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# Behind-the-Border Determinants of Bilateral Trade Flows in East Asia

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# *Executive Summary*

The global economy has witnessed significant reduction in traditional trade barriers (e.g., tariffs and quotas) in the past years. This trend has been mainly a result of unilateral, regional, and multilateral trade liberalization reforms. However, technical barriers to trade and other types of trade barriers still exist and have proliferated, hampering the free flow of goods and services as well as investments across borders. Some examples of trade bottlenecks include trade processes and procedures, trade-related infrastructures, regulations, and institutions. In this regard, trade facilitation has become one of the important trade policy measures that are being pursued by countries around the world.

In this paper, we observe that the recent trends on trade-related documentary requirements, trading time, cost to trade, quality of physical infrastructure—including airports, ports, railroads, etc., telecommunications services, accessibility to finance, and contract enforcement procedures, appear to be mixed across East Asian economies and over time. Using a standard gravity model and bilateral trade data at the Broad Economic Categories (BEC) 1-digit product classification, we find that, overall, bilateral trade in East Asia is influenced by time delays in trade, quality of port infrastructure, telecommunications services, and depth of credit information.

Across product groups or sectors, we find considerable variation with respect to the level of impact of trade facilitation or "behind-the-border" measures. Time delays appear to be influential in trade in food and beverages—due to its "perishability" and its maintaining quality—as well as in trade in transport equipment—as this sector tends to enforce just-in-time business practices and is heavily involved in production sharing. Quality of port infrastructure is significant in the trade in industrial supplies, fuels and lubricants, capital goods, and consumption goods; this suggests that these products are very much dependent on maritime transport. Trade in industrial supplies, fuels and lubricants, capital goods, and consumption goods, are also sensitive to the depth of credit information, implying that exporters and importers in these sectors rely more on financial capital. Trade in consumption goods and trade in other goods are seen to be dependent on telecommunication services, while trade in other goods alone is associated with contract enforcement.

Overall, we conclude that policymakers in East Asia must further promote trade facilitation through reducing time delays in trade, improving the quality of port infrastructure and telecommunication services, and providing more access to finance to both exporters and importers, in order to boost merchandise trade between economies in the region. Furthermore, policymakers must recognize that the potential impacts of addressing these trade facilitation measures vary across sectors or product groups. Therefore, trade facilitation policy must be geared towards addressing significant "behind-the-border" barriers that are specific to each of the key sectors or product groups, in order for trade costs to substantially go down and thereby promote freer bilateral trade within the East Asian region

# 1. Introduction

Trade facilitation[1] is seen as a vital trade policy that can enhance international trade between countries. This has become more important in the past years with tariffs and quotas being reduced in many parts of the world, while non-tariff barriers and other trade barriers remain and exacerbate trade costs, and thereby reduce international trade and hamper the economic benefits of international trade. Indeed, as traditional trade barriers such as tariffs and quotas are being lowered, the focus of trade policy has shifted towards trade facilitation, which is seen to enhance efficiency in trading processes and procedures and reduce trade costs. It is noted that trade facilitation covers a wide range of interrelated issues: customs, transport, hard (e.g., roads, ports) and soft (e.g., human capital) infrastructure, and financial services, among others. Several studies have pointed to the economic gains from trade facilitation: for example, Wilson and Shepherd (2009) have shown that trade facilitation reforms such as improving the quality of port infrastructure in Southeast Asia could increase trade in the region by 7.5%.

Economies in the Asia and Pacific region have embarked on trade policy measures, including trade facilitation, and other initiatives that promote greater economic integration and openness to trade and investments. For example, the 10-member Association of Southeast Asian Nations (ASEAN) formed the ASEAN Free Trade Area (AFTA) in 1992 that aims to create a single market and economic community in the region by the year 2015. More agreements were put in place by this regional body to achieve its goal, including the Common Effective Preferential Tariff (CEPT) scheme, ASEAN Investment Area (AIA), the ASEAN Framework Agreement on Services (AFAS), and the Mutual Recognition Agreement (MRA).

