio in Northeast Asia increased from 1.09 in 1990 to 1.65 in 2004, which was even higher than that of EU since 2001.

¹⁰ Refer page 31 of Lee (2005) to know the list of studies which have dealt the feasibility of FTA in Northeast Asia. Also refer, Cheong (2005).

¹¹ The share of intra-regional trade in Northeast Asia has increased from 12.40 percent in 1990 to 23.90 percent in 2004 (Lee, 2005).

¹² In a study, De (2004) shown that for most Asian countries, trade cost works as a strong barrier to trade integration than tariff. By estimating a structural Gravity model of economic geography using cross-country data on income, infrastructure, transaction costs and trade of selected Asian economies, De (2004) provided evidence that transaction cost is statistically significant and important in explaining variation in trade in Asia. In addition, this study also found that port efficiency and infrastructure quality are two important determinants of trade costs.

¹³ Similar indications were obtained for countries in APEC (Cernat, 2001, World Bank, 2002; Wilson *et al.*, 2003)

time delays affect international trade. According to them, on average each additional day that a product is delayed prior to being shipped reduces trade by at least 1 percent.¹⁴

Although the systematic development of trade facilitation in Northeast Asia has for some time been an important consideration, there is clear lack of broader policy framework which is required for long term development. Moreover, there is a dearth of studies to focus on the causality of factors required for trade facilitation policy framework. The question then arises: how do the non-price determinants of international trade such as infrastructure and transaction costs affect integration of the Northeast Asia? This paper attempts to find out the answer to the above question with following reasons.

First, the reason for focusing on trade costs in Northeast Asia is pressing if we look at the region's trade coverage. When most of the Northeast Asian economies – either through ASEAN+3 or through APEC or combination of both¹⁵ – are planning to promote regional trade, integration of the whole region is likely to be limited due to lack of an integrated and improved transportation and customs.

Second, since the countries in Northeast Asia are planning to intensify economic cooperation through bilateral FTAs (China-Korea, Korea-Japan, China - Japan), trilateral FTA (China-Japan-Korea), inter-regional FTA (ASEAN+3) and multilateral FTA (WTO), these countries should display smaller trade costs. These FTA events are expected to put added competitive pressure on Northeast Asian economies, particularly on trade and through which investments.

Third, to gain anything from liberalised trade regime in Northeast Asia, there is an urgent need to control trade costs, which might not only multiply the welfare emanating from liberalized trade environment but also strengthen the trade capacity of the region in the era of globalization. Gaining a fair idea about trade costs will help dealing its components more accurately.¹⁶

Fourth, while the rhetoric of trade costs has proved very appealing to common people, the analytical basis for the concept is somewhat unclear. If trade between two countries (or among a group of countries) normally raises real income in both; does it mean anything to say that countries may not have to deal with trade costs separately as if these are by default taken care by production costs? Several studies, mostly in context of EU and WTO, show that it is possible that a trading economy(s) may hurt if trading costs are not dealt separately, particularly when there exists structural (artificial or natural or both) asymmetries within or between the trading pairs.

¹⁴ This was estimated by the authors through a structured Gravity model using newly constructed *Doing Business* Database of the World Bank on shipment of cargo from the factory gate to the ship in 126 countries.

¹⁵ Some of the Northeast Asian countries are also members of other extra-regional arrangements too. For example, three Northeast Asian countries, are members of APEC, and two of which (China and Korea) are also member of Bangkok Agreement, now renamed as Asia Pacific Trade Agreement (APTA).

¹⁶ For example, trade facilitation issues, which can be termed as a component of trade costs, are being used differently in literature dealing with WTO issues, which again are very narrow in a sense to deal the barriers to trade in goods and services. According to World Bank, “there is no standard definition of trade facilitation. In a narrow sense, trade facilitation simply addresses the logistics of moving goods through ports or more efficiently moving customs documentation associated with cross-border trade. In recent years, the definition has been broadened to include the environment in which trade transactions take place, including the transparency and professionalism of customs and regulatory environments, as well as harmonization of standards and conformance to international or regional regulations.” (World Bank, 2006a)

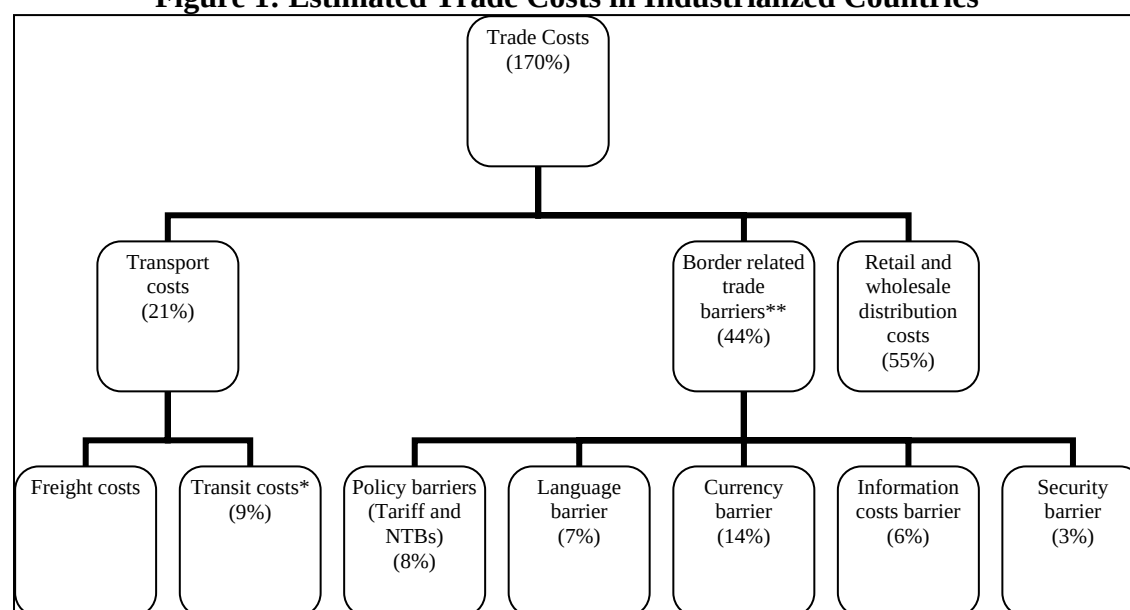
Therefore, this study is an attempt to assess the impact of trade costs on regional trade in Northeast Asia, and propose policy measures that would facilitate trade in the region. The remainder of the paper proceeds as follows. Section 2 deals with the definition of trade costs and its relevance. Data and methodology are dealt in Section 3. Section 4 describes the broad profile of trade and trade costs in Northeast Asia. Section 5 provides some estimates for the impact of trade costs and discusses the results. Finally, conclusions are briefed in Section 6.

2. Definition of Trade Costs and Its Relevance

Broadly defined trade costs include all costs incurred in getting a good to a final user other than the marginal cost of producing the good itself: transportation costs (both freight costs and time costs), policy barriers (tariffs and non-tariff barriers), information costs, contract enforcement costs, costs associated with the use of different currencies, legal and regulatory costs, and local distribution costs (wholesale and retail). Trade costs are reported in terms of their ad-valorem tax equivalent. In Anderson and van Wincoop's (2004) term: the 170 percent 'representative' trade costs in industrialized countries breaks down into 21 percent transportation costs, 44 percent border related trade barriers and 55 percent retail and wholesale distribution costs (Figure 1).

In general, an exporter or importer incurs trade costs in all the phases of the export or import process starting from obtaining information about market conditions in any given foreign market and ending with receipt of final payment. One part of the trade cost is trader specific and depends upon his operational efficiency. The magnitude of this trade cost diminishes with an increase in the efficiency level of the trader, under the prevailing framework of any economy.¹⁷

Figure 1: Estimated Trade Costs in Industrialized Countries



Notes: *Tax equivalent of the time value of goods in transit. Both are based on estimates for US data.

** The combination of direct observation and inferred costs, which, according to author, is an extremely rough breakdown.

Source: Drawn from Anderson and van Wincoop (2004)

¹⁷ Despite the structural differences, trade costs are often termed as transaction costs in literature. We avoid dealing with indirect trade costs, such as auxiliary transaction costs, which exporters incur in terms of speed money (bribes) and delays. The auxiliary transaction costs represent real resource cost as well as costs that may just be ways of sharing the economic rents. For example, delay on the road, in Customs, etc., represent real resource costs but "speed money" is a way of transferring income.

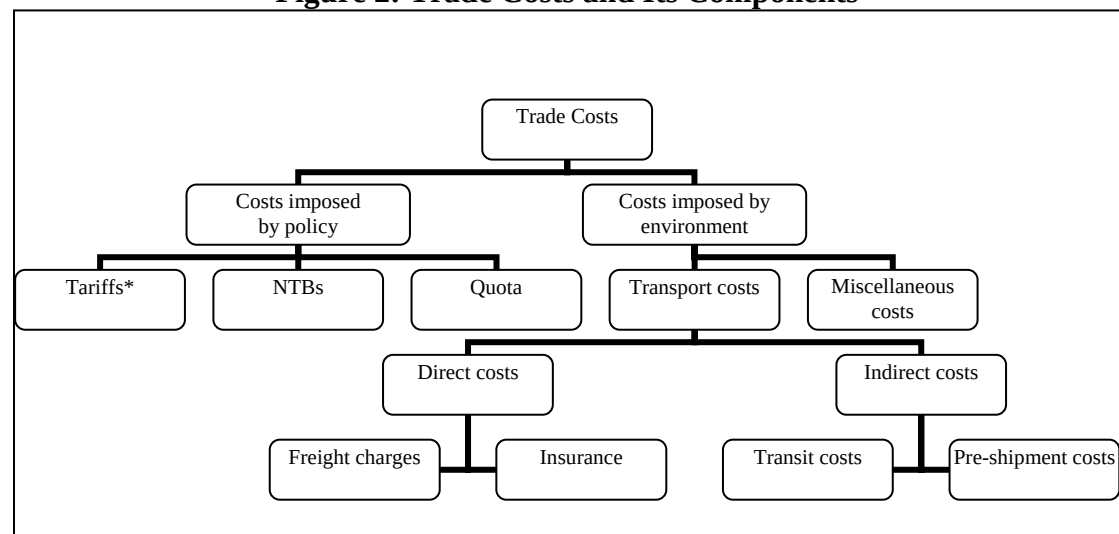
The other part of trade costs is specific to the trading environment and is incurred by the traders due to in-built inefficiencies in the trading environment. It includes institutional bottlenecks (transport, regulatory and other logistics infrastructure), information asymmetry and administrative power that give rise to rent seeking activities by government officials at various steps of transaction. This may cost traders (or country) time and money including demurrage charges, making transactions more expensive.

