Measuring the Impact of Northeast Asian Trade Facilitation on Intra-regional Trade

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ABSTRACT

What would be the most efficient way of enhancing positive trade creation effect in a globalizing world, especially for countries in Northeast Asia? We argue that improvement in trade facilitation measures in East Asian countries, China, Japan and Korea, can serve as an effective policy alternative to complement tariff reduction policy. In order to support our argument, we attempted to analyze the net trade creation effect of trade facilitation among the countries in Northeast Asia including China, Korea, and Japan by using a survey analysis and a Gravity analysis.   We found that each of the four trade facilitation indices we considered (customs procedures, standards and conformity, business mobility, information and communication technology) shows significantly positive effects on bilateral trade between the three Northeast Asian countries.

Keywords: Trade Facilitation, Free Trade Area, Gravity Analysis, Northeast Asia

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I. INTRODUCTION

In recent history, one of the biggest changes in the international trade environment has been globalization – a concept highly supported by multilateral institutional frameworks like the WTO (World Trade Organization) and APEC (Asia Pacific Economic Cooperation). Another change that is just as important as globalization is regionalization. Since the late 1990s, the two main international trading policies, globalization and regionalization, have faced many challenges. For example, the bubble surrounding the rapidly growing developing economies in East Asia finally burst in 1997 leading to a financial crisis. On the other hand, the rapid growth in Information and Communication Technology (ICT), also known as the 'New Economy,' seemed to have finally reached its limits. By experiencing the Asian financial crisis and the worldwide recession sparked by the U.S. economic stagnation, it was realized that regional economic cooperation is necessary for economic stability and revitalization of the world economy. The importance of economic and political cooperation between economies is being emphasized, and in particular, cooperation in trade between major trading partners is becoming increasingly important.

Evaluating the worldwide effort for trade cooperation, the emergence and expansion of NAFTA (North American Free Trade Agreement) and AFTA (ASEAN Free Trade Area) and the creation of the EMU (Economic and Monetary Union of Europe) have led to a widespread lowering of tariff barriers. Overall, the abolishment of tariffs, an important means of achieving free trade, has been partially successful after the conclusion of the Uruguay Round. However the effectiveness of the Uruguay Round has been exhausted. As a complementary policy measure, the WTO, World Bank and APEC, among others, are actively discussing trade liberalization to minimize tension between economies and improve social welfare internationally through a reduction in non-tariff barriers. That is, while complementing the successful completion of the Uruguay Round, trade facilitation is considered a way to achieve economic prosperity along with increases in welfare by continuously liberalizing trade. In 2001, APEC Leaders gathered in Shanghai and reaffirmed the importance of trade facilitation by setting goals to reduce transaction costs by 5 percent across the APEC region by 2006. Since then, APEC's efforts to enhance trade facilitation have emerged as an important engine for expanding regional trade to achieve the Bogor Goals. At the same time, this policy

coincides with the WTO's movement toward globalization against proliferating discriminatory regional trade arrangements. This has led to a preference for trade facilitation amongst APEC member economies including the three Northeast Asian countries, China, Japan and Korea, which have strongly supported APEC's open regionalism.

The three Northeast Asian countries have achieved remarkable economic growth with their export-oriented economic policies. Their experience of economic development is considered to be a model case for many developing and transitional economies. However, this model of economic development has exhibited its share of vulnerability with the 1997 East Asian financial crisis and is now facing potential disadvantages posed by growing tendencies towards regionalization and globalization in the international trade environment. As a viable solution to how the three Northeast Asian countries might cope with these challenges, we strongly suggest regional economic cooperation between the countries through improvements in trade facilitation.[1]

To support our policy recommendation to the three Northeast Asian countries, we will attempt to analyze the net trade creation effect of trade facilitation among the three countries. It is clear that trade facilitation reduces trade costs. In fact, there have been many attempts to analyze the cost reduction effect of trade facilitation. However, as evidenced by past experiences, the identification and measurement of economic effects driven by trade facilitation are very limited and, in most cases, even impossible due to the cross-cutting and non-numeral nature of trade facilitation. More specifically, in order to quantify the economic impacts of trade facilitation more accurately, the following concerns need to be cleared in advance.

- To what extent would trade facilitation reduce trade costs? In other words, is it possible to quantify the relationship (indexation of trade facilitation)?

- How much change in trade can one expect from the improved trade facilitation (quantification of trade facilitation effect)?

In order to answer these questions, we attempt to estimate the effect of trade facilitation on trade costs in the three countries by quantifying survey results from Kim and Park (2001) and APEC (2002).   We then apply the estimates to measure the possible impact of trade facilitation on those economies by using a Gravity regression analysis developed by Wilson, Mann and Otsuki (2003) and a partial equilibrium analysis by Kim and Park (2001).

Following this introductory section, Section II briefly explains the theoretical relationship between trade facilitation, trade costs and gains or losses from freer trade through trade facilitation.   Section III briefly introduces existing empirical studies on the impacts of trade facilitation.   Section IV specifies the methodology we adopt to quantify the impact of enhancing trade facilitation among the three Northeast Asian countries and the Gravity equation used in this study, and Section IV also evaluates the empirical results from the Gravity analysis.   In Section V, we undertake a partial equilibrium analysis to estimate the effect of trade facilitation between the three Northeast Asian countries on its intra-regional trade volume by using price elasticities between the three countries.   We summarize our findings in Section VI.

II. TRADE FACILITATION: THEORETICAL INTRODUCTION

1. Trade Facilitation as an Alternative to Trade Liberalization

A superior form of regional trade arrangement would be one facilitating a deeper integration by removing non-tariff trade barriers, trade barriers in services and investment liberalization. In order to highlight the importance of deeper integration among Northeast Asian countries and the successful implementation of an FTA in the region, we propose an alternative way to achieve a Northeast Asian free trade arrangement. We strongly suggest that the FTA should stress trade facilitation rather than following common guidelines on tariff reduction. We believe that this method is more effective for integrating regional economies in a free trade area because trade facilitation measures such as enhanced customs procedures, standardization, free mobility of businesspeople, and implementing information and communication technology can be used to promote trade among countries in the region as well as between regions by drastically reducing the transaction costs incurred in the process of international trade.[2] These trade facilitation measures could be considered as a complement to General Purpose Technology (GPT).[3] As a public good carries the potential for pervasive use covering all the range of sectors, trade facilitation will generate a broader range of efficiency gains across sectors. Innovation in information and communication technology as well as improved transaction instruments between countries could be defined as GPT, but this may be inefficient because of the existence of trade barriers resulting from failures in trade facilitation.

Furthermore, compared to tariff reduction among members, trade facilitation reduces the problem caused by the "spaghetti bowl phenomenon"[4] and makes it easier for members to open toward nonmembers thereby satisfying APEC's commitment to open regionalism. When we take into account imported intermediate goods and specific sectors such as agriculture, we believe trade facilitation is a superior policy instrument than tariff reduction. While some

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[2] For the positive effect of trade facilitation compared to trade liberalization, see APEC (2002) and Wilson, Mann, and Otsuki (2003).
[3] For the GPT as a source of economic growth, see Helpman (1998).
[4] See Bhagwati, Greenaway, and Panagariya (1998).

argue that the difficulties in accessing agricultural products arise from health – not cost – considerations, such views need not detract from the case for trade facilitation. Relatively greater ease to include "substantially all trade" in the case of trade facilitation also satisfies Article XXIV of GATT.

2. Trade Facilitation: Gains from Trade[5]

In this section, we attempt to formalize the concept of trade facilitation, which strongly complements trade liberalization, and theoretically examine the linkage between trade facilitation and gains from freer and easier trade.

A. Concept of Trade Facilitation

Tariffs and non-tariff measures are barriers impeding international trade. The non-tariff measures can be classified as direct barriers (i.e., import quotas) and indirect barriers (i.e., complex customs procedures). These barriers, along with transportation, insurance and other physical transaction costs, affect the prices of domestically produced goods and imports, thereby restricting the flow of international transactions. The restrictions result in a loss of efficiency in terms of resource allocation, social welfare and economic development.

Trade facilitation can be defined as an effort to pursue greater 'convenience' in international trade through the simplification of economic activities such as the movement of goods and services across borders.[6] In a broad sense, it can be defined as the lowering or elimination of non-tariff barriers. More specifically, it is an attempt to lower the costs of administration, standardization, technology, information, transaction, labor, communication, insurance and financing, as well as reducing the time costs related to these procedures.[7] The administration costs arise during customs procedures, the technology costs are involved during standards procedures, and the information costs arise while importing or exporting goods and services. Those costs result in the loss of economic efficiency and reduce gains from trade.

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[5] Cited and summarized from APEC (2002).
[6] See WTO (2001).
[7] We focus on four main areas of trade facilitation in this study: customs procedures, standards and conformance, mobility of business people, and information and communication technology.

B. Trade Costs and International Trade

Assuming that total costs related to international trade are equivalent to the price difference between world market price of imported goods and domestic consumer price, we can define this to be trade costs.   In this context trade costs can be divided into three categories.   First, there are transaction costs that consist of transport costs and insurance costs.   Second, there are policy costs that are mainly incurred by protection policies such as tariff and non-tariff barriers.   Finally, there is a trade cost due to the lack of trade facilitation.   Therefore, trade costs incurred by the movement of goods and services across borders can be summarized by the following equation (1).

Equation (1):

Trade Costs = Transportation Costs + Policy Costs + Facilitation Costs

We deduce from the above equation that the reduction in trade costs resulting from better trade facilitation has an identical effect as a reduction of tariffs or non-tariffs, both resulting in an increase in social welfare through gains from freer trade.   More specifically, we apply the iceberg method, which is a traditional method of explaining transaction costs involved in international trade, into Equation (1).[8]

Equation (2):

$$p_c = [\frac{(1+t)}{(1-\gamma)(1-\tau)}]\ p_w$$

In Equation (2), the p_w and p_c are world market price and domestic price of the imported goods, respectively, and t represents policy costs, where γ represents transaction costs and τ represents facilitation costs respectively.   Let us assume that γ ($0<\gamma<1$) represents the percentage occupied by transport costs in a single unit of exportable and only (1-γ) arrives at the importing country.   Then γ represents direct transaction costs.   If we apply this iceberg method to define the trade costs related to trade facilitation, out of the (1-γ) of imports

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[8] See pp. 157-163 of Frankel (1997) for the relationship between the traditional "iceberg" method and transaction costs and tariffs.   This section extends Frankel's idea and applies it to facilitation costs.

received, τ $(0<\tau<1)$ percent will additionally be discarded due to inefficient customs procedures in the importing country.   Therefore, only $(1-\gamma)(1-\tau)$ of the exportables will enter the domestic market.   With these assumptions, we can interpret τ as the facilitation cost.