Amidst these trade policy developments in the Asia and Pacific region, there are still calls for more active and effective trade facilitation as countries in the region face several bottlenecks to intra-regional trade, such as at-the-border and behind-the-border barriers to trade. These barriers include domestic laws, policies, procedures, and rules, that tend to exacerbate costs on trade and investments, and thereby impede the free flow of trade in goods and services and domestic and foreign investments in the region. Indeed, it has been conjectured that although the Asia and the Pacific region has in general experienced major improvement in the facilitation of trade, reducing trade procedures and processes, the progress has been uneven across its sub-regions (ADB and UNESCAP 2009).

This paper aims to contribute to the policy debate on trade facilitation in the Asia-Pacific region by identifying certain "behind-the-border" factors of bilateral trade flows in East Asia[2]. The remainder of this paper is organized as follows. Section 2 presents a review of related studies on trade facilitation and Section 3 discusses the significance of this study. Section 4 provides a description of the trends in merchandise trade in the region while Section 5 shows the trends in certain "behind-the-border" indicators. Section 6 describes the methodology while Section 7 discusses key findings. Section 8 documents the limitations of the study. Finally, Section 9 provides the conclusion.

[1] One proposed definition of trade facilitation is that “it is the systemic rationalization of customs procedures and documents”, and that “it covers all the measures that affect the movement of goods between buyers and sellers, along the entire international supply chain” (ADB and UNESCAP 2009).

[2] In this paper, East Asia includes: Brunei Darussalam, Cambodia, the People's Republic of China (PRC), Indonesia, Japan, Republic of Korea, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam.

# 2. Literature Review

Several studies that used gravity models have focused on the potential impacts of trade facilitation measures, including behind-the-border factors on international trade flows. In particular, these studies have shown that trade costs, trading time, customs procedures, and trade-related documentary requirements, among others, are major factors of trade flows. For instance, Djankov, Freund, and Pham (2010) study to what extent the time of delivering products from the factory to the ship affects trade in a sample of 126 countries, and they find that in general, a delay of one day lowers trade by 1%, with a larger impact on time-sensitive products such as agricultural and manufactured goods. Duval and Utoktham (2009) find in a sample of Asia-Pacific countries that a 5% reduction in the delivery cost for a good from the factory to the nearest port can lead to at least a 4% increase in exports.

Helble, Shepherd, and Wilson (2009) find that improving transparency in trade policy via simplification and greater predictability can reduce trade costs, boosting bilateral trade amongst 21 member countries of the Asia-Pacific Economic Cooperation (APEC). Sadikov (2007) uses a gravity model for a sample of 126 countries and shows that burdensome business registration procedures and export signature requirements can have a detrimental effect on exports, more so with differentiated products than homogeneous goods.

Other studies that have made use of gravity modeling have highlighted the important role of infrastructure on international trade. For example, Shepherd and Wilson (2009) find that bilateral trade flows in the Southeast Asia region are sensitive to information and communications technology (ICT) as well as to transport infrastructure, particularly port infrastructure. Using firm-level data with emphasis on small and medium enterprises (SMEs), Li and Wilson (2009) find that SMEs would more likely be an exporter and would have higher export propensity if certain trade facilitation measures are improved, such as ICT and policy predictability. Indeed, certain case studies have pointed towards the strong potential of ICT in lowering the transaction costs of SMEs, and thereby facilitate their entry into international trade, like that of the Philippines (de Dios 2009) and Republic of Korea (Yang 2009). Wilson, Mann, and Otsuki (2005) show that port efficiency and the quality of service sector infrastructure, among others, are significant factors of trade flows in a sample of 75 countries. Nordås and Piermartini (2004) prove that infrastructure quality is a significant factor of trade performance, with port efficiency having the largest impact on trade amongst all infrastructure quality indicators.