Trade costs are large, even aside from trade policy barriers and even between apparently highly integrated economies. In explaining trade costs, Anderson and van Wincoop (2004) referred the example of Mattel's Barbie doll, discussed in Feenstra (1998), indicated that the production costs for the doll were US\$ 1, while it sold for about US\$ 10 in the United States. The cost of transportation, marketing, wholesaling and retailing represent an ad-valorem tax equivalent of 900 percent. Anderson and van Wincoop (2004) commented: "Tax equivalent of representative trade costs for rich countries is 170 percent. This includes all transport, border-related and local distribution costs from foreign producer to final user in the domestic country. Trade costs are richly linked to economic policy. Direct policy instruments (tariffs, the tariff equivalents of quotas and trade barriers associated with the exchange rate system) are less important than other policies (transport infrastructure investment, law enforcement and related property rights institutions, informational institutions, regulation, language)."

Direct transport costs include freight charges and insurance, which is customarily to the freight charge. Indirect transport user costs include holding cost for the goods in transit, inventory cost due to buffering the variability of delivery dates, preparation costs associated with shipment size (full container load vs. partial loads) and the like. Indirect costs must be inferred. Alongside tariffs and NTB's, transport costs look to be comparable in average magnitude and in variability across countries, commodities and time.

Trade costs have large welfare implications. Current policy related costs are often worth more than 10 percent of national income (Anderson and van Wincoop, 2002). Obstfeld and Rogoff (2000) commented that all the major puzzles of international macroeconomics hang on trade costs. Details of trade costs also matter to economic geography. For example, the home market effect hypothesis (big countries produce more of goods with scale economies) hangs on differentiated goods with scale economies having greater trade costs than homogeneous goods (Davis, 1998). The cross-commodity structure of policy barriers is important to welfare (e.g., Anderson, 1994).

Figure 2: Trade Costs and Its Components



In this study, we deal with only those components of trade costs which are imposed by both policy (tariff) as well as environment (transport and others). Figure 2 shows the components of trade costs we are dealing in this study. In this paper, we term the costs imposed by environment as transaction costs.

3. Methodology and Data¹⁸

This study is undertaken in two stages. First, we provide some estimates of trade costs at regional (pooled) level. We stress that the specification of the gravity equation, together with the choice of the distance measure, are crucial for evaluating the size of the barriers. Second, we assess the impact of trade costs on regional trade based on a panel data, controlling for endogeneity and remoteness, following which, policy conclusions are drawn.

3.1 Measuring Transaction Costs

Despite a wide range of theoretical derivations of the gravity equation, the majority of the authors do not model transport costs explicitly, exceptions being Bergstrand (1985, 1989), Davis (1998), Deardorff (1998), Limao and Venables (2001), Fink *et al.*, (2002), Clark, Dollar and Miuccio (2004), Redding and Venables (2004), Hummels (2001a, 2001b), Wilson *et al.*, (2003).¹⁹

To estimate bilateral transaction cost in this study, we have followed the model introduced by Limao and Venables (2001), following the difference of *cif* (cost, insurance and freight) and *fob* (free on board) values.²⁰

Importing countries report the value of imports from partner countries inclusive of *cif*, and exporting countries report their value on *fob*, which measures the cost of the imports and all charges incurred in placing the merchandise aboard a carrier in the exporting port. Let T_{ij} denotes the unit cost of shipping a particular good from country j to country i . We suppose that it is determined by:

$$T_{ij} = f(x_{ij}, X_i, X_j, \mu_{ij}) \quad (1)$$

where x_{ij} is a vector of characteristics relating to the journey between i and j , X_i is a vector of characteristics of country i , X_j is a vector of characteristics of country j , and μ_{ij} represents all unobservable variables.

¹⁸ This paper has two distinct methodological improvements over De (2006a, 2006b). First, we estimate a modified gravity equation, controlling for endogeneity and remoteness. Second, choice of the model (random and/or fixed effect) was based on a series of scientific tests, as described in Section 5.

¹⁹ However, except Limao and Venables (2001) and De (2004), none has incorporated both infrastructure and transport costs in the model.

²⁰ Many measures have been constructed to measure transport cost. The most straightforward measure in international trade is the difference between the *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). There is another source to obtain data for transport costs from industry or shipping firms. Limao and Venables (2001) obtained quotes from shipping firms for a standard container shipped from Baltimore to various destinations. Hummels (2001a) obtained indices of ocean shipping and air freight rates from trade journals which presumably are averages of such quotes. Due to data limitations and the very large size of the resulting datasets, direct methods are best but not always feasible here. The most widely available (many countries and years are covered) is average ad-valorem transport costs are the aggregate bilateral *cif/fob* ratios from UN's COMTRADE database, supplemented in some cases with national data sources. Nevertheless, because of their availability and the difficulty of obtaining better estimates for a wide range of countries and years, apparently careful work such as Harrigan (1993) and Baier and Bergstrand (2001) used the IMF (COMTRADE) database.

Denoting the *fob* price shipped from *j* to *i* by p_{ij} , we define t_{ij} , the ad-valorem transaction cost factor, as

$$t_{ij} = cif_{ij} / fob_{ij} = (p_{ij} + T_{ij}) / p_{ij} = t(x_{ij}, X_i, X_j, \mu_{ij}) \quad (2)$$

where the determinants of T_{ij} are given in equation (1). The ratio of *cif/fob* provides the measure of transaction costs on trade between each pair of countries. Assuming that t_{ij} can be approximated by a log linear function up to some measurement error, the average observed transaction cost rates t_{ij} appears as follows.

$$\ln t_{ij} = \alpha + \beta x_{ij} + \gamma \ln X_i + \delta \ln X_j + \omega_j \quad (3)$$

Following Limao and Venables (2001), in terms of the data, t_{ij} corresponds to the ratio $[(cif/fob) - 1 = (IM_{ij}^t / EX_{ji}^t) - 1]$ for importing country *i*. The ratio $(cif/fob - 1)$ represents the ratio of unit transaction costs to the *fob* price and thus provides a simple summary statistic of the transaction cost on imports. As pointed out by Limao and Venables (2001), *cif/fob* data does contain information about the cross sectional variation in transport costs, and that results from using this data are quite consistent with those obtained from the shipping cost data.²¹

Here, the transaction costs, $TC_{ij}^t (= t_{ij})$ represents costs of transaction between country *i* and *j* for the period *t*, IM_{ij}^t stands for import (*cif*) of country *i* from country *j* for the period *t*, and EX_{ji}^t denotes export (*fob*) of country *j* to country *i* for the period *t*.

3.2 Measuring Trade Infrastructure

Country's infrastructure plays vital role in carrying trade, which has been widely dealt in many studies. For example, by incorporating transport infrastructure in a two-country Ricardian framework, Bougheas *et al.* (1999) have shown the circumstances under which it affects trade volumes.²² According to Francois and Manchin (2006), transport and communication infrastructure and institutional quality are significant determinant not only for country's export levels but also for the likelihood exports. Nordås and Piermartini (2004) shown that quality of infrastructure is an important determinant of trade performance wherein port efficiency alone has the largest impact on trade among all indicators of infrastructure.

The infrastructure variables have explanatory power in predicting trade volume. Limao and Venables (2001) emphasized the dependence of trade costs on infrastructure, where infrastructure is measured as an average of the density of the road network, the paved road network, the rail network and the number of telephone main lines per person. A deterioration of infrastructure from the median to the 75th percentile of destinations raises transport costs by 12 percent. The median landlocked country has transport costs which are 55 percent higher than the median coastal economy.²³ Inescapably, understanding trade costs and their role in determining international trade volumes must incorporate the internal geography of countries and the associated interior trade costs.

²¹ However, *cif/fob* ratio has some drawbacks. The first is measurement error; the *cif/fob* factor is calculated for those countries that report the total value of imports at *cif* and *fob* values, both of which involve some measurement error. The second concern is that the measure aggregates over all commodities imported, so it is biased if high transport cost countries systematically import lower transport cost goods. This would be particularly important if we were using exports, which tend to be concentrated in a few specific goods. It is less so for imports which are generally more diversified and vary less in composition across countries (Limao and Venables, 2001).

²² Bougheas *et al.* (1999) 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 particle correlation with bilateral exports.

²³ Limao and Venables (2001) also reported similar results using the *cif/fob* ratios of the IMF.

Therefore, for country characteristics, we have focused on infrastructure measures – the country’s ability to enhance the movement of merchandise. To assess impact of infrastructure facilities on bilateral trade, we have constructed trade mobility index (TMI), comprising nine infrastructure variables for each individual country.²⁴ TMI is designed to measure the costs of travel across a country.²⁵

3.3 The Augmented Gravity Model

In order to explore the impact of trade costs on trade flows, our empirical analysis has considered an augmented gravity model since it is one of the popular partial equilibrium models known in explaining the variation of trade flows. The gravity model provides the main link between trade barriers and trade flows.²⁶ The augmented gravity model considered here uses a balanced panel data for the period 1991 to 2004 on trade, distances, gross domestic product (GDP), GDP per capita, infrastructure, openness, exchange rate, tariff, and transaction costs and average remoteness from rest of the world for three Northeast Asian economies.²⁷

We look at the trade flows by estimating a gravity model including income, infrastructure and host of institutional and economic variables as reported above. Since the gravity equation is the standard analytical framework for the prediction of bilateral trade flows, we apply panel data policy simulation technique rather than extending it for forecasting purposes. The gravity equation which we have estimated in log-linear form takes following shape.

²⁴TMI was constructed based on UNDP method. TMI measures the relative position of a country considering a set of observables. Index is calculated following general formula: $\text{Index} = [(\text{Actual} - \text{Minimum}) / (\text{Maximum} - \text{Minimum})]$. While indexing the infrastructure stocks of the countries, we have considered following nine variables: (i) railway length density (km per sq. km of surface area), (ii) road length density (km per sq. km of surface area), (iii) air transport freight (million tons per km), (iv) air transport, passengers carried (percentage of total population), (v) aircraft departures (per airport), (vi) container traffic (per port), (vii) fixed line and mobile phone subscribers (per 1,000 people), (viii) internet users (per 1,000 people), and (ix) electric power consumption (kwh per capita). There are several other methods to construct an index, such as multivariate factor analysis, which can also be attempted to measure the infrastructure stock alternatively. Due to limitation of space, we have avoided placing TMI and corresponding weights. Interested readers may contact author for the same.

²⁵ In theory the *fob* and *cif* prices are border prices and thus it would seem that own and trading partner infrastructures as defined here should not affect these rates. It is possible that there are interactions between the variables. The simplest example is that an increase in land distance should increase the cost of going through a given infrastructure.