Therefore, according to Equation (2), trade facilitation improves importing countries' welfare by narrowing the gap between the world market price (p_w) and the domestic price (p_c) of the imported goods, which leads to an increase in the volume of world trade.   This implies that the closer τ is to 0, the more the difference between the two prices will narrow and therefore one can expect higher welfare gains.

C. Gains from Trade Facilitation

The development of information and communication technology (ICT) along with great efforts to liberalize trade has brought about a considerable reduction in transaction (γ) and policy (t) costs.   At the same time, due to developments in information and communication technology, increases in e-commerce as well as efforts[9] to increase efficiency in customs procedures, facilitation costs (τ) have also fallen.   However, this reduction in facilitation costs has been highlighted recently and is only a small fraction of the reduction in transaction and policy costs.   It is believed that there is still plenty of room for additional reductions in facilitation costs that can lead to a remarkable improvement in the world trade environment.

The expected gains from trade facilitation are as follows.   First, similar to tariff reductions, trade facilitation induces a fall in trade costs.   It will create trade and increase gains from freer and easier trade.   Second, trade facilitation will reduce the opportunity costs of international specialization.   This will increase outsourcing opportunities and expand the fragmentation of production activities across borders.   Welfare will improve through this process.   In particular, the expansion of outsourcing and transfer of technology across borders will assist in the industrialization of developing economies.   Third, trade facilitation may improve the government's efficiency in administration and may enhance transparency. In addition to these anticipated benefits, the government revenue may increase from customs procedure-related activities.   Fourth, trade facilitation will reduce the possibility of

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[9] See Ministry of Foreign Affairs and Trade (2000).

international disputes between developed and developing economies arising from differences in customs procedures and operating systems. This will reduce the costs of resolving disputes and lead to an increase in world trade. Fifth, trade facilitation will help small and medium enterprises (SMEs), especially in developing countries, to become more quickly and actively exposed to the global market. This will in turn produce greater gains from trade, promising economic growth in developing economies. In addition, trade facilitation can be easily pushed forward since it has the characteristics of a public good, and if applied non-exclusively, it satisfies the fundamental ideas of the WTO and is consistent with APEC open regionalism.

On the other hand, there are some costs incurred through trade facilitation. Higher implementing costs are expected. Legal and structural infrastructures must be set up prior to carrying out trade facilitation, and the amount of skilled labor must be enlarged through continuous education and training. There is also a huge amount of fixed cost involved in obtaining capital and facilities, which are required for improving the system. A discrepancy in standards among the participating economies is also expected. In reality, it will be very difficult to harmonize the differences in customs procedures, systems, infrastructure, labor standards, safety and technology when each economy is in a different phase of development. In addition, there is a difficulty in measuring effectiveness. Unlike trade liberalization, there are limitations[10] on obtaining statistical evidence for trade facilitation with trade costs. This makes it difficult to carry out a cost-benefit analysis, thus creating a political burden for policymakers to push any trade facilitation-related policy forward without a quantitative estimation of the expected effect.

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[10] See Wilson (2000).

III. EXISTING EMPIRICAL STUDIES ON TRADE FACILITATION

Trade facilitation to achieve a freer and easier trade environment has been one of the hottest issues in international organizations since the WTO's Ministerial Meeting held in Singapore in 1996.　It finally started to take shape during the WTO's Trade Facilitation Symposium in March 1998.　As a result of these various efforts, the effect of trade facilitation on international trade has been carefully examined, but most studies are thought to be too focused on a specific aspect of trade liberalization or inadequate as a quantitative macroeconomic analysis.

In general, there are four different methods for analyzing the effect of trade facilitation.　The most widely used method is investigative analysis based on surveys.[11]　Aside from this, there are empirical analyses, which use gravity model analysis,[12] partial equilibrium model analysis[13] and computable general equilibrium model (CGE) analysis.[14] Table 1 summarizes the existing empirical studies on the effect of trade facilitation based on the four different approaches.[15]

Trade facilitation leads to a reduction in trade costs, which leads to an increase in the volume of world trade.　This results in an increase in real GDP and welfare.　The most important factor in determining the relationship between trade facilitation and macro aggregate variables such as GDP is trade cost.　Until now, the survey results by Cecchini (1988) and UNCTAD (1992) were used as a reference value to represent the relationship.　However, the results obtained in these studies failed to take into account rapid developments in information and communication technology in recent years and the movement towards globalization after the establishment of the WTO.　Addressing such weaknesses in existing studies, Kim and Park (2001) and APEC (2002) attempted to investigate the quantitative relationship between trade

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[11] See Cecchini (1988), Schiavo-Campo (1999), OECD (2000), APFC (2000), Woo and Wilson (2000), Kim and Park (2001) and APEC (2002).

[12] See Baier and Bergstrand (2001) for corroborated research on the theoretical basis of the use of a gravity model and research on transaction costs.　Also see Moenius (1999), Maskus, Wilson, and Otsuki (2001), and Wilson, Mann and Otsuki (2003) on cases of trade facilitation.

[13] See Kim and Park (2001) and Maskus, Wilson, and Otsuki (2001).

[14] For the CGE analysis, see Maskus, Wilson, and Otsuki (2001), APEC (1997, 1999, 2002) and Dee (1998).　Maskus, Wilson, and Otsuki (2001) is based on the collection of empirical estimations from many of previous studies.　It emphasizes the importance of trade facilitation on standards and technical barriers.

[15] Reproduced and updated from APEC (2002).

costs and trade facilitation in the case of the Korean economy and APEC economies.

There have been quite a few studies elaborating the importance of trade facilitation. However, the quantitative analyses of the economic effects at the aggregate macroeconomic level are still limited. In APEC (1997, 1999) and Dee (1998), the effects on macro-aggregate variables based on the CGE model are estimated based on the assumption of a fall in import prices and imports of 2-3 percent and 5 percent, respectively. However, these studies failed to reflect the current changes in the trading environment, as we mentioned earlier. Recently, APEC (2002) measures macroeconomic effect of APEC's trade facilitation effort by combining the survey approach and CGE analysis. According to its findings, the effect of the Shanghai Accord on APEC's GDP growth will be 0.98 percent (154 billion US dollars); on average, Singapore enjoying the biggest gain of 7.65 percent and the United States receives the smallest gain of 0.32 percent. Moreover, the optimistic case of APEC's regional trade facilitation multiplies the beneficial effect on APEC's GDP by 1.3 percent (204 billion US dollars).

On the other hand, Wilson, Mann and Otsuki (2003) analyzes the relationship between trade facilitation, trade flows and GDP per capita in the Asia-Pacific region by using a Gravity analysis. They found that enhanced port efficiency has a large and positive effect on trade, regulatory barriers deter trade, and improvements in customs and greater e-business use significantly expands trade but to a lesser degree than the effects of ports or regulations. They also found that if below-average APEC members improve capacity to half the average level, intra-APEC trade could increase by 254 billion US dollars, representing approximately a 21-percent increase in intra-APEC trade flows. These improvements in trade facilitation suggest an increase in APEC average per capita GDP of 4.3 percent by using Dollar and Kraay's estimate of the effect of trade on per capita GDP.

Table 1. Corroborated Analyses on the Economic Benefits of Trade Facilitation

A. Corroborated Analyses Based on Investigative Survey Method

Research	Itemized trade facilitation	Abstract of corroborated analysis
Cecchini (1998)	Non-tariff barriers such as restrictions and border restriction costs incurred by customs between EU members.	• Trade cost is estimated to be 5% of total trade value. • Benefits from trade facilitation: 4.3-6.4% of the EU's total GDP.
UNCTAD (1994)[*]	Transaction costs incurred by trade facilitation.	• 7-10% of total trade value.
Schiavo-Campo (1999)	Japan's time cost for freight loading.	• In the case of air freight, improved by 70% from 2.3 hours in 1991 to 0.7 hours in 1998.
Schiavo-Campo (1999)	Philippine's time cost for freight loading.	• from 6-8 days before implementing automation to 4-6 days after automation in the case of green lane. • a reduction by 48 hours in the case of yellow and red lanes.
OECD (2000)	The technology standards and approval regulations of telecommunications, dairy products and car component industries in the U.S., Japan, UK and Germany.	• 0-10% increase in total production costs.
APFC (2000)	A qualitative analysis of customs procedures, standards and conformance, and mobility of business people for the 21 APEC members.	• Out of the 3 previously mentioned obstacles to facilitating trade, complex customs procedures and regulations are assessed as the biggest problem equivalent to the tariff barriers.
Kim and Park (2001)	The survey targeted Korean businesses engaged in trade with APEC economies to gather their views on the effects of trade facilitation on transaction costs in three areas: customs procedures, standards and conformity, and mobility of business people.	• High tariff (43%) is the biggest concern when trading among member economies, followed by the complexity of customs and trade administration (34%), restrictions, quotas and licenses (27% each), standards (23%) and business mobility (18%). • Upon an improvement of 50% in trade facilitation, transaction costs are reduced from 11.3% to 26.5% and import price falls by between 3.9% and 9.6%.

A. Corroborated Analyses Based on Investigative Survey Method (continued)

Research	Itemized trade facilitation	Abstract of corroborated analysis
APEC (2002)	Expansion of Kim and Park (2001)'s research including all the APEC member economies	● Most optimistic case: the reduced trade costs incurred by 50% improvement of trade facilitation will range from 5.8% in the case of industrialized APEC economies, 6.2% in the case of newly industrialized APEC economies, and 7.7% in the case of industrializing APEC economies.

* reproduced from APEC (1999).

B. Econometric Analyses Based on the Gravity Model

Research	Itemized trade facilitation	Abstract of corroborated analysis
Swann et al. (1996)[**]	Regression analysis to estimate trade creation effect of standardization in Britain between 1985 and 1991	● Imports increased by 34% and exports increased by 48%.
Moenius (1999)	Regression analysis to estimate trade creation effect of standardization in 12 countries between 1980 and 1995	● It is estimated that when the accumulated rate of standardization between all economies exceeds 1% of trade volume, total trade increases by 0.32%
Wilson et al. (2003)	Regression analysis to estimate trade creation effect of port efficiency, customs environment, own regulatory environment, and e-business usage in all the APEC economies between 1989 and 2000	● Assuming that APEC members below average improve trade facilitation halfway to the average for all members, the intra-APEC trade increases by $254 billion (approximately a 21% increase in intra-APEC trade flows) and the APEC average per capita GDP increases by 4.3%.