Certain studies have argued that the level of financial development or access to finance, which is a major part of the overall domestic business or investment environment, can potentially affect international trade. Duval and Utoktham (2009) find that improving credit information can raise exports of merchandise goods by up to 16%. Hur, Raj, and Riyanto (2006) find in a sample of 27 sectors in 42 countries that the level of financial development is positively associated with export shares and trade balances for those countries with more intangible assets. Beck (2002) provides evidence for a sample of 65 countries indicating that financial development has a large causal effect on exports and trade balances of manufactured products.

Other studies have pointed towards the potential impact of certain governance indicators—contract enforcement, corruption, institutional quality, investor protection, and the rule of law, among others, on international trade. Duval and Utoktham (2009) show that in

developing Asia, simplifying domestic contract enforcement procedures to that of the average of member countries of the Organisation for Economic Co-operation and Development (OECD) can boost merchandise exports by up to 27%. Hur, Raj, and Riyanto (2006) find that improving investor protection can raise export shares and trade balances of countries with relatively more intangible assets. Méon and Sekkat (2006) use a gravity model composed of 38 to 60 countries and find that poor institutional quality is related to low manufactured exports; that control of corruption is the most significantly related to manufactured exports, compared to the rule of law or government effectiveness.

## 3. Significance of the Study

This study attempts to contribute to the existing literature on trade facilitation by providing a more comprehensive model and discussion on the potential effects of "behind-the-border" measures on bilateral trade flows in East Asia. Specifically, this study aims to first describe the most recent trends of potentially important "behind-the-border" measures—such as trade documents, time delays in trade, cost of trade, physical infrastructure, telecommunication services, access to finance, and business and regulatory environment—among others, as well as of bilateral merchandise trade, at both the aggregate and sectoral levels, in the region. Secondly, this study extends the empirical findings of related studies, namely, Djankov, Freund, and Pham (2010), Duval and Uthoktam (2009), and Shepherd and Wilson (2009), by identifying the important "behind-the-border" measures of bilateral trade flows, at both the aggregate and sectoral levels, in East Asia, as well as provide for possible explanations as regards the potential variation of these "behind-the-border" measures across sectors or product groups.

## 4. Merchandise Trade Performance in East Asia

Table 1 depicts the trends in East Asia's merchandise trade during the last four decades or so. Most economies in the region have registered steady improvement in their merchandise trade performances over the 1960-2008 period. The most open economies in the region—Hong Kong, China and Singapore—both recorded merchandise trade (as a share of gross domestic product or GDP) of more than 300 percent by 2008. Moreover, Cambodia, the People's Republic of China (PRC), and Thailand, have registered impressive growth in their merchandise trade in the past years. On the other hand, it may be worthwhile to note that other economies, specifically, Indonesia, Lao PDR, and the Philippines, have posted deterioration in their merchandise trade since 2000.

**Table 1**
**Merchandise Trade in East Asia, 1960-2008**
**(Percent of GDP)**

| | 1960 | 1970 | 1980 | 1990 | 2000 | 2005 | 2008 |
|---|---|---|---|---|---|---|---|
| **Brunei Darussalam** | — | 100.0 | 104.5 | 91.3 | 83.5 | 81.2 | — |
| **Cambodia** | 25.9 | 12.9 | — | — | 88.8 | 108.7 | 112.8 |
| **PRC** | 8.5 | 5.0 | 20.1 | 32.3 | 39.6 | 63.6 | 59.2 |
| **Hong Kong, China** | 129.8 | 142.7 | 150.3 | 217.4 | 246.4 | 333.2 | 354.4 |
| **Indonesia** | — | 21.8 | 42.0 | 41.5 | 66.1 | 56.9 | 51.6 |
| **Japan** | 19.3 | 18.8 | 25.8 | 17.3 | 18.4 | 24.4 | 31.5 |
| **Korea, Rep. of** | 9.7 | 31.7 | 62.4 | 51.1 | 62.4 | 64.6 | 92.3 |
| **Lao PDR** | — | — | — | 30.5 | 49.9 | 52.0 | 47.5 |
| **Malaysia** | 85.9 | 72.2 | 95.4 | 133.4 | 192.1 | 185.3 | 182.8 |
| **Philippines** | 20.0 | 34.1 | 43.3 | 47.8 | 101.2 | 91.8 | 64.8 |
| **Singapore** | 380.0 | 211.7 | 369.8 | 308.1 | 293.7 | 355.3 | 361.6 |
| **Thailand** | 31.1 | 28.3 | 48.6 | 65.7 | 106.7 | 136.5 | 136.8 |
| **Viet Nam** | — | — | — | 79.7 | 96.6 | 131.1 | 158.0 |