²⁶ 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. Since then the gravity equation has become a standard analytical tool for prediction of bilateral trade flows with simultaneous development of its theoretical discourse. 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), Hummels (1999), Baier and Bergstrand (2001), Limao and Venables (2001), Glick and Rose (2002), Fink et al (2002, 2005), Wilson *et al*, (2003).

²⁷ By taken both tariff and transaction costs, we cover a major portion of trade costs. Ideally, no study has attempted so far to capture all the components of trade costs associated with country’s exports and imports. Due to absence of data, we have avoided taking NTBs in this study, though exists among the three countries.

$$\ln IM_{ij}^t = \beta_1 \ln GDP_i^t + \beta_2 \ln GDP_j^t + \beta_3 \ln GDPPC_i^t + \beta_4 \ln GDPPC_j^t + \beta_5 \ln TMI_i^t + \beta_6 \ln TMI_j^t + \beta_7 \ln ONS_i^t + \beta_8 \ln ONS_j^t + \beta_9 \ln TC_{ij}^t + \beta_{10} \ln T_{ij}^t + \beta_{11} \ln ER_i^t + \beta_{12} \ln ER_j^t + \beta_{13} \ln R_i^t + \beta_{14} \ln D_{ij} + e_{ij}^t \quad (4)$$

where i and j are importing and exporting country respectively, IM_{ij}^t represents import by country i from country j , GDP is country's gross domestic products, taken at constant US\$, $GDPPC$ stands for country's per capita gross domestic products, considered in constant US\$, TMI represents country's trade mobility infrastructure, ONS is country's openness, measured in terms of trade as percentage of country's GDP, TC_{ij}^t stands for transaction costs for bilateral trade between countries i and j for the period t , T_{ij}^t stands for bilateral tariff (weighted average) between country i and j for the period t , ER represents exchange rates of country i and country j , R represents average remoteness of country i for the period t ,²⁸ D_{ij} is the distance between countries i and j , and t denotes trading years ($t = 1991, \dots, 2004$).²⁹ The parameters to be estimated are denoted by β and e_{ij} is the error term.³⁰

There are few important reasons for considering the equation (4). First, we estimate a modified gravity equation, controlling for endogeneity and remoteness. Second, the variables are identified keeping in mind their importance in influencing bilateral trade. Third, we can estimate elasticity of trade flows with respect to exogenous variables. Fourth, a country's trade with any given partner is dependent upon its average remoteness to the rest of the world (Anderson and van Wincoop, 2003). Studies that do not control for remoteness produce biased estimates of the impact of transaction costs on trade. Finally, in an attempt to minimize the possibility of endogeneity bias we also estimate equation (4) instrumenting transaction costs. We use number of ports in bilateral pairs as instrument mainly for two reasons: (i) being geographically separated, countries rely more on seaports for merchandise trade, rather than overland, and (ii) due to spatial distribution, number of seaports are unlikely to be affected by the total volume of import in a given pair.

3.4 The Data

The dataset includes bilateral trade between three Northeast Asian economies for the years 1991 to 2004. Given the dataset, there are 84 unidirectional trading pairs and 13 variables that make the dataset as 1092 pooled observations. Table 1 presents correlation coefficients among the dependent and independent variables. Tariffs, transaction costs, exporting country's trade mobility index are all negatively correlated with imports and highly robust.

The major sources of secondary data are collected from many sources such as United Nations Conference on Trade and Development (UNCTAD), United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), International Monetary Fund (IMF), World Bank (WB), Asian Development Bank (ADB), and United Nations Statistical Division (UNSD). Data specific sources are briefed in Appendix 1.

²⁸ Following Melitz (2005), remoteness (R) was calculated based on $R_i = \sum_{j=1}^C \left(\frac{Y_j}{Y_w - Y_i} \right) d_{ij}$, where d_{ij} is

the distance between countries i and j , C is the number of countries, Y_w is World GDP, taken here at constant price, Y_j and Y_i are GDPs of countries i and j , taken at constant prices, respectively.

²⁹ We do not include common language or currency or PTA/FTA dummy because the countries considered in this paper do not share such characteristics.

³⁰ In case of random effect model, we define the error term, $e_{ij}^t = \alpha_i + \omega_{ij}^t$, where α_i represents the variations in trade flows due to the unobserved differences, and the random error term, ω_{ij}^t , which is assumed to be normally distributed with mean 0. In case of fixed effect model, α_i is considered independently but not as a part of the error term (e_{ij}^t).

Table 1: Correlations between Variables

	IM_{ij}^t	TMI_i^t	TMI_j^t	TC_{ij}^t	T_{ij}^t
IM_{ij}^t	1				
TMI_i^t	0.169* p=.1328	1			
TMI_j^t	-0.373 p=.0012	-0.433* p=.0002	1		
TC_{ij}^t	-0.220* p=.0480	0.389* p=.0009	0.239* p=.0319	1	
T_{ij}^t	-0.213 p=.0562	0.608* p=.0008	0.105 p=.3524	0.396* p=.0006	1

Note: * Significant at 1 percent level

4. Overview of Regional Trade and Trade Costs in Northeast Asia

In Northeast Asia, China is seen as an industry-driven economy, whereas Korea and Japan are services driven. Services sector in Korea and Japan presently contributes over 60 percent to GDP, whereas the industry contributes over 50 percent to GDP in China. Virtually, contribution of services sector to GDP in China has been found as static during 1991 to 2003. However, agricultural sector's contribution to GDP in all the three countries has declined over the period 1991 to 2003. The bigger but less developed economy (China) is industry driven, whereas relatively advanced economies (Japan and Korea) are services driven. Even though the momentum of growth in GDP and GDP per capita in all the three countries has been slowed down since 2001, the trade has surged up. An outcome of aggressive industry-driven development strategy, particularly in China and Korea, is reflected in rising production and expansion of exports, and positive current account balance, thus generating employment, raising wages, and thereby gradually catching up higher income countries.

Table 2: Trends in Regional Trade in Northeast Asia

Particulars	1991	2001	2004
	US\$ billion		
China's Export to Japan	10.25	45.08	73.51
China's Import from Japan	10.03	42.81	94.37
China's Total Trade with Japan	20.28	87.89	167.89
Japan's Export to China	8.60	30.95	73.92
Japan's Import from China	14.25	57.78	94.34
Japan's Total Trade with China	22.85	88.73	168.25
China's Export to Korea	2.18	12.54	27.82
China's Import from Korea	1.07	23.40	62.25
China's Total Trade with Korea	3.24	35.94	90.07
Korea's Export to China	1.00	18.19	49.76
Korea's Import from China	12.80	13.30	29.58
Korea's Total Trade with China	13.80	31.49	79.35
Japan's Export to Korea	20.09	25.29	44.25
Japan's Import from Korea	12.38	17.22	22.06
Japan's Total Trade with Korea	32.47	42.51	66.31
Korea's Export to Japan	12.36	16.51	21.70
Korea's Import from Japan	21.12	26.63	46.14
Korea's Total Trade with Japan	33.48	43.14	67.85

Note: Consider export at *fob* and import at *cif* prices

Source: IMF (2005)

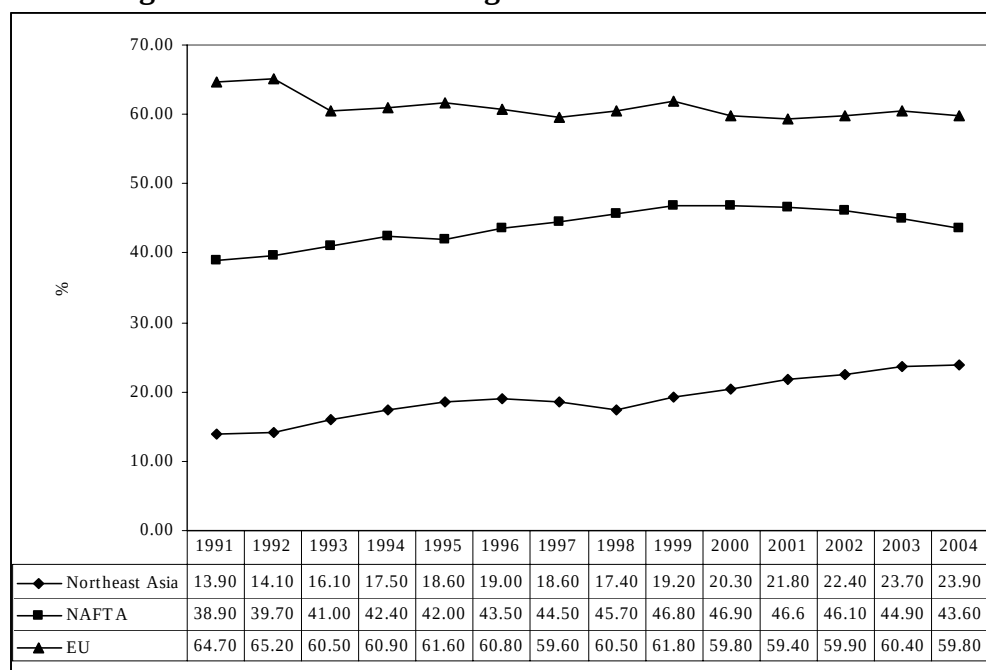
Trade in the region (among China, Japan, and Korea) has rapidly increased over the last decade. Countries are now more open than they used to be a decade earlier. Rising regional trade shows higher trade openness in Northeast Asia. Table 2 indicates that trade among these three countries has gone up substantially over last one and half decade. In 1991, the total intraregional trade in Northeast Asia was US\$ 56 billion, which grew 37 percent per annum since 1991 and became US\$ 324 billion in 2004. The share of the intraregional trade in Northeast Asia has also increased from 13.90 percent in 1991 to 23.90 percent in 2004 (Figure 3). It has increased steadily since 1991 except for the years of the Asian financial crisis. In fact, intraregional trade in Northeast Asia is fast catching up with those of the EU and NAFTA. At the country level, Korea's trade with China and Japan has increased twice faster than her trade with other countries during 2000 and 2004, whereas Japan's intraregional trade increased five times faster than its trade with other countries in the same period. Since the intraregional trade has intensified in Northeast Asia during 1991 to 2004, in order to gain larger from the trade settings (global and regional), there is an urgent need for free trade among the three countries in Northeast Asia. In particular, the trade concentration ratio in Northeast Asia crossed that of the EU, without any formal regional agreement (Lee, 2005).