C. Partial Equilibrium Analyses

Research	Itemized trade facilitation	Abstract of corroborated analysis
Thilmany and Barret (1997)[**]	Technology restrictions on US dairy products imported into NAFTA member economies	● Similar to the effect of tariffs, domestic consumers' welfare falls
Calvin and Krissoff (1988)[**]	Health restrictions on US apples imported into Japan	● Equivalent to the imposition of tariffs by 27.2%

C. Partial Equilibrium Analyses (continued)

Research	Itemized trade facilitation	Abstract of corroborated analysis
Guasch and Spiller (1999)[***]	Monopolistic operation of harbors by Latin American economies and the regulations applied	• Equivalent to an export tax of 5-15%
Staples (1998)[***]	Paperwork for import customs	• An extra 7-10% costs on top of the world's total trade amount
WTO (2000)[***]	Transport restrictions when crossing borders between middle and eastern Europe	• 6% of total transportation time
Gasiorek et al. (1992)[**]	Standardization in the EU	• 2.5% reduction in trade costs
Harrison et al. (1996)[**]	Expansion of Gasiorek et al. (1992)'s research	• In the short run, the welfare gain is 0.5% of the GDP • In the long run, due to the increase in ROI (Return on Investment), the welfare gain becomes 2.4% of the GDP
Kim and Park (2001)	For Korea, the effects of trade facilitation on transaction costs in three areas: customs procedures, standards and conformity, and mobility of business people	The 50% improvement in trade facilitation • Overall, it expands Korea's total trade volume by a maximum US$17.9 billion • Customs procedures expand Korea's trade volume by US$6.7 billion • Standards and conformity expand Korea's trade volume by maximum US$6.2 billion • Mobility of business people expands Korea's trade volume by maximum US$5.0 billion

** reproduced from Maskus, Wilson, and Otsuki (2001).
*** reproduced from Messerlin and Zarrouk (2000).

D. CGE Model Analyses

Research	Itemized trade facilitation	Abstract of corroborated analysis
Dee (1998)	Trade facilitation brings about an increase in real income by 5% of the total trade	• For APEC as a whole, an increase in real income of US$216 billion.

D. CGE Model Analyses (continued)

Research	Itemized trade facilitation	Abstract of corroborated analysis
APEC (1997)	Assumes that out of the APEC members industrialized economies will see a 2% fall in import prices and for less developed economies, a 3% drop	● For APEC as a whole, an increase in real income of US$45 billion (0.26% of the total GDP; in the case of tariff reductions, the increase in real income is 0.14% of the total GDP)
APEC (1999)	Assumes that out of the APEC members industrialized economies will see a 2% fall in import prices and less developed economies, a 3% drop	● For APEC as a whole, an increase in real income of US$46 billion (0.25% of the total GDP; in the case of tariff reductions, the increase in real income is 0.16% of the total GDP)
APEC (2002)	Measure the macroeconomic effects of trade facilitation on the APEC economy as a whole and on participating member economies	● Gains from trade facilitation are more beneficial to the APEC economy than gains from trade liberalization. ● The effect of the Shanghai Accord on APEC's GDP growth will be 0.98% (US$154 billion) ● The optimistic case of APEC's regional trade facilitation multiplies the beneficial effect on APEC's GDP by 1.3% (US$204 billion).

Sources: Kim and Park (2001), APEC (2002) and Wilson, Mann and Otsuki (2003).

IV. GRAVITY REGRESSION ANALYSIS OF TRADE FACILITATION

1. Quantifying Trade Facilitation Indices

This section attempts to measure the effect of reduced trade costs arising from trade facilitation on intra-regional trade between the three Northeast Asian countries. As we mentioned earlier, trade costs can be divided into transaction, policy and facilitation costs. The transaction costs of trade are assumed to be measured by distance between trading partners and policy costs of trade is assumed to be measured by import tariffs between trading partners. For the facilitation costs of trade, we adopt the following method.

We include four indicators of trade facilitation that measure four different categories of trade facilitation:

- customs procedures (CP)
- standards and conformity (SC)
- business mobility (BM)
- information and communication technology (ICT)

In order to generate the trade facilitation indicators, we rely on results from Kim and Park (2001) and APEC (2002, 2003). For the quantification of the first three trade facilitation indices (CP, SC and BM), we use the expected effect of trade facilitation on transaction cost, import price, and import demand in each of the three Northeast Asian countries.[16] The survey results from developing APEC economies are treated as a proxy variable for China because APEC (2002) failed to receive significant response from the survey conducted in China. Table 2 reports the minimum, maximum and median change in transaction cost,

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[16] As in Kim and Park (2001) and APEC (2002), we asked the following three questions: (i) What percent of the total transaction cost of your commodities moving from production site to market place will be saved if APEC economies enhance trade facilitation by 50 percent in each of the following areas – Customs Procedures, Standards and Conformity, and Business Mobility? (ii) Suppose that you are an importer in an APEC economy and your government improves trade facilitation by 50 percent in each of the following areas – Customs Procedures, Standards and Conformity, and Business Mobility. For example, the custom procedure can be shortened from 2 days to 1 day. What percent of the consumer price of the importable can be reduced? (iii) Suppose that you are an importer in an APEC economy and your government improves trade facilitation by 50 percent in each of the following areas – Customs Procedures, Standards and Conformity, and Business Mobility. What will be the likely impact of the reduced cost on the demand for the importable? What percent of the consumers' demand for the importable will rise in terms of volume?

import price, and import demand that are caused by the three trade facilitation areas for the three North East Asian countries. For example, from the survey, we found that Korean importing companies expect minimum 2.0 percent increase in import demand if Korea's customs procedures were improved by 50 percent. We consider this figure to represent the degree to which the customs procedures impede trade with their trading partners. That is, higher expectation of import demand increase reveals larger impediments for importing companies passing through.

As the first step to quantify the index, we calculate the average effect of trade facilitation by taking a simple average of the three different effects on transaction cost, import price, and import demand in each country as shown in Table 3. That is, for each of the three countries (represented by the subscript j), the average effect of the improvement in an area of trade facilitation (represented by the subscript f) is calculated as follows.

Step 1 [Equation (3)]:

$$(Average\ Effect\ of\ Trade\ Facilitation\ on\ Trade\ Cost)_{fj}$$
$$= [(Effect\ on\ Transaction\ Cost)_{fj} +$$
$$(Effect\ on\ Import\ Price)_{fj} + (Effect\ on\ Import\ Demand)_{fj}]\ /\ 3$$
$$for\ f = CP,\ SC,\ BM\ and\ j = Korea,\ Japan,\ China$$

As the second step to quantifying the index, we calculate the average effect of trade facilitation by taking an average of the three countries as a base.

Step 2 [Equation (4)]:

$$(Base\ for\ the\ Trade\ Facilitation\ Index)_f =$$
$$[\sum_j (Average\ Effect\ of\ Trade\ Facilitation\ on\ Trade\ Cost)_{fj}]\ /\ 3$$
$$for\ f = CP,\ SC,\ BM\ and\ j = Korea,\ Japan,\ China$$

We then calculate relative ratio of each country to the base value.

Step 3 [Equation (5)]:

$$(Trade\ Facilitation\ Index)_{fj} = (Base\ for\ the\ Trade\ Facilitation\ Index)_f$$
$$/\ (Average\ Effect\ of\ Trade\ Facilitation\ on\ Trade\ Cost)_{fj}$$

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for f = CP, SC, BM and j = Korea, Japan, China

The trade facilitation indices are figured in Table 3. The higher the value of the index indicated, the better the trade facilitation, incurring lower facilitation costs to be paid by importing companies.

For the quantification of the ICT index, we take KBE (knowledge based economies) indicators for information and communication technology from APEC (2003). Table 4 reports the KBE indicators in APEC (2003) and the ICT index calculated for this research. As the first step to quantify the index, we calculate the average level of ICT by taking a simple average of the five different areas of ICT – numbers of mobile telephone, phone lines, and computers per 100 people and shares of internet and e-commerce users – in each country and APEC as a whole, then calculate the relative ratio of each country to the APEC average. Higher index values indicate better ICT, incurring lower information costs to be paid by importing companies.

Table 2. Effects of Trade Facilitation (Survey Results)

Effect of Trade Facilitation on Transaction Cost (Survey Result)

	MIN	MAX	MED
JAPAN			
Customs Procedures	0.029	0.074	0.052
Standards	0.022	0.059	0.041
Business Mobility	0.036	0.061	0.041
KOREA			
Customs Procedures	0.052	0.106	0.079
Standards	0.030	0.085	0.058
Business Mobility	0.031	0.074	0.062
CHINA			
Customs Procedures	0.069	0.152	0.110
Standards	0.013	0.030	0.031
Business Mobility	0.022	0.042	0.032

Effect of Trade Facilitation on Import Price (Survey Result)

	MIN	MAX	MED
JAPAN			
Customs Procedures	0.019	0.040	0.029
Standards	0.024	0.041	0.033
Business Mobility	0.018	0.031	0.024
KOREA			
Customs Procedures	0.020	0.036	0.025
Standards	0.010	0.033	0.022
Business Mobility	0.009	0.027	0.018
CHINA			
Customs Procedures	0.040	0.090	0.065
Standards	0.015	0.029	0.022
Business Mobility	0.010	0.030	0.020

Effect of Trade Facilitation on Import Demand (Survey Result)

	MIN	MAX	MED
JAPAN			
Customs Procedures	0.017	0.034	0.022
Standards	0.015	0.033	0.024
Business Mobility	0.018	0.037	0.027
KOREA			
Customs Procedures	0.020	0.045	0.033
Standards	0.018	0.039	0.028
Business Mobility	0.015	0.033	0.024
CHINA			
Customs Procedures	0.077	0.135	0.106
Standards	0.005	0.014	0.009
Business Mobility	0.026	0.046	0.036

Sources: Kim and Park (2001) and APEC (2002).