— = data not available. PRC = People's Republic of China.
Source: World Bank, World Development Indicators

Intra-regional trade of East Asia has been growing immensely in recent years (see Table 2). For instance, intra-regional imports in East Asia expanded from US$988 billion in 2004 to US$1.6 trillion in 2008. The PRC had the biggest share in intra-regional imports for the full year of 2008 at 24.7% followed by Hong Kong, China (18.2%) and Japan (17.7%), while the Philippines and Indonesia had relatively low shares at 2.0% and 5.1%, respectively.

**Table 2**
**Intra-Regional Trade in East Asia, 2004-2008**
**(US$ Billion)**

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| **Brunei Darussalam** | — | — | 1.2 | — | — |
| **Cambodia** | 1.6 | — | — | — | — |
| **PRC** | 231.3 | 264.4 | 305.7 | 358.8 | 392.3 |
| **Hong Kong, China** | 198.1 | 220.0 | 248.2 | 274.1 | 289.1 |
| **Indonesia** | 23.9 | 32.9 | 34.3 | 42.5 | 80.6 |
| **Japan** | 185.4 | 206.9 | 227.1 | 243.5 | 281.0 |
| **Korea, Rep. of** | 101.4 | 115.1 | 132.2 | 154.5 | 180.9 |
| **Malaysia** | 60.4 | 66.3 | 75.7 | 85.3 | 88.5 |
| **Philippines** | 24.3 | 25.3 | 27.8 | 30.6 | 32.2 |
| **Singapore** | 93.2 | 104.6 | 124.0 | 135.9 | 155.8 |
| **Thailand** | 50.0 | 62.4 | 67.5 | 76.9 | 88.9 |
| **Viet Nam** | 20.2 | 23.9 | 29.9 | 42.0 | — |
| **Total** | 988.1 | 1,121.9 | 1,272.5 | 1,444.0 | 1,589.4 |

— = data not available, PRC = People's Republic of China.
Note: Myanmar and Lao PDR data are not available.
Source: Authors' calculations, United Nations (UN) Comtrade.

The structure of merchandise trade in East Asia in recent years has been biased towards capital-intensive commodities. Based on the Broad Economic Categories' (BEC) 1-digit product classification, more than 40% of intra-regional trade in East Asia involves capital goods (see Table 3). In particular, as of 2008, capital goods comprised 42.5% of East Asia's intra-regional trade followed by industrial supplies at 27.1%. Among the East Asian economies that have capital goods with the largest share in intra-regional trade include the PRC; Hong Kong, China; Japan; Republic of Korea; Malaysia; the Philippines; and Singapore.

**Table 3**
**Structure of Intra-Regional Trade in East Asia by BEC 1-Digit Product Classification, 2004-2008**
**(Percent of total)**

| | Food & beverage | Industrial supplies (nec) | Fuels & lubricants | Capital goods (except transport equipment), including parts and accessories | Transport equipment, including parts and accessories | Consumption goods (nec) | Goods (nec) |
|---|---|---|---|---|---|---|---|
| **2004** | 3.3 | 25.8 | 7.3 | 46.5 | 4.0 | 12.5 | 0.6 |
| **2005** | 3.0 | 25.6 | 8.3 | 46.5 | 4.1 | 11.9 | 0.6 |
| **2006** | 2.9 | 26.2 | 8.5 | 46.4 | 4.1 | 11.1 | 0.8 |
| **2007** | 3.0 | 27.1 | 8.3 | 45.6 | 4.4 | 10.7 | 0.9 |
| **2008** | 3.2 | 27.1 | 11.1 | 42.5 | 4.9 | 9.9 | 1.3 |

BEC = Broad Economic Categories, nec = not elsewhere classified.