China's robust trade performance and rapid economic growth have made a strong impact on the regional trade structure over time in Northeast Asia. These countries do more trade among each other compared to their trade with rest of the world (Hai and Zhang, 2004). Gradually, Japan and Korea have become China's second and forth largest trading partners in 2004 respectively, whereas China and Korea are Japan's second and third largest trading partners, following the United States in the same year. In case of Korea, China and Japan are the first and third largest trading partners, respectively. Therefore, considering the increase in trade interdependency of the three countries in the Northeast Asia, the need for an FTA has increased substantially.

In general, China and Korea heavily rely on Japan for intermediate products (and also raw materials and technology) and for market of their finished products. Although trade in the region is well diversified, trilateral trade structure among China, Korea and Japan has been quite similar to each other. For example, four products (HS 84, 85, 87, 90) of top 10 bilateral trade items between China and Japan overlapped in 2004. Similarly, six items (HS 27, 29, 72, 84, 85, 90) out of top 10 bilateral trade items between China and Korea overlapped in the same year. The same also holds true in case of trade between Japan and Korea. Eight of the top 10 trade items between Korea and Japan overlapped (HS 27, 29, 39, 72, 84, 85, 87, 90) in 2004. Tables reported in Appendix 2 capture this trend briefly.

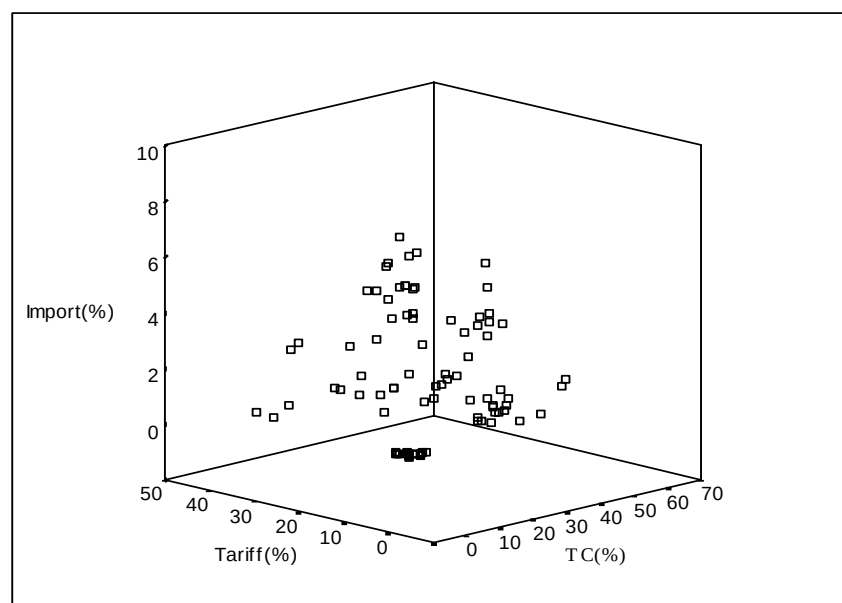
The manufacturing sector has an overwhelming stake in trade in Northeast Asia. In 2004, manufacturing products constituted 93.40 and 92.00 percent of Korea's exports and imports to and from China, and 73.00 percent and 97.10 percent to and from Japan, respectively (Lee, 2005). Among the manufacturing sector, six industries, namely, electronics, automobile, general machinery, textile, steel, and petrochemicals, share the larger pie. These six industries constitute 3/4th of Korea's and Japan's exports and 2/3rd of China's exports in intraregional trade among Korea, China and Japan (Lee, 2005). Also, in total exports, electronics (28.80 percent), textiles (26.10 percent), general and machinery (23.20 percent) have the highest shares, in that order. Excluding petrochemicals (15.50 percent), the rest five industries have a higher market share in the world market than the overall market share (15.80 percent) of the three countries. One of the reasons for rising trade in manufacturing industry is the rapid development of China's heavy and chemical industries and the rapid increase of Korea's and Japan's trade with China after 2000. Therefore, it may be concluded that regional trade interdependence has become very high in Northeast Asia, which has evolved over time, perhaps, due to less policy barriers (tariffs, for example) in the region. But has that also been associated with low trade costs?

Figure 3: Trends in Intraregional Trade in Northeast Asia



Source: Lee (2005)

Figure 4: Scatter of Trade, Tariff and Transaction Costs in Northeast Asia



Notes: 1. Cross-section pooled data for the period 1991 to 2004. 2. TC represents transaction costs, calculated based on the methodology as shown in Section 2. 2. Imports, tariffs and TC are based on bilateral trading pairs.

To answer this, we have plotted trade, tariff and transaction costs in a scatter plot for the panel of 1991 to 2004 in Figure 4, which shows that despite lower tariffs, trade in Northeast Asia is still associated with high transaction costs, which, in other words, indicates that even though the regional trade has gone up over time in Northeast Asia with substantial reduction in tariffs, the cost of trade in the region has seen no substantial fall. Perhaps, rise in costs of trade being an outcome of rising international freight costs has an impact on trade and trade equivalent to tariffs or even the exchange rate. A reduction in the cost of transport directly

stimulates exports and imports, just as an increase in the exchange rate makes exports more competitive, and a reduction in national tariffs lowers the cost of imports. This is more amplified in Table 3, which shows bilateral imports, transaction costs and tariffs for two cross-section years, 1991 and 2004.

Spurred by trade liberalization, all the three countries are now having lower tariffs (Table 3). In fact, tariffs have dropped to levels where in many cases any additional reduction would now no longer have a significant impact. However, movement towards lowering transaction costs varies across the three countries. While, in one hand, China's imports from Korea and Japan have gone up substantially during 1991 to 2004 along with substantial fall in tariffs, on the other, China's bilateral import costs from Korea have increased from 6.40 percent in 1991 to 25.09 percent in 2004, and from 16.58 percent in 1991 to 27.67 percent in case of imports from Japan. Merchandise trade between Japan and Korea and Korea and China indicate fall in tariffs and transaction costs, and rise in trade during 1991 and 2004. In the case of exports of China and Korea to Japan, for example, tariffs have reached to an average of 1.53 percent (Korea), and 3.65 percent (China), compared with a 28.32 percent share accounted for transaction costs in case of China and 1.66 percent in case of Korea. However, the movement of transaction costs do not change much even if we consider distance-weighted transaction costs (TC_w). It follows the same direction indicated in un-weighted transaction costs (TC_n) among the three countries.

What is interesting is that Korea's transaction costs in 2004 were found even much lower than her import tariffs, both in cases of her imports from China and Japan. There is no substantial fall in tariffs in Korea for her imports from China, but her transaction costs for import from China has gone down substantially during 1991 to 2004 due to which bilateral trade between the two countries has gone up much faster than their trade with rest of the region. If Korea's geographical location (distance) in the region is a vital factor for her ability to control the transaction costs, the country's performance in trade enhancement by way of improved associated infrastructure facilities is also praiseworthy. On contrary, the trade between China and Japan is associated with high transaction costs.

Table 3: Aggregate Transaction Cost and Tariff

Year	Importer	Exporter	Import ¹	TC_n ²	TC_w ³	Tariff ⁴
			(%)			
1991	China	Korea	0.24	6.40	0.007	41.80
2004	China	Korea	4.19	25.09	0.026	6.21
1991	China	Japan	2.23	16.58	0.008	41.80
2004	China	Japan	6.35	27.67	0.013	6.41
1991	Korea	China	1.11	57.91	0.061	11.40
2004	Korea	China	4.81	6.35	0.007	11.28
1991	Korea	Japan	6.80	5.14	0.004	11.40
2004	Korea	Japan	7.50	4.29	0.004	4.45
1991	Japan	China	0.34	38.98	0.019	7.51
2004	Japan	China	1.90	28.32	0.014	3.65
1991	Japan	Korea	0.29	0.20	0.001	6.58
2004	Japan	Korea	0.44	1.66	0.001	1.53

Notes: 1. Bilateral imports, as percentage of GDP. 2. Normal bilateral transaction costs, expressed in terms of percentage of total import without controlling distance. 3. Weighted bilateral transaction costs expressed in terms of percentage of total import controlling distance. 4. Weighted average tariff

Sources: Calculated based on WB WITS, UN COMTRADE, and IMF DOTS

This calls for further investigation of sector-wise transaction costs, as bilateral transaction costs are aggregative in nature. In order to capture sector-wise transaction costs, we have considered HS 4 digit products. Tables 4, 5 and 6 provide the top 10 import items, ranked in terms of import volume in bilateral pairs in Northeast Asia for 2001 and 2004. Reason for selection of only top 10 import items is to see the movement of transaction costs in high value imports. Incidentally, in all the pairs, top 10 items cover above 30 percent of total imports of that country from its partner, which even gone above 50 percent in 2004.

Table 4 (a, b) reports China's top 10 import items (at HS 4) from Korea and Japan and corresponding tariffs and transaction costs for 2001 and 2004. Even though China's weighted average tariff has declined in 2004, compared to 2001, transaction costs of her imports from Korea has gone up in most of the items at the top 10 category, whereas the same for her imports from Japan has seen some improvements in most of the top 10 products in 2004. For example, China imports electronic integrated circuits and micro-assemblies (HS 8542) in large volume from both Korea and Japan. In fact, electronic integrated circuits and micro-assemblies alone share 13.45 percent of China's total import from Korea and 9.69 percent of her total import from Japan in 2004. Electronic integrated circuits and micro-assemblies are used as intermediate products in electronics and electrical industry in China, which thereby influence global market as China has considerably good share in global exports of electronics and electrical products. Looking at its high scale use and value addition in the country, Chinese government has completely withdrawn import tariffs on HS 8542. However, associated transaction costs of import of this item from Korea and Japan are too high; more than 200 percent is found to be as transaction costs for her import of this product from Korea and the same was around 90 percent for her import from Japan in 2004. Similarly, China imports liquid crystal devices (HS 9013) from both Korea and Japan, which almost share 13.33 percent of China's total imports from Korea and 3 percent of her total imports from Japan in 2004. These have been used as intermediate items in telecommunication, electronics and electrical industry. However, the cost of import of liquid crystal devices (HS 9013) from Korea is found to be three times higher than the import of the same from Japan.

Therefore, while the policy barriers (e.g. tariff) have been reduced, environmental barriers are very much in existence due to which prices of the finished products are becoming higher. In general, top 10 Chinese imports from Korea are associated with 0 to 10 percent tariffs and 7 to 304 percent transaction costs, whereas the same for China's imports from Japan are associated with 0 to 35 percent tariffs and 2 to 123 percent transaction costs, respectively.