Table 3. Trade Facilitation Index of the Three Northeast Asian Countries

Average Effect of Trade Facilitation	MIN	MAX	MED
JAPAN			
Customs Procedures	0.022	0.049	0.034
Standards	0.020	0.044	0.033
Business Mobility	0.024	0.043	0.031
KOREA			
Customs Procedures	0.031	0.062	0.046
Standards	0.019	0.052	0.036
Business Mobility	0.018	0.045	0.035
CHINA			
Customs Procedures	0.062	0.126	0.094
Standards	0.011	0.024	0.021
Business Mobility	0.019	0.039	0.029
AVERAGE			
Customs Procedures	0.038	0.079	0.058
Standards	0.017	0.040	0.030
Business Mobility	0.021	0.042	0.032

Indexation	MIN	MAX	MED
JAPAN			
Customs Procedures	1.759	1.604	1.686
Standards	0.831	0.910	0.912
Business Mobility	0.856	0.984	1.029
KOREA			
Customs Procedures	1.243	1.269	1.268
Standards	0.874	0.771	0.827
Business Mobility	1.121	0.948	0.910
CHINA			
Customs Procedures	0.615	0.630	0.618
Standards	1.535	1.658	1.441
Business Mobility	1.063	1.076	1.076
AVERAGE			
Customs Procedures	1.000	1.000	1.000
Standards	1.000	1.000	1.000
Business Mobility	1.000	1.000	1.000

Table 4. ICT Index for the Three Northeast Asian Countries

	Korea	Japan	China	APEC
Mobile Telephone per 100 people	67.89	57.71	16.11	43.40
Phone Lines per 100 people	45.70	60.40	13.80	37.23
Computers per 100 people	34.20	47.70	2.70	31.06
Internet Users (%)	55.73	50.92	4.21	32.24
E-Commerce (%)	0.56	0.68	0.14	0.46
Average	40.82 (K)	43.48 (J)	7.39 (C)	28.88 (A)
ICT Index	1.413 (K/A)	1.506 (J/A)	0.256 (C/A)	1.000

2. Gravity Model

We set up a conventional gravity model of international trade to analyze the effects of trade liberalization and facilitation on bilateral trade between the three Northeast Asian countries. We extend the model with a number of extra variables representing trade costs (mentioned earlier) for the analysis as follow.

Equation (6):

$$\ln(IM_{ijt}) = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln PGDP_{it} + \beta_4 \ln PGDP_{jt} + \beta_5 \ln DIST_{ij}$$
$$+ \beta_6 \ln TARIFF_{it} + \beta_7 \ln CP_{ijt} + \beta_8 \ln SC_{ijt} + \beta_9 \ln BM_{ijt} + \beta_{10} \ln ICT_{ijt}$$
$$+ \beta_{11} YEAR_t + \varepsilon_{ijt}$$

where i and j denote countries, t denotes time, and the variables are defined as:

- IM_{ijt} denotes the average value of import value from j to i at time t,
- GDP is real GDP,
- $PGDP$ is per capita GDP,
- $DIST$ is the distance between i and j,
- $TARIFF_{it}$ is tariff rate imposed on imports by i at time t,
- CP_{ijt} is a trade facilitation index of customs procedures from j to i at time t,
- SC_{ijt} is a trade facilitation index of standards and conformity from j to i at time t,
- BM_{ijt} is a trade facilitation index of business mobility from j to i at time t,
- ICT_{ijt} is an index to represent the level of information technology from j to i at time t,
- $YEAR$ is a set of binary variables that are united in the specific year t, and
- Data covers the three Northeast Asian countries for 23 years (1980-2002).

The distance variable (DIST), tariffs (TARIFF) and trade facilitation indices (CP_{ijt}, SC_{ijt}, BM_{ijt}, ICT_{ijt}) represent transaction cost, policy cost and facilitation cost of trade costs in Equation (1), respectively. Since the trade facilitation indices from the survey result and KBE indicators measure the average effect of each area of trade facilitation among all the APEC economies, the indices may not correctly represent the bilateral trade relationship between the three Northeast Asian countries. Therefore, for the bilateral trade facilitation indices over time, CP_{ijt}, SC_{ijt}, BM_{ijt} and ICT_{ijt}, we calculate a relative ratio of each pair of countries at time t by multiplying the relative trade volume of each importing country to its average trade volume with all the APEC economies at time t as shown in Equation (7) below. The same methodology is applied for the calculation of ICT_{ijt}. That is, for the country-specific and time-variant trade facilitation indices, we apply the following intra-regional trade concentration weight relative to intra-APEC trade.

Equation (7):

(Trade Facilitation Index)$_{fijt}$ =

> *[(bilateral trade volume between i and j at time t) / (i's average trade volume with all the APEC countries at time t)]* •
> *[(Trade Facilitation Index)$_{fj}$ from Equation (5)]*
> *for f = CP, SC, BM, ICT and i, j = Korea, Japan, China*

We will analyze the characteristics and relevance of each parameter. First, GDP_i, GDP_j, $PGDP_i$, and $PGDP_j$ represent the increase in income in both economies and parameters β_1 - β_4 tend to be positive. Second, the DIST represents the transaction costs and the coefficient β_5 tends to have a negative value. Third, the coefficient representing tariff barriers, β_6, theoretically tends to be negative. Fourth, we expect positive values of β_7 - β_{10} induced from lower trade costs through enhanced trade facilitation.

3. Gravity Regression Analysis: Effect of Trade Facilitation

Table 5 presents the results from the fixed-effects estimation. We only report the results from the Gravity regression analysis with maximum values of trade facilitation indices

because there are no large differences between the minimum, median and maximum values when we estimated the model. Alternatively, we failed to produce reasonable estimates when we included all the trade facilitation indices together as explanatory variables. Columns I, II, III and IV in Table 5 present the four different sets of regression result with a specific trade facilitation index – customs procedures (CP), standards and conformity (SC), business mobility (BM), and information and communication technology (ICT), respectively. Overall, the gravity model fits the data reasonably, explaining a major part of the variation in bilateral trade flows. The conventional variables behave very much as the model predicts, but the estimated coefficients are statistically insignificant in some cases. To summarize briefly, the estimated coefficients on economic size are mostly positive, those on bilateral distance and tariffs are negative, and those on each of the trade facilitation indexes are also positive, as expected.

From the statistically insignificant estimates on the distance variable, we may argue that the transaction costs are not an important factor affecting the bilateral trade between the neighboring countries in the Northeast Asian region. Another interesting finding is that each of the four trade facilitation indices shows significantly positive effects on bilateral trade between the three Northeast Asian countries. This means that trade facilitation is a very important factor for boosting intra-regional trade among the three countries. For the estimated coefficients on import tariffs, each of the four different cases shows large negative numbers that are statistically insignificant because we include customs procedures and business mobility. We may argue that the tariff barriers strongly affect bilateral trade but are not as important as non-tariff barriers such as trade facilitation.

Evaluating the coefficients of explanatory variables representing trade costs, tariff and trade facilitation indices, when a country reduces import tariffs by 10 percent, increase imports from the neighboring country between the minimum 5.4 percent and the maximum 9.6 percent, whereas improved trade facilitation by 10 percent boosts the intra-regional import by a minimum 2.2 percent in the case of ICT and maximum 7.4 percent in the case of BM. Ignoring statistical significance, the trade creation effect of tariff reduction is much stronger than that of trade facilitation. However, we also find that the trade creation effect of improvements in trade facilitation measures can be an effective policy alternative to supplement tariff reduction policy, as argued by Wilson, Mann and Otsuki (2003). Moreover,

if we improve trade facilitation between the three countries in the four areas at the same time, the impact on intra-regional trade will overtake that of tariff reduction considering the Gravity regression analysis in Table 5.   This may support the argument found in APEC (2002) stating that gains from trade facilitation are more beneficial than gains from trade liberalization through tariff reduction.

Table 5. Gravity Regression Analysis

	I	II	III	IV
Constant	-2.278	-21.242***	-15.718**	0.021
	(6.876)	(6.720)	(6.777)	(6.913)
Log of GDP$_i$	0.869	0.320	0.088	1.046*
	(0.600)	(0.555)	(0.576)	(0.606)
Log of GDP$_j$	0.065	1.828***	1.487**	0.515
	(0.711)	(0.679)	(0.708)	(0.690)
Log of PGDP$_i$	0.149	0.467***	0.398**	0.103
	(0.195)	(0.177)	(0.183)	(0.198)
Log of PGDP$_j$	-0.448	1.376***	0.744*	-0.735**
	(0.370)	(0.440)	(0.413)	(0.351)
Log of Distance (DIST)	-0.068	-2.693*	-2.272	-0.330
	(1.595)	(1.445)	(1.509)	(1.615)
Log of Tariff (TARIFF)	-0.612	-0.901**	-0.540	-0.964***
	(0.419)	(0.435)	(0.440)	(0.389)
Log of Customs Procedures (CP)	0.280***			
	(0.087)			
Log of Standards (SC)		0.716***		
		(0.101)		
Log of Business Mobility (BM)			0.739***	
			(0.122)	
Log of Information and Communication Technology (ICT)				0.215***
				(0.088)
Number of Observation	137	137	137	137
R-squared	0.727	0.796	0.777	0.716

Note: "*", "**", and "***" denote statistical significance at the 10%, 5%, and 1% levels, respectively.   Figures in parenthesis are standard errors.

VI. PARTIAL EQUILIBRIUM ANALYSIS OF TRADE FACILITATION

In this section, we quantitatively estimate the effect of trade facilitation on bilateral trade between Korea, Japan and China with a partial equilibrium analysis.   The partial equilibrium analysis uses two different approaches.   First, we quantify the relationship between trade facilitation and import price by using a survey analysis.   Second, we estimate the relationship between import price and import volume by using a regression analysis.   Then, we combine these two empirical findings to estimate the likely impact of trade facilitation on trade between the three countries in Northeast Asia.

1. Trade Facilitation and Import Price: Survey Analysis

As the first step to measure the effect of trade facilitation on trade between the three Northeast Asian countries, the effect of trade facilitation on import price will be quantified from the survey results in Kim and Park (2001) and APEC (2002).   We take the survey results for the cases of Korea and Japan without any problem.   However, since we do not have survey response from China, we take survey results for industrializing economies of APEC in APEC (2002) as a proxy for the case of China.

For the trade facilitation in this section, we only consider the following three areas of trade facilitation – customs procedures, standards and conformity, and mobility of business people. Table 6 reports the minimum, median and maximum percentage change in consumer prices of imports that are caused by trade facilitation in each of the three areas and overall effect if trade facilitation is carried out together in the three areas for each country at the same time. According to the outcome of the survey, upon a improvement of 50 percent in trade facilitation in each of the three areas, the resulting reduction of import price ranged from 0.9 percent in the area of business mobility for Korea to 9.0 percent in the area of customs procedures for China.[17]   Overall, Korea's gain from trade facilitation is expected to be about 6.5 percent (when we take the median value).   For Japan and China, these values are 8.6 percent and 10.7 percent, respectively.

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[17] We asked following question: "Suppose that you are an importer in an APEC economy and your government improves trade facilitation by 50 percent in each of the following areas – customs procedures, standards and conformity, and mobility of business people.   For example, the customs procedure can be shortened from 2 days to 1 day. What percent of the consumer price of the importable can be reduced?"