Source: Authors' calculations, United Nations (UN) Comtrade

# *5. Selected Trade Facilitation and "Behind-the-Border" Measures in East Asia*

As noted in the literature, among the trade facilitation measures and behind-the-border indicators that can potentially influence bilateral trade include trade-related documentary requirements, time to trade, costs to trade, quality of physical infrastructure (ex. ports, roads, air transport) and telecommunications services (ex. level of internet use), access to finance, and contract enforcement procedures, among others. This section presents a brief description on each of these, including its recent trends, in East Asia.

## 5.1 Trade Documents

Among the trade facilitation measures that can potentially affect trade flows are the "trading across borders" indicators—number of documents, time, and cost—to trade, based on the World Bank's Doing Business survey.

Table 4 presents the number of documents needed for export in East Asian economies over the 2006-2009 period. It can be gleaned from the table that the East Asian region as a whole registered a slight decline in the number of documents needed to export: from 7 documents in 2006 to 6 in 2009. While Thailand showed significant improvements (from 9 documents in 2006 to 4 documents), Cambodia (from 8 to 11) and PRC (from 6 to 7) have increased their documentary requirements during the comparable period. In 2009, Hong Kong, China; Indonesia, Singapore, and Thailand, have relatively low or below-average documents needed for exports while Cambodia, the PRC, Lao PDR, Malaysia, and the Philippines have above-average export documentary requirements.

**Table 4**
**Number of Documents Required for Export in East Asia, 2006-2009**

| | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|
| **Brunei Darussalam** | — | 6 | 6 | 6 |
| **Cambodia** | 8 | 11 | 11 | 11 |
| **PRC** | 6 | 7 | 7 | 7 |
| **Hong Kong, China** | 6 | 4 | 4 | 4 |
| **Indonesia** | 7 | 7 | 5 | 5 |
| **Japan** | 4 | 4 | 4 | 4 |
| **Korea, Rep. of** | 6 | 6 | 6 | 6 |
| **Lao PDR** | 11 | 11 | 9 | 9 |
| **Malaysia** | 7 | 7 | 7 | 7 |
| **Philippines** | 8 | 8 | 8 | 8 |
| **Singapore** | 4 | 4 | 4 | 4 |
| **Thailand** | 9 | 9 | 7 | 4 |
| **Viet Nam** | 6 | 6 | 6 | 6 |
| **Regional Average** | 7 | 7 | 6 | 6 |

— = data not available, PRC = People's Republic of China.
Notes: Myanmar data are not available. Regional average data are computed by the authors.
Source: World Bank's Doing Business.

Table 5 depicts the number of documents needed by firms for importing in East Asia over the 2006-2009 period. As a region, there has been a constant improvement in reducing the number of documentary requirements for imports since 2006, falling by one each year and reaching 6 in 2009 from 9 in 2006. Thailand posted the most significant improvement (from 12 documents in 2006 to 3 documents in 2009) while PRC, Lao PDR, and Hong Kong, China also showed improvements across time. In 2009, the number of documents needed for imports in Hong Kong, China; Japan; Singapore; and Thailand are lower than the regional average of 6. On the other hand, Cambodia, Lao PDR, Malaysia, the Philippines, and Thailand have above-average numbers.