In case of Japan's imports from China (Table 5(a)), most of the top 10 items except apparels and readymade garments, and electrical wire and cables (HS 8544) face no tariff barrier but carry high transaction costs. Total aggregate costs (tariff + transaction) are high in case of import of apparel and ready made garments (HS 6110, 6204, 6203) and insulated wire and cable (HS 8544) from China. Virtually, no policy barrier (in terms of tariff) exists in Japan on imports of high value – high end items (electronics and electrical intermediate and finished products) from China, but environmental barriers, due to structural differences in the logistics and support services, often make the landed price of imports much higher. In case of Japan's imports from Korea (Table 5(b)), all the top 10 Korean products except petroleum oil, other than crude (HS 2710) faced no tariffs in 2004. In general, aggregate average transaction costs of Japan's import from Korea is much less than her import from China appearing mainly due to Korea's location and improved transportation facilities of the two countries, compared to China. Therefore, Japan's imports from Korea face lesser constraints than her imports from China. In other words, due to favourable policy (tariff) and environment (improved trade infrastructure), Japan's welfare gain from her imports from Korea and China seems to be much higher. To some extent, it may also be said that trade environment in Japan is far open and competitive, compared to Korea and China.

Table 4(a): Transaction Costs of China's Import from Korea: Top 10 Products

HS	Product Name	Share ¹ (%)	Tariff ² (%)	TC ² (%)
Year: 2001				
2710	Oils petroleum, bituminous, distillates, except crude	7.32	8.80	9.98
8542	Electronic integrated circuits and microassemblies	6.08	5.97	416.60
8540	Thermionic and cold cathode valves and tubes	4.98	12.39	18.91
2917	Polycarboxylic acid, derivatives	3.08	11.08	11.33
3901	Polymers of ethylene, in primary forms	3.02	16.00	17.08
3903	Polymers of styrene, in primary forms	2.84	16.00	91.14
2902	Cyclic hydrocarbons	2.51	7.94	6.16
5407	Woven synthetic filament yarn, monofilament >67dtex	2.50	29.95	83.53
4104	Bovine or equine leather, no hair, not chamois, patent	2.16	8.55	36.66
7219	Rolled stainless steel sheet, width > 600mm	2.13	12.17	13.06
Year: 2004				
8542	Electronic integrated circuits and microassemblies.	13.45	0.00	214.50
9013	Liquid crystal devices	13.33	8.44	304.14
8529	Parts suitable for use with the apparatus of headings 85.25 to 85.28	4.80	5.37	*
2710	Petroleum oils, other than crude	4.40	6.55	10.89
2917	Polycarboxylic acids, their anhydrides	3.03	8.24	6.56
2902	Cyclic hydrocarbons.	2.66	2.99	*
7219	Flat-rolled products of stainless steel, of a width of 600 mm or more.	2.50	4.93	11.31
8473	Parts and accessories for use with machines of heading 84.69 to 84.72	2.20	0.02	*
8540	Thermionic, cold cathode or photo-cathode valves and tubes	1.95	8.24	19.96
3903	Polymers of styrene, in primary forms.	1.87	10.10	31.61

Table 4(b): Transaction Costs of China's Import from Japan: Top 10 Products

HS	Product Name	Share ¹ (%)	Tariff ² (%)	TC ² (%)
Year: 2001				
8542	Electronic integrated circuits and microassemblies	9.35	5.98	168.63
8479	Machines nes having individual functions	3.10	14.55	46.31
8541	Diodes, transistors, semi-conductors, etc	2.73	10	106.75
8473	Parts, accessories, except covers, for office machines	2.46	9.01	47.22
8708	Parts and accessories for motor vehicles	1.83	26.6	4.85
8529	Parts for radio, tv transmission, receive equipment	1.63	13.46	49.18
5407	Woven synthetic filament yarn, monofilament >67dtex	1.46	29.98	7.04
8522	Parts, accessories of audio, video recording equipment	1.44	32.3	123.32
7210	Flat-rolled iron/steel, >600mm, clad, plated or coated	1.40	9.9	92.10
8536	Electrical switches, connectors, etc, for < 1kV	1.28	11.98	39.70
Year: 2004				
8542	Electronic integrated circuits and microassemblies.	9.69	0.00	88.01
8479	Machines and mechanical appliances having individual functions	3.88	1.05	25.60
8541	Diodes, transistors and similar semiconductor devices	3.33	0.00	88.85
8529	Parts suitable for use with the apparatus of headings 85.25 to 85.28	3.23	5.36	48.69
9013	Liquid crystal devices	3.00	8.17	100.53
8473	Parts and accessories for use with machines of heading 84.69 to 84.72	2.78	0.11	20.85
8708	Parts and accessories of the motor vehicles of headings 87.01 to 87.05.	2.63	14.91	4.50
2902	Cyclic hydrocarbons.	1.81	3.00	1.62
8703	Motor cars and other motor vehicles principally designed for the transport, etc.	1.79	35.19	28.20
8532	Electrical capacitors, fixed, variable or adjustable (pre-set).	1.49	0.00	123.30

Notes: 1. Share in country's total import from partner. 2. Weighted average MFN tariff applied to the partner. 3. Transaction costs of import from partner country. * Not possible to compute due to discrepancy in trade data
Source: Calculated based on WB WITS and UN COMTRADE, sourced using KIEP's online access.

Table 5(a): Transaction Costs of Japan's Import from China: Top 10 Products

HS	Product Name	Share ¹ (%)	Tariff ² (%)	TC ² (%)
Year : 2001				
6110	Jerseys, pullovers, cardigans, waist-coats and sim	3.70	12.11	82.50
6204	Women's or girls' suits, ensembles, jackets, blaze	3.27	11.98	11.94
8471	Automatic data processing machines and units there	2.70	0.00	27.13
6203	Men's or boys' suits, ensembles, jackets, blazers,	2.29	12.16	*
4202	Trunks, suit-cases, vanity-cases, executive-cases,	2.15	9.26	90.17
8473	Parts and accessories (other than covers, carrying	1.80	0.00	228.31
8504	Electrical transformers, static converters (for ex	1.70	0.00	47.71
8529	Parts suitable for use solely or principally with	1.65	0.00	*
2701	Coal; briquettes, ovoids and similar solid fuels	1.63	0.00	10.33
6109	T-shirts, singlets and other vests, knitted or	0.00	11.03	*
Year : 2004				
8471	Automatic data processing machines and units thereof	8.90	0.00	30.75
6110	Jerseys, pullovers, cardigans, waist-coats and similar articles, knitted or .	3.71	10.67	90.24
8473	Parts and accessories for use with machines of heading 84.69 to 84.72	3.21	0.00	76.57
6204	Women's or girls' suits, ensembles, jackets, blazers, dresses, skirts	2.79	9.81	15.43
8529	Parts suitable for use with the apparatus of headings 85.25 to 85.28	1.89	0.00	17.97
2701	Coal; briquettes, ovoids and similar solid fuels manufactured from coal.	1.86	0.00	20.39
6203	Men's or boys' suits, ensembles, jackets, blazers, trousers	1.80	10.08	*
4202	Trunks, suit-cases, vanity-cases, executive-cases, brief-cases	1.79	9.21	130.64
8544	Insulated (including enamelled or anodised) wire, cable	1.51	2.49	72.00
8504	Electrical transformers, static converters (for example, rectifiers) etc.	1.50	0.00	33.62

Table 5(b): Transaction Costs of Japan's Import from Korea: Top 10 Products

HS	Product Name	Share ¹ (%)	Tariff ² (%)	TC ² (%)
Year: 2001				
2710	Oils petroleum, bituminous, distillates, except crude	16.56	2.89	*
8542	Electronic integrated circuits and micro assemblies	12.81	0.00	34.53
8471	Automatic data processing machines (computers)	7.09	0.00	8.24
8473	Parts, accessories, except covers, for office machines	3.07	0.00	*
0303	Fish, frozen, whole	1.71	3.87	5.02
8525	Radio and TV transmitters, television cameras	1.58	0.00	34.21
8522	Parts, accessories of audio, video recording equipment	1.53	0.00	81.23
7208	Hot-rolled products, iron/steel, width>600mm, not clad	1.51	1.27	3.00
0307	Molluscs	1.23	6.92	*
8480	Moulds for metals (except ingot), plastic, rubber, etc	1.01	0.00	*
Year: 2004				
8542	Electronic integrated circuits and micro assemblies.	15.62	0.00	16.01
2710	Petroleum oils, other than crude	12.49	2.93	*
8473	Parts and accessories for use with machines of heading 84.69 to 84.72	6.09	0.00	145.91
8471	Automatic data processing machines and units thereof	2.60	0.00	*
8529	Parts suitable for use with the apparatus of headings 85.25 to 85.28	2.36	0.00	*
8525	Transmission apparatus for radio-telephony, radio-broadcasting	1.79	0.00	22.51
7219	Flat-rolled products of stainless steel, of a width of 600 mm or more.	1.76	0.00	0.55
7208	Flat-rolled products of iron or non-alloy steel	1.58	0.00	0.44
7209	Flat-rolled products of iron or non-alloy steel	1.42	0.00	*
2902	Cyclic hydrocarbons.	1.34	0.00	*

Notes: 1. Share in country's total import from partner. 2. Weighted average MFN tariff applied to the partner. 3. Transaction costs of import from partner country. * Not possible to compute due to discrepancy in trade data
Source: Calculated based on WB WITS and UN COMTRADE, sourced using KIEP's online access.