Table 6. Effect of Trade Facilitation on Import Price (Survey Result)

	Minimum	Median	Maximum
Korea			
Customs Procedures (A)	0.020	0.025	0.036
Standards (B)	0.010	0.022	0.033
Business Mobility (C)	0.009	0.018	0.027
Overall (A+B+C)	0.040	0.065	0.096
Japan			
Customs Procedures	0.019	0.029	0.040
Standards	0.024	0.033	0.041
Business Mobility	0.018	0.024	0.031
Overall	0.061	0.086	0.112
China			
Customs Procedures	0.040	0.065	0.090
Standards	0.015	0.022	0.029
Business Mobility	0.010	0.020	0.030
Overall	0.065	0.107	0.149

2. Import Price and Import Volume: Regression Analysis

For a regression analysis measuring the import price elasticity between the three countries, a trade matrix is completed to observe trade patterns for the last 30 years, combining the trade data of those three countries from 1971 to 2002 (extracted from Direction of Trade Statistics by IMF). The export data of the three countries is converted into real prices based on 1995 to correct for the differences resulting from alternative methods for calculating prices and processing statistical data between import prices and export prices of the partner country, and the exports of one country are set as the same as the imports of another country for bilateral trade. Therefore, the exports of country A to country B are the same as the imports of country B from country A. The import demand function of country B can be deduced as follows.[18]

Equation (8):

$$P_B M_{BA} = f(P_{EXA}, P_B, Y_B)$$

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[18] Stern, Francis, and Schumacher (1976).

where

P_B	domestic price of country B
M_{BA}	import volume of country B coming from country A
P_{EXA}	export price of country A
Y_B	income of country B

When we assume there is no monetary illusion, the equation (8) can be rewritten as follow:

Equation (9):

$$M_{BA} = f\,(P_{EXA}/P_B,\ Y_B/P_B)$$

The equation (9) explains the simple relation that the import amount of one country is decided by the relative price of exportables to domestic price and the real income of an importing country.   In order to analyze the price and income elasticity, it is converted into a log linear function as follows:

Equation (10):

$$log\ M_{BA} = log\ \ss_0 + \ss_1\ log\ P_B{}' + \ss_2\ log\ Y_B{}' + log\ u$$

where $\ss_0$, $P_B{}'$, $Y_B{}'$ and u are constant, real import price, real income and error term, respectively.

In Equation (10), M_{BA} is a dependent variable and $P_B{}'$ and $Y_B{}'$ are explanatory variables. Since the equation is written as a log-log function, $\ss_1$, the coefficient of relative export price and $\ss_2$, the marginal propensity to imports, respectively mean price elasticity and income elasticity to import demand.   On the one hand, with the assumption that the domestic inputs and import inputs are perfectly substitutable, the rise in income would increase import demand while the increase in the import price (the export price of country A) would contract import demand.   Therefore, $\ss_1$, the price elasticity to import demand, will have negative sign and $\ss_2$, the income elasticity to import demand, will have a positive sign.   Consequently, if we carry out an OLS regression using the model in Equation (10), we can estimate the price and the income elasticity between two countries, and applying this method, we can examine

the effect that trade facilitation brings.

Table 7 reports the price and the income elasticity between the three Northeast Asian countries.   Although the sample period between 1971 and 2002 is defined as the maximum period in the estimation for each country, some adjustments are set, aiming to improve the absence of appropriate data.   Trend variable and time lag are added in needs.

For most cases of import demand for Korea and Japan (rows indicated as <1>, <3>, <5>, <6> and <7>), the estimated signs of the price and income elasticity are theoretically and statistically acceptable, but for the import demands of China (rows indicated as <2> and <4>), the estimates for the price and income elasticity are not statistically significant.   As an alternative to improve statistical significance, we rerun the import demand of China for goods coming from all the APEC countries rather than imports from Korea or Japan (row indicated as <7>).

3. Trade Facilitation and Bilateral Trade

Trade facilitation between the three Northeast Asian countries reduces the import price of each country and results in the import volume between the countries.   The change in bilateral trade between the three countries is estimated based on Equation (11).

Equation (11):

$$(\Delta M_{BA} / M_{BA}) = \beta_1 \cdot (\Delta P_B{'} / P_B{'}).$$

M_{BA}, imports to country B from country A, is equivalent to E_{AB}, exports from country A to country B. β_1 is estimated from the regression analysis in Table 7, $(\Delta P_B{'}/P_B{'})$ is estimated from the survey analysis in Table 6, and M_{BA} (or E_{AB}) in 1999 are figured in Table 8.[19]   Table 8 summarizes the trade relationship between the three Northeast Asian countries to help our understanding about trade structure by country before and after the trade facilitation are activated through economic cooperation among the three countries.

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[19] We use trade data for year 1999 as a base to measure the change in the bilateral trade between the three countries.

Table 7. Regression Analysis

	Price Elasticity	Income Elasticity	Adjusted R^2	Sample Period	
Import Demand for Korean Exportables					
Japan	-0.609 (-2.025)	1.775 (3.230)	0.843	'71 ~ '02	<1>
China	-0.660 (-0.46)	1.129 (0.79)	0.303	'91 ~ '99	<2>
Import Demand for Japanese Exportables					
Korea	-0.647 (-2.647)	3.726 (7.196)	0.964	'71 ~ '02	<3>
China	-0.104 (-0.260)	2.850 (1.513)	0.909	'79 ~ '02	<4>
Import Demand for Chinese Exportables					
Korea	-0.842 (-2.475)	2.748 (8.876)	0.947	'79 ~ '02	<5>
Japan	-0.709 (-3.001)	0.890 (1.344)	0.961	'71 ~ '02	<6>
Import Demand for APEC Exportables					
China	-0.655 (-2.121)	0.638 (1.297)	0.959	'79 ~ '02	<7>

Note: Figures in parenthesis are t-statistics.

Table 8. Intra-Northeast Asian Trade Structure in 1999

Trade Volume (Million US Dollars)

Export from / Import to	Korea	Japan	China	Northeast Asian 3	Others	World
Korea		23,089	7,808	30,897	88,843	119,740
Japan	15,863		32,399	48,262	262,471	310,733
China	13,685	23,450		37,135	128,583	165,718
Northeast Asian 3	29,548	46,539	40,207	116,294	479,897	596,191
Others	114,099	372,668	154,724			
World	143,647	419,207	194,931			

Export Share (%)

	Korea	Japan	China	Northeast Asian 3		
Korea		5.5	4.0	4.1		
Japan	11.0		16.6	6.4		
China	9.5	5.6		4.9		
Northeast Asian 3	20.6	11.1	20.6	15.3		
Others	79.4	88.9	79.4	84.7		
World	100.0	100.0	100.0	100.0		

Import Share (%)

	Korea	Japan	China	Northeast Asian 3	Others	World
Korea		19.3	6.5	25.8	74.2	100.0
Japan	5.1		10.4	15.5	84.5	100.0
China	8.3	14.2		22.4	77.6	100.0
Northeast Asian 3	5.0	7.8	6.7	19.5	80.5	100.0

Trade Balance (Million US Dollars)

	Korea	Japan	China	Northeast Asian 3		
Korea		7,226	-5,877	1,349		
Japan	-7,226		8,949	1,723		
China	5,877	-8,949		-3,072		
Northeast Asian 3	-1,349	-1,723	3,072			
Others	25,256	110,197	26,141			
World	23,907	108,474	29,213			

Source: IMF, Direction of Trade Statistics.

4. Effect of Trade Facilitation on Bilateral Trade by Country

Tables 9, 10 and 11 show the effects that improvements in trade facilitation have on bilateral trade between Korea, Japan and China when the three countries reduce non-tariff barriers against each other by 50 percent both in each of the three trade facilitation areas (customs procedures, standards and business mobility) and in the three areas together at the same time (overall).[20]

A. Imports, Exports and Trade Balance between Korea, Japan and China

Table 9 shows that Korea's exports to neighboring countries are expected to increase and the additional export amount ranges from a minimum 1.2 billion US dollars (0.82-percent increase in total exports) to a maximum 2.4 billion US dollars (1.68-percent increase in total exports) if the three countries improve all three trade facilitation areas at the same time. Korea's import expansion is expected to range from a minimum 0.9 billion US dollars (0.72-percent increase in total imports) to a maximum 2.1 billion US dollars (1.72-percent increase in total imports). In particular, the overall improvement of trade facilitation among the three countries widens Korea's trade deficit with Japan (7.2 billion US dollars in 1999) by a minimum 8 million US dollars and a maximum 352 million US dollars and Korea's trade surplus (5.9 billion US dollars in 1999) with China by a minimum 320 million US dollars and a maximum 704 million US dollars. Overall, Korea's trade balance is expected to improve by a minimum 0.3 billion US dollars and a maximum 0.4 billion US dollars (approximately). The effects of trade facilitation in each of the three areas are reported in Table 9.

Table 10 indicates that Japan's exports to neighboring countries are expected to increase by a minimum 1.6 billion US dollars (1.11-percent increase in total exports) and a maximum 3.7 billion US dollars (2.59-percent increase in total exports) if the three countries improve all three trade facilitation areas at the same time. The Japan's import expansion is expected to range from a minimum 2.0 billion US dollars (0.64-percent increase in total imports) to a maximum 3.7 billion US dollars (1.18-percent increase in total imports). In particular, the

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[20] For the estimated price elasticity in the case of China, we use China's import demand for APEC exportables in Table 7 due to the statistical insignificance mentioned earlier. The effects of trade facilitation by using the China's import demand for the Korean and Japanese exportables are summarized in Appendix Tables 1, 2 and 3 as a reference.

overall improvement of trade facilitation among the three countries widens Japan's trade surplus with Korea (7.2 billion US dollars in 1999) by a minimum 8 million US dollars and a maximum 352 million US dollars and Japan's trade deficit (8.9 billion US dollars in 1999) with China by a minimum 284 million US dollars and a maximum 403 million US dollars. Overall, Japan's trade balance is expected to deteriorate by a minimum 0.2 billion US dollars and a maximum 0.4 billion US dollars (approximately). However, if we apply the maximum value of the survey result, Japan's trade surplus is expected to increase by 0.07 billion US dollars. The effects of trade facilitation for each of the three areas are also reported in Table 10.

Table 11 indicates that China's exports to neighboring countries are expected to increase, ranging from a minimum 1.6 billion US dollars (1.16-percent increase in total exports) to a maximum 3.2 billion US dollars (2.23-percent increase in total exports) if the three countries improve all three trade facilitation areas at the same time. China's import expansion is expected to range from a minimum 1.6 billion US dollars (0.95-percent increase in total imports) to a maximum 3.6 billion US dollars (2.19-percent increase in total imports). In particular, the overall improvement of trade facilitation among the three countries widens China's trade deficit with Korea (5.9 billion US dollars in 1999) by a minimum 320 million US dollars and a maximum 704 million US dollars and China's trade surplus (8.9 billion US dollars in 1999) with Japan by a minimum 284 million US dollars and a maximum 403 million US dollars. Overall, China's trade balance is expected to deteriorate by a minimum 0.2 billion US dollars and a maximum 0.4 billion US dollars (approximately). However, if we apply the minimum value of the survey result, China's trade surplus is expected to increase by 0.08 billion US dollars. The effects of trade facilitation for each of the three areas are also reported in Table 11.