**Table 5**
**Number of Documents Required for Import in East Asia, 2006-2009**

| | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|
| **Brunei Darussalam** | — | 6 | 6 | 6 |
| **Cambodia** | 12 | 11 | 11 | 11 |
| **PRC** | 11 | 6 | 6 | 6 |
| **Hong Kong, China** | 8 | 4 | 4 | 4 |
| **Indonesia** | 9 | 9 | 6 | 6 |
| **Japan** | 5 | 5 | 5 | 5 |
| **Korea, Rep. of** | 8 | 8 | 6 | 6 |
| **Lao PDR** | 15 | 15 | 10 | 10 |
| **Malaysia** | 7 | 7 | 7 | 7 |
| **Philippines** | 8 | 8 | 8 | 8 |
| **Singapore** | 4 | 4 | 4 | 4 |
| **Thailand** | 12 | 12 | 9 | 3 |
| **Viet Nam** | 8 | 8 | 8 | 8 |
| **Regional Average** | 9 | 8 | 7 | 6 |

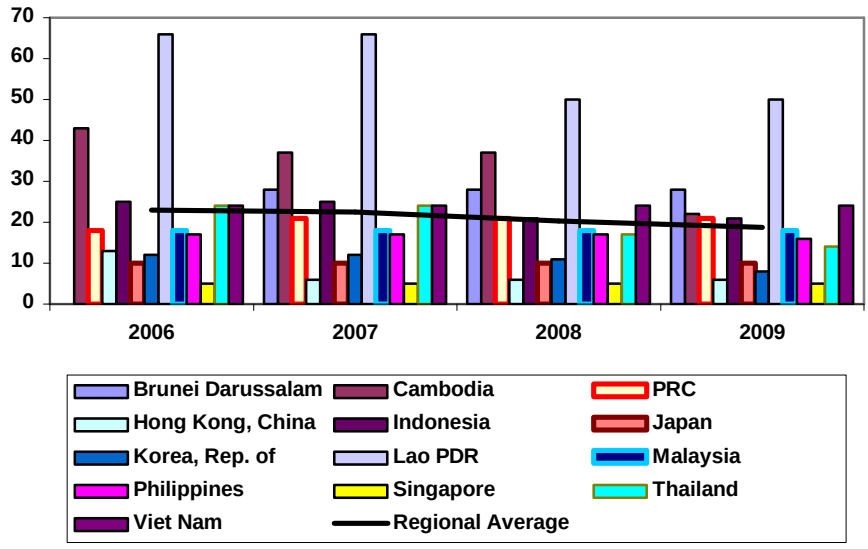
— = data not available, PRC = People's Republic of China.
Note: Myanmar data are not available. Regional average data are computed by the authors.
Source: World Bank's Doing Business.

### 5.2 Time

Figure 1 illustrates the time or number of days to export in all 13 East Asian economies. On average, in 2006, 23 days were needed before an economy in the region would be able to export; in 2009, this has gone down to 19 days, marking a substantial improvement in lowering the time to export. Across East Asian economies, the time to export differs, ranging from 5 days in Singapore to 50 days in Lao PDR, as of 2009. Around 7 economies were able to bring down the time to export and these include Cambodia; Hong Kong, China; Indonesia; Korea; Lao PDR; the Philippines; and Thailand. However, the PRC registered an increase in the time to export, from 18 days in 2006 to 21 days to 2009.

Figure 2 shows the time or number of days to import a product for each of the East Asian economies over 2006-2009. The regional average fell from 23 days in 2006 to 18 days in 2009, due to reductions in the time to import for 8 economies: Cambodia; Hong Kong, China; Indonesia; Korea; Lao PDR; the Philippines; and Thailand. As of 2009, the fastest time to import is 3 days for Singapore while the longest time to import is 50 days in Lao PDR.