Table 6(a): Transaction Costs of Korea's Import from China: Top 10 Products

HS	Product Name	Share ¹ (%)	Tariff ² (%)	TC ² (%)
Year : 2001				
2701	Coal, briquettes, ovoids etc, made from coal	6.65	1.00	9.18
8473	Parts, accessories, except covers, for office machines	3.75	8.00	193.96
8471	Automatic data processing machines (computers)	3.22	0.00	32.37
8504	Electric transformers,static converters and rectifiers	3.02	8.00	59.88
2710	Oils petroleum, bituminous, distillates, except crude	2.44	8.00	5.53
6110	Jerseys, pullovers, cardigans, etc, knit or crochet	2.43	13.00	*
8529	Parts for radio, tv transmission, receive equipment	2.41	8.00	20.23
0303	Fish, frozen, whole	2.28	10.00	1.83
1005	Maize (corn)	2.25	0.00	*
6203	Mens or boys suits, jackets, trousers etc not knit	2.01	13.00	7.25
Year : 2004				
8471	Automatic data processing machines and units thereof	4.69	8.00	*
2701	Coal; briquettes, ovoids and similar solid fuels manufactured from coal.	4.67	1.00	*
8542	Electronic integrated circuits and microassemblies.	3.48	8.00	*
8473	Parts and accessories for use with machines of heading 84.69 to 84.72	3.18	8.00	*
7208	Flat-rolled products of iron or non-alloy steel	2.97	8.00	*
7601	Unwrought aluminium.	2.95	3.00	*
8504	Electrical transformers, static converters (for example, rectifiers) etc.	2.33	8.00	24.03
8531	Electric sound or visual signalling apparatus	1.88	8.00	11.14
8529	Parts suitable for use with the apparatus of headings 85.25 to 85.28	1.84	8.00	22.16
8543	Electrical machines and apparatus with individual functions	1.76	8.00	27.73

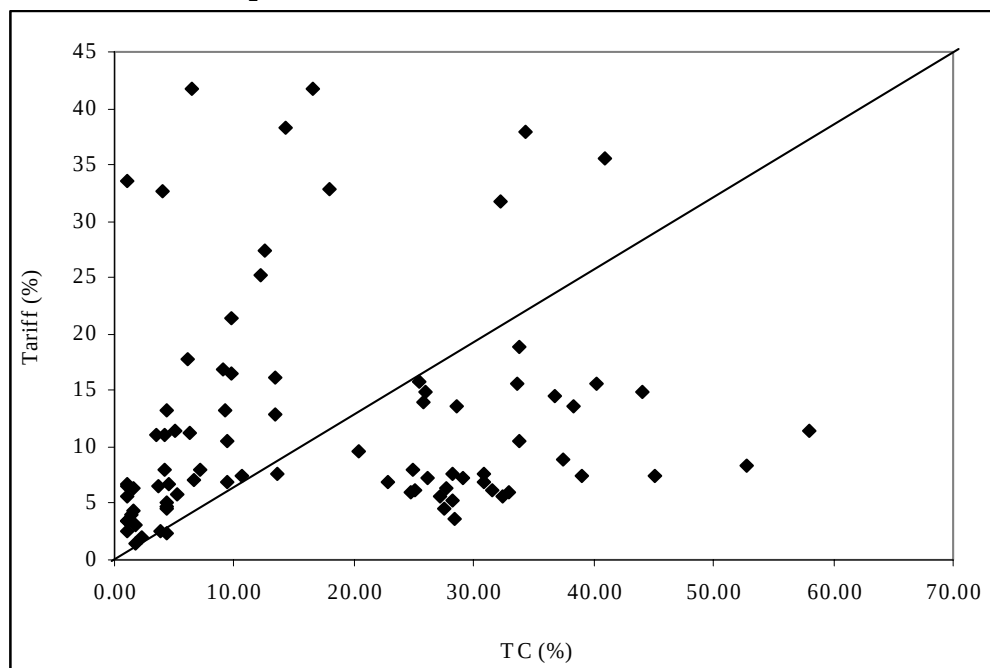
Table 6(b): Transaction Costs of Korea's Import from Japan: Top 10 Products

HS	Product Name	Share ¹ (%)	Tariff ² (%)	TC ² (%)
Year : 2001				
8542	Electronic integrated circuits and microassemblies	9.93	8.00	16.27
8479	Machines nes having individual functions	4.04	8.00	20.15
7208	Hot-rolled products, iron/steel, width>600mm, not clad	3.78	8.00	13.15
8541	Diodes, transistors, semi-conductors, etc	2.75	8.00	10.23
8529	Parts for radio, tv transmission, receive equipment	2.33	8.00	50.01
8708	Parts and accessories for motor vehicles	2.24	8.00	9.32
2902	Cyclic hydrocarbons	1.76	5.00	*
8471	Automatic data processing machines (computers)	1.71	0.00	76.89
9001	Optical fibres, lenses, mirrors, prisms, etc	1.50	8.00	*
8473	Parts, accessories, except covers, for office machines	1.40	8.00	23.50
Year : 2004				
8542	Electronic integrated circuits and microassemblies.	7.66	8.00	*
8479	Machines and mechanical appliances having individual functions	5.84	8.00	*
7208	Flat-rolled products of iron or non-alloy steel	4.73	8.00	8.78
8529	Parts suitable for use with the apparatus of headings 85.25 to 85.28	2.41	8.00	*
8541	Diodes, transistors and similar semiconductor devices	2.27	8.00	*
9001	Optical fibres and optical fibre bundles	1.98	8.00	*
8543	Electrical machines and apparatus, having individual functions	1.97	8.00	*
9010	Apparatus and equipment for photographic (including cinematographic) laboratories	1.91	8.00	1.93
7204	Ferrous waste and scrap; remelting scrap ingots of iron or steel.	1.84	1.00	8.19
2902	Cyclic hydrocarbons.	1.73	5.00	1.84

Notes: 1. Share in country's total import from partner. 2. Simple average MFN tariff applied to the partner. 3. Transaction costs of import from partner country. * Not possible to compute due to discrepancy in trade data.
Source: Calculated based on WB WITS and UN COMTRADE, sourced using KIEP's online access.

On contrary, compared to China and Japan, Korea's trade environment is more restrictive. Most of electrical and electronics import items (HS 8542, 8543, 8529) from China and Japan face import tariffs of average 8 percent and also relatively higher transaction costs. In general, due to Korea's distance advantage and its relatively better-endowed transportation facilities, cost of imports from Japan is much lower than her imports from China (see, Table 7). However, Korea's relatively high tariffs are offsetting its welfare gain arising from her improved trade infrastructure and its strategic location in the region.

Figure 5: Relative Importance of Transaction Costs and Tariff in Northeast Asia



Notes: 1. Pooled data for the period 1991 to 2004. 2. Tariffs and TC are based on bilateral trading pairs.

Therefore, what follows is that regional trade is increasingly taking place in intermediate goods in Northeast Asia, which are used in regional and global production processes. The price of the vast majority of traded goods is thus not necessarily exogenous (appears to be), particularly in case of China and Korea in the Northeast Asia. Indirectly, as Tables 4, 5, and 6 indicate, the shipping of imports has become more expensive. Table 7 is also further confirmed this. Since rise in shipping costs being directly related with higher inflation ensues as a result of the increased cost of imported goods, and in the case of intermediate and capital goods, this also increases the costs of local production. Econometric estimates suggest that the doubling of an individual country's transaction costs leads to a drop in its trade of 80 percent or even more (Hummels, 1999; Limao and Venables, 2001). So, lowering transaction costs is very much important to raise competitiveness of finished goods, particularly in case of Northeast Asia. Trade in intermediate goods requires JIT (just-in-time) deliveries of inputs. JIT in turn requires a particularly sophisticated and efficient transport system, which tends to be widely asymmetric in terms of services across the three countries in Northeast Asia.

Therefore, transaction costs have profound influence on trade. In our case, we found that average incidence of transaction costs seems to exceed that of tariffs over 1991 to 2004 (Figure 5), indirectly pointing towards the fact that trade and transport services are ever more closely linked with one another: to attain higher trade one need to improve its trade services. But does that relationship exogenously determined or can they be influenced by policy? This has been dealt in the next section in the framework of a partial equilibrium model.

Table 7: Trends in Shipping Rates in Northeast Asia¹

Exporter/ Origin	Importer/ Destination	Ocean freight		Other charges ²		Total	
		2003	2005	2003	2005	2003	2005
		(US\$ per container)					
Japan	China	250.00	275.00	178.02	223.11	428.02	498.11
China	Japan	900.00	800.00	162.32	365.90	1062.32	1165.90
Japan	Korea	300.00	275.00	238.35	288.68	538.35	563.68
Korea	Japan	300.00	400.00	218.25	262.25	518.25	662.25
Korea	China	250.00	350.00	202.89	220.33	452.89	570.33
China	Korea	300.00	500.00	190.43	239.86	490.43	739.86

Notes: 1. For shipment of a 20' container (TEU). 2. Including container handling charges, documentation fees, government taxes and levies, etc. of both the trading partners.

Source: Calculated based on Maersk Sealand (2006).

5. Impact of Trade Costs on Regional Trade: Estimation Results

Having discussed the interdependence of Northeast Asian countries in trade, let us turn to see the impact of trade costs on bilateral trade with the help of the fixed effect panel regression.³¹ To assess such impact, as described in Section 3, we have used an augmented gravity model (equation 4). The explanatory variable of interest is transaction cost. We expect that the transaction cost is negatively correlated with the volume of imports. Endogeneity may still be a problem since relatively high imports within the region may lead to better or worse trade facilitation. To check the endogeneity, we use no of ports engaged in trade in bilateral pair as instrument. The reason (rather intuition) is lack of adequate port slows down trade facilitation, but it is not a result of trade volumes. The LSDV estimates are provided in Table 8.

The gravity model performs well as most of the variables do have expected signs. As variables are used in natural logarithms, estimated coefficients show elasticity. All the models (1 to 7) explain 86 to 91 percent of the variations in direction of trade flows. The volume of imports is increasing in GDP and decreasing in the distance. The most interesting result is the strong influence that transaction costs had on trade: the higher the transaction cost between each pair of partners, the less they trade. Therefore, reduction in transactions costs between the trading partners will certainly raise trade by a very large proportion. As can be seen from Table 8, coefficients of transaction costs in all the cases are statistically significant at 5 percent level and always negative.

Models 2 to 7 report the results including remoteness. Coefficients of remoteness and distance are interchangeably significant with unchanged signs. It may be said that while distance has clear negative effect on imports, trade in Northeast Asia does not suffer much from remoteness from rest of the world. Coefficients of remoteness are positive and slightly

³¹ A limited discussion on selection of model in present context is required. We consider both "individuality" of each country as well as "time" in fixed effects regression (or what is known Least-Squares Dummy Variable (LSDV) regression). In other word, LSDV model tells us that intercept varies for each country and/or time but slope coefficients are constant across countries. This model is applied taking in account balanced panel data as described in Section 3. Selection of LSDV model over OLS was based on values of restricted F test using LIMDEP 7.0. In all such tests (OLS vs. LSDV), restricted F values were found highly significant and therefore OLS was found to be invalid in this study. While dealing with fixed effect model (FEM) vs. random effect model (REM), we have carried out Hausman (1978) specification test with the help of STATA 8.0 for all the reported models in this paper. In all cases, *chi-sq.* values were found to be significant, and thus we selected FEM (and not the REM) to assess the impact of trade costs on trade with following caveat. As reported in Park (2005), all the panel estimates were carried out in LIMDEB 7.0 and not in STATA 8.0 for two reasons: (i) STATA 8.0 can not run two-way fixed effect, and (b) R^2 reported in STATA 8.0 fixed effect (within) model is incorrect. To save space, we have omitted placing all these test results in this paper. Interested readers may contact the author for the same.

significant in only three cases. This in other word endorses the importance of ‘nearness’ in Northeast Asia. This is a great advantage for the Northeast Asian countries to achieve higher intraregional trade and mobility of labour and capital by removing common borders.³²