Table 9. Effect of Trade Facilitation on Korea's Trade with Japan and China

Overall Effect (Million US Dollars)

	Minimum			Median			Maximum		
	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Japan	589	598	-8	831	971	-140	1,082	1,434	-352
China	583	263	320	959	427	532	1,336	631	704
Northeast Asian 3	1,172	861	311	1,790	1,398	392	2,418	2,065	352
Share over World	0.82%	0.72%	1.30%	1.25%	1.17%	1.64%	1.68%	1.72%	1.47%

Effect of Improved Customs Procedures (Million US Dollars)

	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Japan	184	299	-115	280	374	-93	386	538	-151
China	359	132	227	583	164	418	807	237	570
Northeast Asian 3	542	430	112	863	538	325	1,193	775	419
Share over World	0.38%	0.36%	0.47%	0.60%	0.45%	1.36%	0.83%	0.65%	1.75%

Effect of Improved Standards (Million US Dollars)

	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Japan	232	164	68	319	329	-10	396	493	-97
China	134	72	62	197	145	53	260	217	43
Northeast Asian 3	366	237	130	516	473	43	656	710	-54
Share over World	0.26%	0.20%	0.54%	0.36%	0.40%	0.18%	0.46%	0.59%	-0.23%

Effect of Improved Business Mobility (Million US Dollars)

	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Japan	174	134	39	232	269	-37	299	403	-104
China	90	59	30	179	118	61	269	178	91
Northeast Asian 3	264	194	70	411	387	24	568	581	-12
Share over World	0.18%	0.16%	0.29%	0.29%	0.32%	0.10%	0.40%	0.49%	-0.05%

Table 10. Effect of Trade Facilitation on Japan's Trade with Korea and China

	Minimum			Median			Maximum		
	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Overall Effect (Million US Dollars)									
Korea	598	589	8	971	831	140	1,434	1,082	352
China	998	1,401	-403	1,643	1,976	-332	2,289	2,573	-284
Northeast Asian 3	1,596	1,991	-395	2,615	2,806	-192	3,723	3,655	68
Share over World	1.11%	0.64%	-0.36%	1.82%	0.90%	-0.18%	2.59%	1.18%	0.06%
Effect of Improved Customs Procedures (Million US Dollars)									
Korea	299	184	115	373	280	93	538	386	151
China	614	436	178	998	666	332	1,382	919	464
Northeast Asian 3	913	620	293	1,372	946	425	1,920	1,305	615
Share over World	0.64%	0.20%	0.27%	0.96%	0.30%	0.39%	1.34%	0.42%	0.57%
Effect of Improved Standards (Million US Dollars)									
Korea	164	232	-68	329	319	10	493	396	97
China	230	551	-321	338	758	-420	445	942	-496
Northeast Asian 3	395	783	-388	667	1,077	-410	938	1,338	-399
Share over World	0.27%	0.25%	-0.36%	0.46%	0.35%	-0.38%	0.65%	0.43%	-0.37%
Effect of Improved Business Mobility (Million US Dollars)									
Korea	134	174	-39	269	232	37	403	300	104
China	154	414	-260	307	551	-244	461	712	-251
Northeast Asian 3	288	587	-299	576	783	-207	864	1,012	-147
Share over World	0.20%	0.19%	-0.28%	0.40%	0.25%	-0.19%	0.60%	0.33%	-0.14%

Table 11. Effect of Trade Facilitation on China's Trade with Korea and Japan

Overall Effect (Million US Dollars)	Minimum			Median			Maximum		
	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Korea	263	583	-320	427	959	-532	631	1,336	-704
Japan	1,401	998	403	1,975	1,644	332	2,573	2,289	284
Northeast Asian 3	1,664	1,581	83	2,403	2,603	-200	3,204	3,624	-420
Share over World	1.16%	0.95%	0.28%	1.67%	1.57%	-0.68%	2.23%	2.19%	-1.44%

Effect of Improved Customs Procedures (Million US Dollars)	Minimum			Median			Maximum		
	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Korea	131	359	-227	164	583	-418	237	807	-570
Japan	436	614	-178	666	998	-332	919	1,382	-464
Northeast Asian 3	568	973	-405	831	1,581	-750	1,156	2,189	-1,034
Share over World	0.40%	0.59%	-1.39%	0.58%	0.95%	-2.57%	0.80%	1.32%	-3.54%

Effect of Improved Standards (Million US Dollars)	Minimum			Median			Maximum		
	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Korea	72	135	-62	145	197	-53	217	260	-43
Japan	551	230	321	758	338	420	942	445	496
Northeast Asian 3	624	365	259	903	535	368	1,159	705	453
Share over World	0.43%	0.22%	0.89%	0.63%	0.32%	1.26%	0.81%	0.43%	1.55%

Effect of Improved Business Mobility (Million US Dollars)	Minimum			Median			Maximum		
	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Korea	59	90	-30	118	179	-61	178	269	-91
Japan	413	154	260	551	307	244	712	461	251
Northeast Asian 3	473	243	229	670	487	183	890	730	160
Share over World	0.33%	0.15%	0.79%	0.47%	0.29%	0.63%	0.62%	0.44%	0.55%

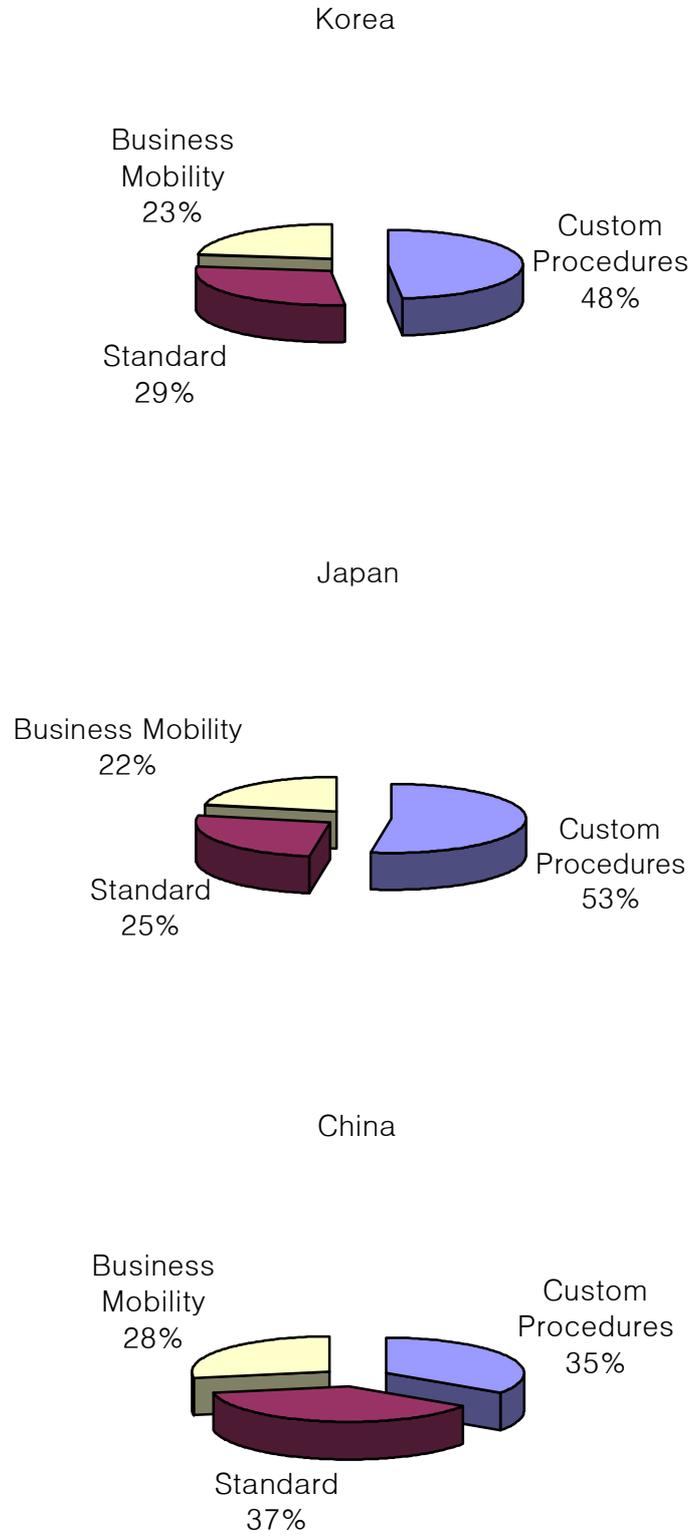**B. Trade Expansion for Each of the Trade Facilitation Areas**

Figures 1 and 2 illustrate the relative importance of each of the three trade facilitation areas on the trade expansion effect between the three countries in the case of applying the median value of the survey results in Table 6.   For Korea and Japan, almost half of export expansion (48 percent and 53 percent, respectively) is induced by improvements in customs procedures as exportables cross the borders of neighboring countries.   Korean and Japanese imports from neighboring countries increase almost evenly through improvements in customs procedures (38 percent and 34 percent, respectively) and standards (34 percent and 38 percent).   For China, a 60-percent increase in imports is induced by improvements in customs procedures, and China's exports to Japan and Korea increase almost evenly from improvements in customs procedures (35 percent) and standards (37 percent).