**Figure 1**
**Number of Days to Export in East Asia, 2006-2009**

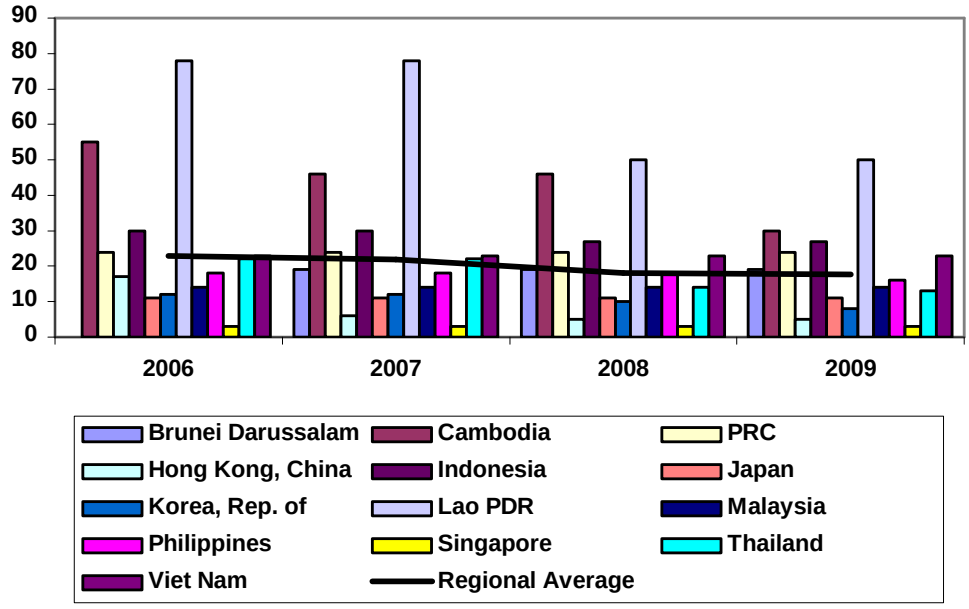



PRC = People's Republic of China.

Notes: Myanmar data are not available for all years and Brunei Darussalam 2006 data is not available. Regional average data are computed by the authors.

Source of basic data: World Bank's Doing Business.

**Figure 2**
**Number of Days to Import in East Asia, 2006-2009**




PRC = People's Republic of China.

Notes: Myanmar data are not available and Brunei Darussalam 2006 data is not available.

Regional average data are computed by the authors.

Source of basic data: World Bank's Doing Business.

### 5.3 Cost to Trade

Table 6 shows the cost to export in terms of US$ per container in East Asia. The average export cost for the region increased in recent years, from US$700 per container in 2006 to US$758 in 2009. Only 3 economies experienced a reduction in their export cost and these are Cambodia, Korea, and Thailand. Japan did not incur any change in its export cost since 2006 while most other East Asian economies registered an increase in export cost. In 2009, the lowest cost to export belongs to Malaysia while the highest is Lao PDR.

**Table 6**
**Cost to Export (US$ per container) in East Asia, 2006-2009**

| | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|
| **Brunei Darussalam** | — | 515 | 515 | 630 |
| **Cambodia** | 736 | 722 | 722 | 732 |
| **PRC** | 335 | 390 | 390 | 460 |
| **Hong Kong, China** | 425 | 525 | 525 | 625 |
| **Indonesia** | 546 | 546 | 667 | 704 |
| **Japan** | 989 | 989 | 989 | 989 |
| **Korea, Rep. of** | 780 | 780 | 745 | 767 |
| **Lao PDR** | 1,420 | 1,420 | 1,750 | 1,860 |
| **Malaysia** | 432 | 432 | 432 | 450 |
| **Philippines** | 800 | 800 | 800 | 816 |
| **Singapore** | 416 | 416 | 416 | 456 |
| **Thailand** | 848 | 848 | 615 | 625 |
| **Viet Nam** | 669 | 669 | 669 | 734 |
| **Regional Average** | 700 | 696 | 710 | 758 |

— = data not available, PRC = People's Republic of China.
Notes: Myanmar data are not available. Regional average data are computed by the authors.
Source: World Bank's Doing Business.