Table 7: Effect of Transaction Costs on Trade: Least Square Estimates

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Importing countries GDP	2.803** (5.409)	1.991** (3.349)	2.700** (5.096)	2.144** (3.166)	2.607** (4.715)	2.621** (4.738)	1.957** (3.339)
Exporting countries GDP	2.528** (4.766)	2.333** (4.537)	2.262** (4.180)	2.683** (4.633)	2.511** (5.304)	2.697** (5.286)	2.232** (4.797)
Importing countries GDP per capita	1.093 (1.747)	1.086 (1.021)		0.907 (0.748)	0.062 (0.095)	0.935 (0.846)	0.696 (1.039)
Exporting countries GDP per capita	1.168 (1.780)	1.935* (2.761)		1.724* (2.162)	0.467 (1.268)	0.504 (1.361)	1.981* (2.874)
Importing countries trade infrastructure	0.458 (0.898)	0.270 (0.474)	0.035 (0.094)	-0.403 (-0.621)		0.567 (0.979)	
Exporting countries trade infrastructure	0.643 (1.308)	1.264* (2.371)	0.038 (0.133)	-0.774 (-1.304)			1.320* (2.554)
Importing countries openness	0.007 (0.015)	0.271 (0.556)	0.359 (0.897)	0.339 (0.610)	0.271 (0.682)	0.555 (1.128)	0.129 (0.338)
Exporting countries openness	-0.603 (-1.154)	-0.924 (-1.787)	-0.115 (-0.315)	-0.458 (-0.794)	-0.062 (-0.159)	-0.081 (-0.208)	-0.953 (-1.867)
Transaction costs	-0.146** (-3.991)	-0.149** (-4.266)	-0.141** (-3.829)		-0.132** (-3.708)	-0.131** (-3.698)	-0.150** (-4.328)
Tariff	-0.086 (-0.489)	-0.202 (-1.153)	-0.009 (-0.054)	-0.329 (-1.667)	-0.026 (-0.184)	-0.076 (-0.436)	-0.162 (-1.063)
Importing countries exchange rate	0.088 (0.237)	-0.272 (-0.705)	-0.416* (-2.404)	-0.261 (-0.592)	-0.341 (-1.118)	-0.563 (-1.481)	-0.158 (-0.527)
Exporting countries exchange rate	0.058 (0.155)	-0.442 (-1.139)	-0.498* (-2.704)	-0.433 (-0.978)	-0.129 (-0.431)	-0.170 (-0.564)	-0.488 (-1.305)
Remoteness		2.751* (2.479)	0.455 (1.118)	2.556* (2.020)	0.797 (1.125)	1.514 (1.486)	2.480* (2.625)
Distance	-4.913* (-2.289)	-2.511 (-1.105)	-6.469** (-3.442)	-2.904 (-1.121)	-5.674** (-3.643)	-6.296** (-3.742)	-2.063 (-1.005)
Adjusted R ²	0.903	0.911	0.901	0.885	0.904	0.904	0.913
No of Observations	1176	1260	1092	1176	1092	1176	1176

Notes: Numbers in parentheses are t-values. * Significant at the 10 percent level. ** Significant at the 5 percent level. ***Significant at the 1 percent level. #Country fixed effects are included. \$Results are corrected for heteroskedasticity.

Next important factor is GDP of both exporting and importing countries. But this is a rather common phenomenon as we are dealing with aggregate behaviours. The negative but insignificant coefficients of tariffs in all the models indicate that further tariff liberalisation will not much enhance the regional trade in Northeast Asia. While exporting country’s openness has appeared with negative signs in all the models, the same in case of importing country has come out with positive signs, but none is significant. It may be said that country’s openness has never appeared as significant barrier primarily because of existence of two main factors: (i) existence of low tariff rates among the countries considered here, and (ii) Korea and China’s comparatively higher dependence on foreign trade so that absence of any counter-factual variation in the dataset could not make the statistical test going in favour of ‘openness’.

³² By removing common borders between Germany and Czech, and also between the United States and Mexico, substantial positive effects could be observed on predicted income per capita in the smaller countries; income per capita of Czech and Mexico have gone up by 26 percent and 27 percent respectively presumably as a result of integration (Redding and Venables, 2004).

On the other hand, exchange rates show a significant (at 10 percent level in model 3) negative effect on trade. All the models in Table 8 indicate that a lowering of the exchange rate fluctuations will have a stronger impact on trade. On the cynical side, one could say that actual volume of trade in the world is still a phenomenon which is driven more by exchange rate manipulation than by pure competitiveness (Krugman, 1994).

Quite consistent with the behaviour of transaction cost, country's trade mobility infrastructure produces positive signs with bilateral trade in all the models except in model 4. Coefficients of infrastructure (both importing and exporting countries) switch signs when we exclude transaction costs in model 4. The explanation behind this changeover sign is that in absence of trade infrastructure at border (both visible and invisible), such as trade facilitation measures, economic infrastructure (namely, railways, roadways, ports, airways and telecommunication facilities) will not produced desired results in enhancing trade in isolation. In other words, strengthening trade facilitation measures at border as well as economic (internal) infrastructure should go together. Separating the two will not enhance trade since collection and/or distribution of the goods inside the country is equally important as like as facilitating the trade at border.

Table 9: Effect of Transaction Costs on Trade: 2-Stage Least Square Estimates

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Importing countries GDP	1.254** (3.264)	1.407** (5.952)	1.190** (3.288)	1.550** (4.210)	0.891** (2.342)
Exporting countries GDP	1.025** (4.342)	1.154** (5.838)	0.990** (4.362)	1.148** (5.046)	0.868** (3.693)
Importing countries GDP per capita	0.427 (0.581)		0.987* (2.258)	-0.122 (-0.189)	1.416* (2.704)
Exporting countries GDP per capita	0.193 (0.439)		0.699** (4.460)	0.672** (4.284)	0.044 (0.100)
Importing countries trade infrastructure	0.483 (1.591)	0.639** (3.122)		0.611 (1.994)	
Exporting countries trade infrastructure	0.512 (1.116)	0.635** (3.782)			0.692 (1.511)
Importing countries openness	-0.090 (-0.310)	-0.176 (-0.626)	0.100 (0.340)	-0.152 (-0.472)	0.113 (0.396)
Exporting countries openness	-0.626 (-1.403)	-0.753* (-2.612)	-0.437 (-1.444)	-0.317 (-1.012)	-0.820 (-1.960)
Transaction costs	-0.150** (-4.194)	-0.149** (-4.447)	-0.139** (-4.010)	-0.139** (-4.203)	-0.153** (-4.203)
Tariff	-0.059 (-0.422)	-0.021 (-0.189)	-0.094 (-0.864)	-0.148 (-1.339)	-0.011 (-0.083)
Importing countries exchange rate	-0.924** (-4.559)	-0.806** (-7.531)	-1.098** (-6.354)	-0.849** (-4.288)	-1.129** (-6.399)
Exporting countries exchange rate	-0.834** (-5.204)	-0.785** (-6.491)	-0.971** (-6.365)	-0.964** (-6.553)	-0.794** (-4.717)
Remoteness	0.280 (0.308)	-0.063 (-0.177)	0.338 (0.650)	-0.514 (-0.862)	1.171 (1.439)
Distance	-5.234** (-4.486)	-5.359** (-5.564)	-6.031** (-5.519)	-6.252** (-5.941)	-4.719** (-3.772)
Instrument: No of seaports for exports and imports in bilateral pair	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	0.878	0.880	0.875	0.878	0.877
No of Observations	1176	1008	1008	1092	1092

Notes: Numbers in parentheses are t-values. * Significant at the 10 percent level. ** Significant at the 5 percent level. ***Significant at the 1 percent level. \$ Results are corrected for heteroskedasticity

Next, we deal the 2-stage least square estimates (2SLS) which addresses more precisely the potential problem of omitted variable bias and endogeneity. The results are reported in Table 9. In fact robustness of transaction costs has gone up in Table 9 by using instrumental variable. This result holds when we deal with the potential endogeneity of the variable transaction costs by using as instrument number of ports engaged in trade in bilateral pair. Transaction costs have statistically significant negative impact on the volume of imports. The coefficient of transaction costs increases in all the models reported in Table 9, compared to the same in Table 8, when we use instrumental variable. Therefore, result implies that 10 percent saving in transaction costs increases imports by about 4 to 5 percent. Results are unchanged and robust when we include both the partners' trade infrastructure in model 2, and interchangeably in models 4 and 5, respectively. Tariff, as usual, shows no significant impact on imports. Therefore, it also may be concluded that countries with relatively low trade infrastructure facilities have encountered with high transaction costs thereby offsetting the gain from higher trade.

6. Conclusions and Policy Implications

The analysis carried out in this paper place evidences to ascertain that today's trade issues in Northeast Asia go beyond the traditional mechanisms of tariffs, and include "behind-the-border" issues. The link between trade flows and trade costs has been based previously more on intuition than evidence, particularly in context of Northeast Asia. We found that variations in transaction costs along with trade infrastructure facilities have significant influence on regional trade flows in Northeast Asia. The rise in transaction cost is an outcome of the environment and policy constraints on the regional trade and infrastructure system.

Our results have important implications for Northeast Asian countries seeking to expand trade. When the tariffs have come down heavily, the economies of this region could potentially benefit substantially from higher trade in Northeast Asia subject to (i) control of transaction costs, and (b) strengthening the chain of necessary trading infrastructure facilities, starting from the production point to the shipment point, and associated trade facilitation measures. The challenge for Northeast Asian countries is to identify improvements in logistics services and related infrastructure that can be achieved in the short-to-medium term and that would have a significant impact on competitiveness of these three countries. Therefore, policy protection should tend to complement natural protection, lowering the variability of trade costs.