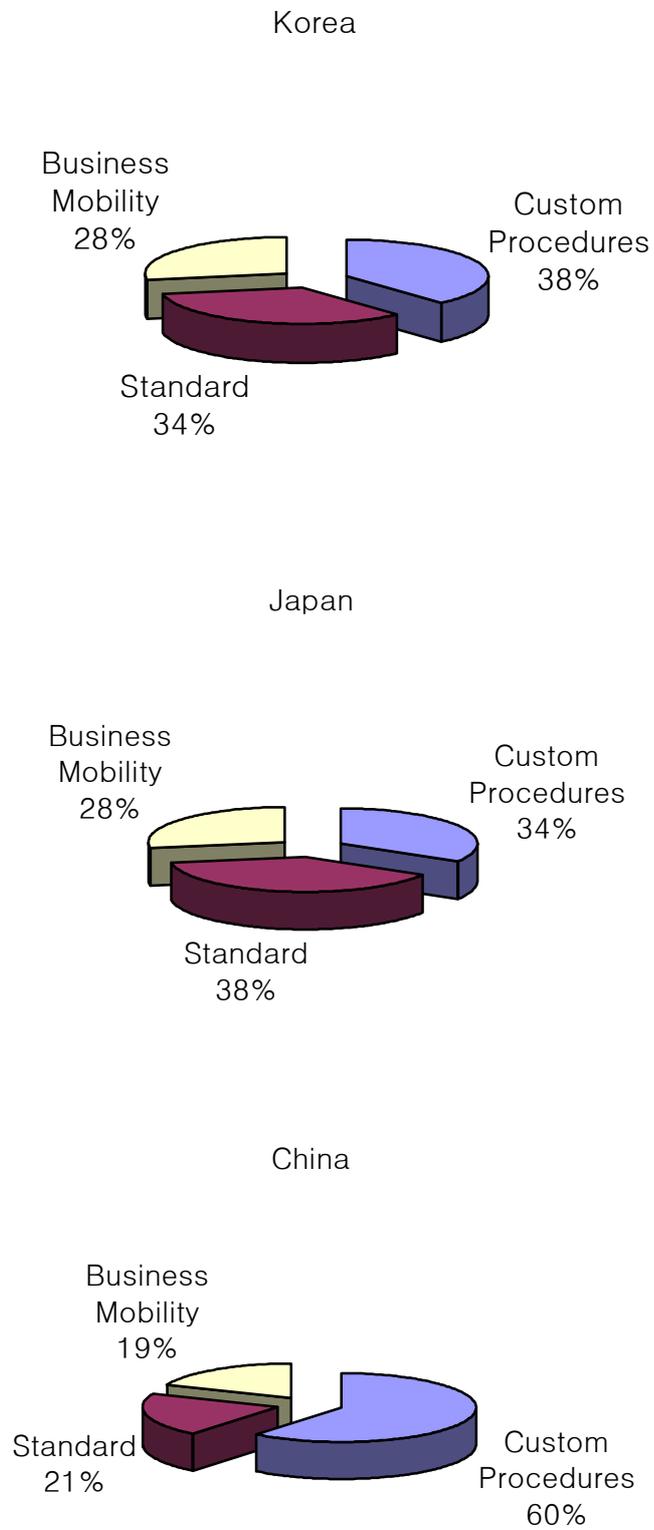**C. Overall Evaluation by Country and by Trade Facilitation Area**

Figures 3, 4, 5 and 6 summarize the positive effects of trade facilitation by country and by each of the trade facilitation areas.   From the overall effect of trade facilitation on the trade surplus and export promotion of each country in Figure 3, we find that Korea is receiving the biggest benefits.   For Japan and China, the Northeast Asian economic cooperation through better facilities for transactions of goods and services may expand their exports but deteriorate their trade account with neighboring countries.   For the area of customs procedures illustrated in Figure 4, Japan is the biggest beneficiary; Korea is another winner, but China may be a loser.   For the area of standards and business mobility, China is the biggest winner; the effect on Korea is minimal, and Japan's trade balance is expected to deteriorate.

Overall, trade facilitation among the three Northeast Asian countries promotes increased trade between Korea, Japan and China.   It also improves the trade accounts of Korea and China with neighboring countries, but Japan's trade account deteriorates.   In addition, considering the effect on bilateral trade with neighboring countries and the resulting effect on trade balances, improvements in customs procedures among the three countries is the most important area of trade facilitation for Korea and Japan, and improvements in standards and business mobility among the three countries are the most important areas of trade facilitation for China.

Figure 1. Decomposition of Trade Facilitation Effect on Exports

Korea

Business
Mobility
23%

Custom
Procedures
48%

Standard
29%

Japan

Business Mobility
22%

Custom
Procedures
53%

Standard
25%

China

Business
Mobility
28%

Custom
Procedures
35%

Standard
37%

Figure 2. Decomposition of Trade Facilitation Effect on Imports

Korea

Business Mobility 28%

Custom Procedures 38%

Standard 34%

Japan

Business Mobility 28%

Custom Procedures 34%

Standard 38%

China

Business Mobility 19%

Standard 21%

Custom Procedures 60%

Figure 3. Effect of Overall Trade Facilitation

(Units: Million US Dollars)

◆ Korea ■ Japan ▲ China
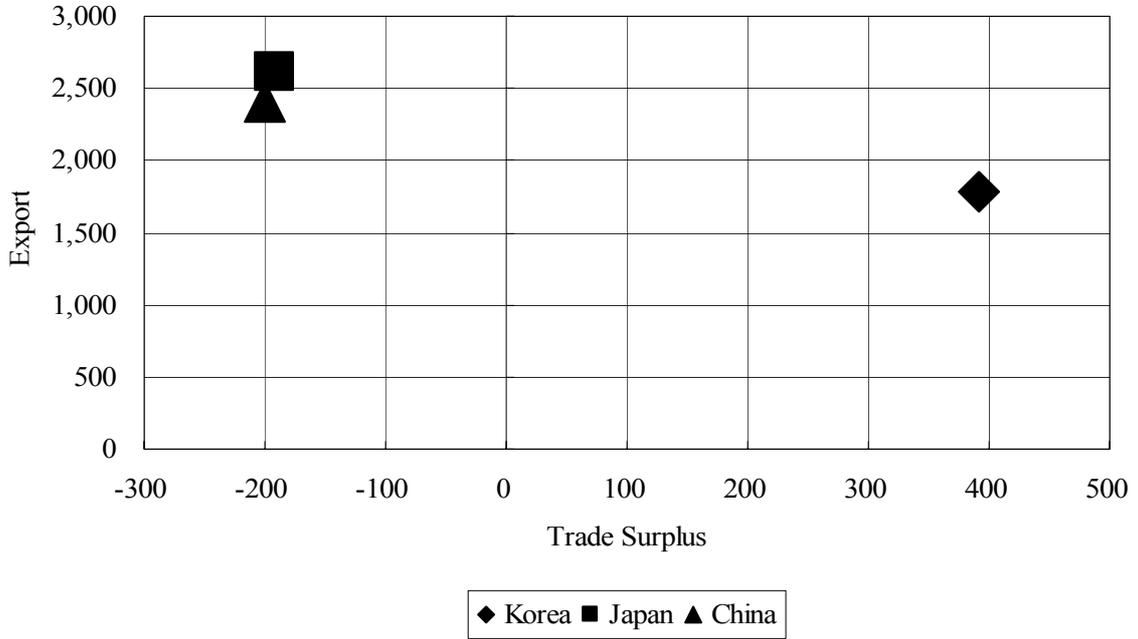
Figure 4. Effect of Improved Customs Procedures

(Units: Million US Dollars)

◆ Korea ■ Japan ▲ China
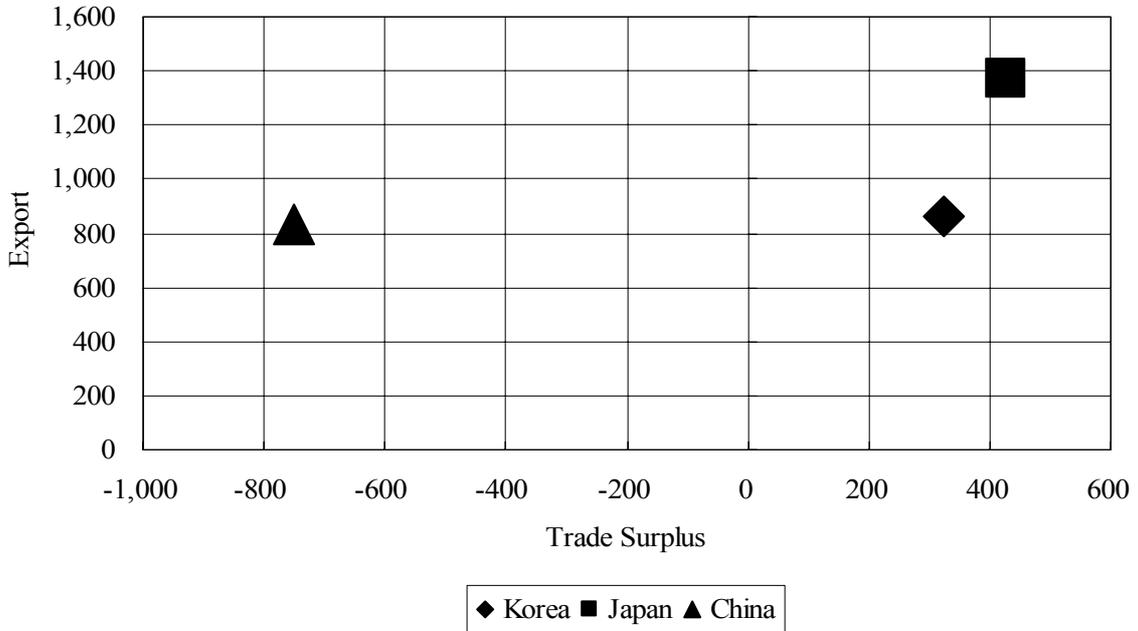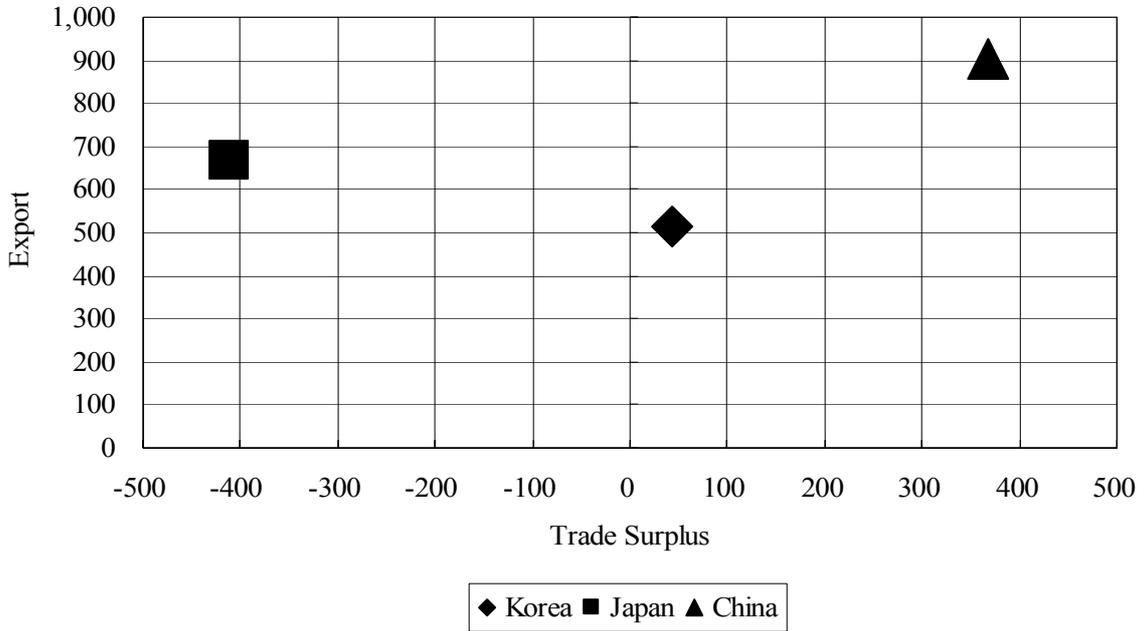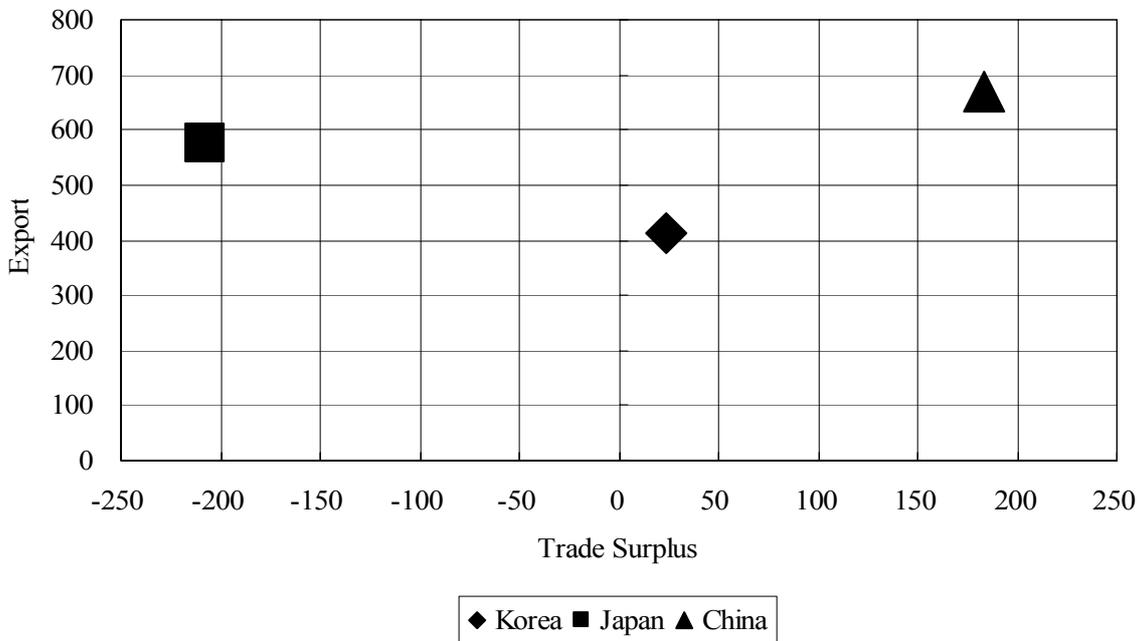
Figure 5. Effect of Improved Standards