Tariffs tend to be lower not only in Northeast Asia but also across most of the economies in the world. Attention is being paid towards trade facilitation, to a varied extent, across the world. Generally speaking, tariffs are not regarded as major barriers to trade although high-tariff items and tariff escalation still exist for certain sensitive products. With globalization of economic activities, business and trading communities—in particular, small and medium enterprises—pay greater attention to various government documentation requirements in order to reduce the cost of doing business. Studies by World Bank, OECD, UNCTAD, APEC and UNESCAP clearly show that documentary requirements are burdensome to the trading community, and that trade facilitation efforts will be more beneficial than trade liberalization.³³ Even though Customs Authorities in Northeast Asia have undergone significant reforms in recent years³⁴, particularly in Korea and Japan, one of the major reasons

³³ To mention a few, Brooks *et al* (2005), Duval (2006)

³⁴ An efficient, friendly and corruption free customs can help boost trade and investment. Customs procedures between China and Korea have improved moderately in recent years since China began to actively develop its export trade but document processing is still largely manual and discourages the seamless flow of traffic. With an objective to reduce border transaction time, China, Japan and Korea have successfully simplified administrative documentation, computerization of documents by connecting all custom points through electronic data interchange, paperless trading, alignment with

for high transaction costs in Northeast Asia, however, is time taking in cross-border trading procedures. Table 10 exemplifies this further. Requirement of export documentations in Northeast Asian countries is less, but it involves 20 to 11 days. It takes average 20 days when consignment is exported from China. Japan and Korea still take average 24 days to clear imports coming from China. Generally, a consignment needs several documentations, signatures, and copies for the final approval, taking into account both sides, and encounter multiple transshipments, resulting which costs are rising high day-by-day which often tends to change the composition and direction of trade.³⁵ Sending a containerised cargo from China to Japan costs about US\$ 1166 (in 2005), whereas the same from Japan to China costs only US\$ 498 (see, Table 7). Among the three, due to favourable policy (tariff) and environment (improved trade infrastructure), Japan's welfare gain from her trade with Korea and China seems to be much higher.

Table 10: Trade Facilitation Indicators in Northeast Asia in 2005

Exporter/ Origin	Importer / Destination	Documents for export (number)	Time for export (days)	Shipping cost (US\$ per container) ¹	Documents for import (number)	Time for import (days)
Japan	China	5	11	498.11	7	11
China	Japan	6	20	1165.90	11	24
Japan	Korea	5	11	563.68	7	11
Korea	Japan	5	12	662.25	8	12
Korea	China	5	12	570.33	8	12
China	Korea	6	20	739.86	11	24
World Average ²		7	30		11	37
Asian Average ³		7	23		10	26

Notes: 1. Cost including both the partners (taken from Table 7). 2. Includes 154 countries. 3. Includes ASEAN+6 countries except Brunei and Myanmar.

Sources: 1. World Bank (2006b). 2. Maersk Sealand (2006)

Needless to mention, procedural complexities coupled with high variability in shipping costs work as deterrent to trade in Northeast Asia. As noted in Table 10, even though performances of Northeast Asian countries in export facilitation (in terms of days and numbers) are comparatively better than the world and Asian averages, but the variability in case of imports facilitation between Northeast Asian countries and World and/or Asia is not much wide thereby indicating the need for further improvement of their trade facilitation performances.

To move towards this direction, countries in Northeast Asia have to adopt a policy for lowering trade costs – not only for their trade in the region but also for the rest of the world. While doing so, their regional obligations need to match with their WTO commitments towards facilitation of trade. Adopting two different approaches towards trade facilitation (regional and multilateral) will not produce desired results and thus not recommended as trade

international standards, pre-shipment inspection for all non-government imports, simplified tariff based on the Harmonized Code (8 digit); and red and green channels in major airports, seaports since 1999 (APEC, 2005).

³⁵ The average lead time from port arrival to granting an import permit for all imported cargo in Japan has largely been reduced over the past 10 years. This reduction in the port distribution lead time has resulted in higher efficiency of operations for cargo owners, shipping companies and shipping forwarders, etc. The Customs and Tariff Bureau, Ministry of Finance of Japan, has so far implemented six time release surveys. According to the latest survey conducted in 2001, the average requisite time from port arrival to permit issuance for all imported cargo was 73.8 hours or 3.1 days, representing a major reduction compared with the lead time in the first survey in 1991 of 168.2 hours or 7.0 days (Government of Japan, 2004). Complex customs and tariff administration were also found as strong barriers to trade in Korea (Kim and Park, 2001). Refer, Table 2 of Sohn and Yang (2003) for further details.

is not restricted to a particular region and there is high interdependence among the economies across the world.

In order to better inform policy-making process, future research should be undertaken to complement the findings of this paper in following ways. First, the focus of this study is on the importance of trade costs and trade facilitation in the context of Northeast Asia. Both the measures are very much aggregative in nature. So, future study should attempt to decompose the trade infrastructure index, and find the causal linkages of the variables with the trade flow separately. Second, the study has considered aggregate trade, transaction costs and tariffs in bilateral pairs. Future research should consider disaggregated data, at least at the HS 4-digit level, for trade costs and tariffs. Third, this paper has considered direct trade costs but omitted infrastructure costs. Variability in infrastructure endowments and costs thus need to be captured more accurately in the model provided the data is available. Finally, in order to find out the relative robustness of the transaction costs, one may need to replace the transaction costs assessment methodology adopted here by other method(s).

Appendix 1

Sources of Data

Particular	Source
Bilateral trade	UN COMTRADE IMF DOTS
Bilateral tariff	WB WITS Korea Customs
GDP, GDP per capita, surface area, population, openness, exchange rate	WB WDI 2005
Distance	Great circle distance, http://www.wcrl.ars.usda.gov/cec/java/lat-long.htm
Infrastructure variables: (i) railway length, (ii) road length, (iii) air transport freight, (iv) air transport passengers carried, (v) aircraft departures, (vi) container traffic, (vii) fixed line and mobile phone subscribers, (viii) internet users, and (ix) electric power consumption	WB WDI 2005 UNESCAP
Shipping rates and number of ports	Maersk Sealand, Denmark, http://www.maerskline.com

Appendix 2

(a) Trade Structure between China and Japan: Top 10 Commodities in 2004

Commodity Code	Commodity Description	Value	Share
		(US\$ billion)	(%)
(a) Export			
HS 85	Electrical machinery and equipment and parts thereof; sound recorders etc.	13.10	17.82
HS 84	Machinery and mechanical appliances; parts thereof	11.69	15.90
HS 62	Articles of apparel and clothing accessories, not knitted or crocheted	7.55	10.27
HS 61	Articles of apparel and clothing accessories, knitted or crocheted	6.06	8.24
HS 27	Mineral fuels, mineral oils and products of their distillation	2.99	4.07
HS 90	Optical, photographic, cinematographic, measuring, checking, precision, etc.	2.55	3.47
HS 16	Preparations of meat, of fish or of crustaceans	2.18	2.97
HS 94	Furniture; bedding, mattresses, cushions and similar stuffed furnishing	1.61	2.19
HS 63	Other made up textile articles; sets; worn clothing and worn textile article, etc.	1.47	1.99
HS 87	Vehicles other than railway or tramway rolling stock	1.46	1.98
(b) Import			
HS 85	Electrical machinery and equipment and parts thereof; sound recorders, etc.	28.33	30.04
HS 84	Machinery and mechanical appliances; parts thereof	21.69	23.00
HS 90	Optical, photographic, cinematographic, measuring, checking, precision, etc.	7.82	8.29
HS 72	Iron and steel	5.58	5.92
HS 39	Plastics and articles thereof	4.65	4.93
HS 87	Vehicles other than railway or tramway rolling stock	4.63	4.90
HS 29	Organic chemicals	4.54	4.82
HS 73	Articles of iron or steel	1.43	1.51
HS 74	Copper and articles thereof	1.41	1.50
HS 38	Miscellaneous chemical products	1.06	1.12

Note: Consider China's two-way trade with Japan

Source: UN COMTRADE

(b) Trade Structure between China and Korea: Top 10 Commodities in 2004

Commodity Code	Commodity Description	Value (US\$ billion)	Share (%)
(a) Export			
HS-85	Electrical machinery and equipment and parts thereof; sound recorders etc.	6.64	23.86
HS-84	Machinery and mechanical appliances; parts thereof	2.89	10.38
HS-72	Iron and steel	2.53	9.10
HS-27	Mineral fuels, mineral oils and products of their distillation	1.74	6.24
HS-62	Articles of apparel and clothing accessories, not knitted or crocheted	1.38	4.95
HS-61	Articles of apparel and clothing accessories, knitted or crocheted	1.33	4.78
HS-76	Aluminium and articles thereof	0.97	3.48
HS-03	Fish and crustaceans, molluscs and other aquatic invertebrates	0.85	3.06
HS-29	Organic chemicals	0.59	2.13
HS-90	Optical, photographic, cinematographic, measuring, checking, precision, etc.	0.58	2.10
(b) Import			
HS-85	Electrical machinery and equipment and parts thereof; sound recorders, etc.	18.58	29.86
HS-90	Optical, photographic, cinematographic, measuring, checking, precision, etc.	9.18	14.76
HS-84	Machinery and mechanical appliances; parts thereof	6.89	11.07
HS-29	Organic chemicals	4.98	8.01
HS-39	Plastics and articles thereof	4.88	7.83
HS-72	Iron and steel	4.17	6.69
HS-27	Mineral fuels, mineral oils and products of their distillation	3.21	5.16
HS-87	Vehicles other than railway or tramway rolling stock	1.50	2.42
HS-74	Copper and articles thereof	0.86	1.38
HS-54	Man-made filaments	0.78	1.26

Note: Consider China's two-way trade with Korea

Source: UN COMTRADE

(c) Trade Structure between Korea and Japan: Top 10 Commodities in 2004

Commodity Code	Commodity Description	Value (US\$ billion)	Share (%)
(a) Export			
HS-85	Electrical machinery and equipment and parts thereof; sound recorders etc.	6.05	27.86
HS-27	Mineral fuels, mineral oils and products of their distillation	3.39	15.60
HS-84	Machinery and mechanical appliances; parts thereof	2.77	12.76
HS-72	Iron and steel	1.62	7.45
HS-39	Plastics and articles thereof	0.87	4.01
HS-29	Organic chemicals	0.78	3.60
HS-73	Articles of iron or steel	0.62	2.86
HS-03	Fish and crustaceans, molluscs and other aquatic invertebrates	0.60	2.78
HS-90	Optical, photographic, cinematographic, measuring, checking, precision, etc.	0.52	2.37
HS-87	Vehicles other than railway or tramway rolling stock	0.34	1.57
(b) Import			
HS-85	Electrical machinery and equipment and parts thereof; sound recorders etc.	12.30	26.65
HS-84	Machinery and mechanical appliances; parts thereof	8.57	18.57
HS-72	Iron and steel	5.85	12.68
HS-90	Optical, photographic, cinematographic, measuring, checking, precision, etc.	4.81	10.42
HS-29	Organic chemicals	2.18	4.73
HS-39	Plastics and articles thereof	2.18	4.72
HS-38	Miscellaneous chemical products	1.28	2.76
HS-87	Vehicles other than railway or tramway rolling stock	1.02	2.21
HS-70	Glass and glassware	0.74	1.61
HS-27	Mineral fuels, mineral oils and products of their distillation	0.71	1.54

Note: Consider Korea's two-way trade with Japan

Source: UN COMTRADE

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