(Units: Million US Dollars)

Figure 6. Effect of Improved Business Mobility

(Units: Million US Dollars)

V. CONCLUDING REMARKS

The growing trend towards globalization and regionalization poses dynamic challenges for the international trade environment in the 21st century. The necessity for increased Korea-China-Japan economic cooperation by liberalizing their external economic relations is being increasingly felt as the region seeks ways to recover from the economic sluggishness caused by the 1997 financial crisis. In order to stimulate the regional economy, economic cooperation between the three countries in Northeast Asia is considered critical by many observers. In contrast to the empirical analyses for trade liberalization through tariff reduction, empirical research on the impact of trade liberalization through trade facilitation is very limited because of difficulties in the quantification of trade facilitation data.

This research provides a quantitative analysis of the economic effects produced by improvements in trade facilitation between Korea, Japan and China as an alternative commercial policy to tariff reduction. We attempted to analyze the net trade creation effect of trade facilitation among the three Northeast Asian countries. In order to quantify the economic impact of trade facilitation more accurately, we quantified the relationship between trade costs and trade facilitation by using survey analysis in Kim and Park (2001) and APEC (2002). We then applied to measure the possible impact of trade facilitation on those economies by using a Gravity regression analysis developed by Wilson, Mann and Otsuki (2003). In addition to the Gravity analysis, we also applied a partial equilibrium analysis to measure the impact of trade facilitation on intra-regional trade by estimating price elasticity similar to that in Kim and Park (2001).

From the Gravity analysis, we found that: (i) transportation costs are not an important factor affecting bilateral trade between the neighboring countries in the Northeast Asian region; (ii) each of the four trade facilitation indices we consider (customs procedures, standards and conformity, business mobility, information and communication technology) shows a significantly positive effect on bilateral trade between the three Northeast Asian countries; (iii) tariff barriers strongly affect the intra-regional trade but are not as important as non-tariff barriers like trade facilitation; (iv) the trade creation effect of improvements in trade

facilitation measures can be an effective policy alternative to complement tariff reduction policy even though the trade creation effect of overall tariff reduction is stronger than that of independent improvement in each area of trade facilitation; and (v) if we improve all four areas of trade facilitation at the same time, we expect that gains from trade facilitation would be more beneficial than gains from tariff reduction.

From the partial equilibrium analysis, we found that trade facilitation among the three Northeast Asian countries promotes more trade between Korea, Japan and China.   It will also improve the Korea and China trade accounts with neighboring countries, but Japan's trade account will deteriorate.   In addition, considering the effect on bilateral trade with neighboring countries and the resulting effect on trade balance, improvements in customs procedures among the three countries is the most important area of trade facilitation for Korea and Japan, while improvements in standards and business mobility among the three countries are the most important areas of trade facilitation for China.

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Appendix Table 1. Effect of Trade Facilitation on Korea's Trade with Japan and China

Overall Effect (Million US Dollars)

	Minimum			Median			Maximum		
	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Japan	589	598	-8	831	971	-140	1,082	1,434	-352
China	587	263	324	966	427	539	1,346	631	715
Northeast Asian 3	1,176	861	316	1,797	1,398	399	2,428	2,065	363
Share over World	0.82%	0.72%	1.32%	1.25%	1.17%	1.67%	1.69%	1.72%	1.52%

Effect of Improved Customs Procedures (Million US Dollars)

	Minimum			Median			Maximum		
	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Japan	184	299	-115	280	374	-93	386	538	-151
China	361	132	230	587	164	423	813	237	576
Northeast Asian 3	545	430	115	867	538	329	1,199	775	425
Share over World	0.38%	0.36%	0.48%	0.60%	0.45%	1.38%	0.83%	0.65%	1.78%

Effect of Improved Standards (Million US Dollars)

	Minimum			Median			Maximum		
	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Japan	232	164	68	319	329	-10	396	493	-97
China	135	72	63	199	145	54	262	217	45
Northeast Asian 3	367	237	131	518	473	44	658	710	-52
Share over World	0.26%	0.20%	0.55%	0.36%	0.40%	0.19%	0.46%	0.59%	-0.22%

Effect of Improved Business Mobility (Million US Dollars)

	Minimum			Median			Maximum		
	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Japan	174	134	39	232	269	-37	299	403	-104
China	90	59	31	181	118	62	271	178	93
Northeast Asian 3	264	194	71	412	387	25	570	581	-10
Share over World	0.18%	0.16%	0.30%	0.29%	0.32%	0.11%	0.40%	0.49%	-0.04%

Appendix Table 2. Effect of Trade Facilitation on Japan's Trade with Korea and China

Overall Effect (Million US Dollars)

	Minimum			Median			Maximum		
	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Korea	598	589	8	971	831	140	1,434	1,082	352
China	159	1,401	-1,243	261	1,976	-1,715	363	2,573	-2,209
Northeast Asian 3	756	1,991	-1,234	1,232	2,806	-1,574	1,797	3,655	-1,857
Share over World	0.53%	0.64%	-1.14%	0.86%	0.90%	-1.45%	1.25%	1.18%	-1.71%

Effect of Improved Customs Procedures (Million US Dollars)

	Minimum			Median			Maximum		
	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Korea	299	184	115	373	280	93	538	386	151
China	98	436	-339	159	666	-508	219	919	-699
Northeast Asian 3	396	620	-224	532	946	-414	757	1,305	-548
Share over World	0.28%	0.20%	-0.21%	0.37%	0.30%	-0.38%	0.53%	0.42%	-0.51%

Effect of Improved Standards (Million US Dollars)

	Minimum			Median			Maximum		
	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Korea	164	232	-68	329	319	10	493	396	97
China	37	551	-515	54	758	-704	71	942	-871
Northeast Asian 3	201	783	-582	382	1,077	-694	564	1,338	-774
Share over World	0.14%	0.25%	-0.54%	0.27%	0.35%	-0.64%	0.39%	0.43%	-0.71%

Effect of Improved Business Mobility (Million US Dollars)

	Minimum			Median			Maximum		
	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Korea	134	174	-39	269	232	37	403	300	104
China	24	414	-389	49	551	-503	73	712	-639
Northeast Asian 3	159	587	-429	318	783	-466	477	1,012	-535
Share over World	0.11%	0.19%	-0.40%	0.22%	0.25%	-0.43%	0.33%	0.33%	-0.49%

Appendix Table 3. Effect of Trade Facilitation on China's Trade with Korea and Japan

	Minimum			Median			Maximum		
	Export	Import	Trade Balance	Export	Import	Trade Balance	Export	Import	Trade Balance
Overall Effect (Million US Dollars)									
Korea	263	587	-324	427	966	-539	631	1,346	-715
Japan	1,401	159	1,243	1,975	261	1,714	2,573	363	2,209
Northeast Asian 3	1,664	746	919	2,403	1,227	1,175	3,204	1,709	1,495
Share over World	1.16%	0.45%	3.14%	1.67%	0.74%	4.02%	2.23%	1.03%	5.12%
Effect of Improved Customs Procedures (Million US Dollars)									
Korea	131	361	-230	164	587	-423	237	813	-576
Japan	436	98	339	666	159	508	919	220	699
Northeast Asian 3	568	459	109	831	746	85	1,156	1,032	123
Share over World	0.40%	0.28%	0.37%	0.58%	0.45%	0.29%	0.80%	0.62%	0.42%
Effect of Improved Standards (Million US Dollars)									
Korea	72	136	-63	145	199	-54	217	262	-45
Japan	551	37	515	758	54	704	942	71	871
Northeast Asian 3	624	172	452	903	252	650	1,159	333	826
Share over World	0.43%	0.10%	1.55%	0.63%	0.15%	2.23%	0.81%	0.20%	2.83%
Effect of Improved Business Mobility (Million US Dollars)									
Korea	59	90	-31	118	181	-62	178	271	-93
Japan	413	24	389	551	49	503	712	73	639
Northeast Asian 3	473	115	358	670	229	440	890	344	545
Share over World	0.33%	0.07%	1.23%	0.47%	0.14%	1.51%	0.62%	0.21%	1.87%