Table 7 shows the cost to import in the region. The regional average for the cost to import rose from US$795 per container in 2006 to US$820 per container in 2009. Only Indonesia, Korea, and Thailand were able to reduce their import cost since 2006. In 2009, Singapore have the lowest import cost in the region at US$439 followed by Malaysia (US$450) while Lao PDR and Japan have the highest import cost at US$2,040 and US$1,047, respectively.

**Table 7**
**Cost to Import (US$ per container) in East Asia, 2006-2009**

| | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|
| **Brunei Darussalam** | — | 590 | 590 | 708 |
| **Cambodia** | 816 | 852 | 852 | 872 |
| **PRC** | 375 | 430 | 430 | 545 |
| **Hong Kong, China** | 425 | 525 | 525 | 633 |
| **Indonesia** | 675 | 675 | 623 | 660 |
| **Japan** | 1,047 | 1,047 | 1,047 | 1,047 |
| **Korea, Rep. of** | 1,040 | 1,040 | 745 | 747 |
| **Lao PDR** | 1,690 | 1,690 | 1,930 | 2,040 |
| **Malaysia** | 385 | 385 | 385 | 450 |
| **Philippines** | 800 | 800 | 800 | 819 |
| **Singapore** | 367 | 367 | 367 | 439 |
| **Thailand** | 1,042 | 1,042 | 786 | 795 |
| **Viet Nam** | 881 | 881 | 881 | 901 |
| **Regional Average** | 795 | 794 | 766 | 820 |

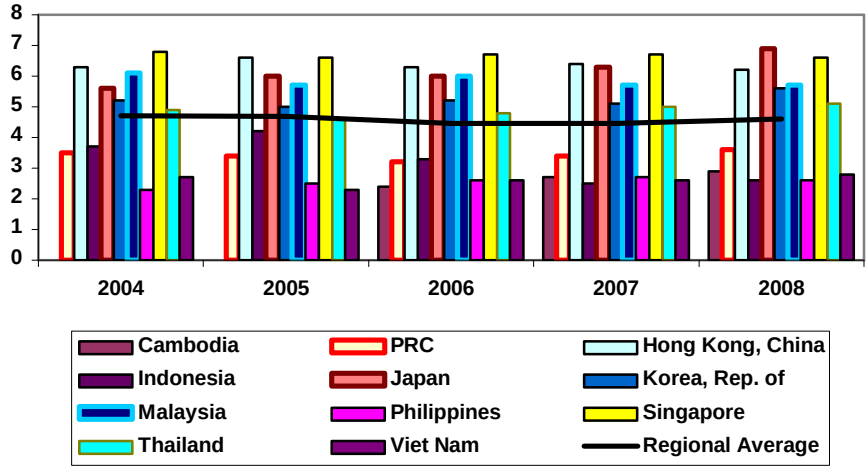
— = data not available, PRC = People's Republic of China.
Notes: Myanmar data are not available. Regional average data are computed by the authors.
Source: World Bank's Doing Business.

## 5.4 Infrastructure

### *5.4.1 General Infrastructure*

Figure 3 provides for the quality of general infrastructure in East Asian economies covering the period 2004-2008. The quality of infrastructure in the region has basically remained the same, as measured by Executive Opinion Survey. Japan, Singapore, and Hong Kong, China have the best infrastructure in the region followed by Malaysia, Korea, and Thailand. Indonesia, the Philippines, Viet Nam, Cambodia, and PRC have infrastructure below regional average. It appears that the quality of infrastructure in Cambodia, Korea, and the Philippines has improved, while that of Indonesia and Malaysia deteriorated over time.

**Figure 3**
**Quality of Overall Infrastructure in East Asia, 2004-2008**




PRC = People's Republic of China.

Notes:

(i) Data for Brunei Darussalam, Lao PDR, and Myanmar are not available for all years and Cambodia data for years 2004 and 2005 are not available.

(ii) Quality of overall infrastructure indicates whether the general infrastructure in the economy is (1=underdeveloped, 7 = as extensive and efficient as the world's best)

(iii) Regional average data are computed by the authors.

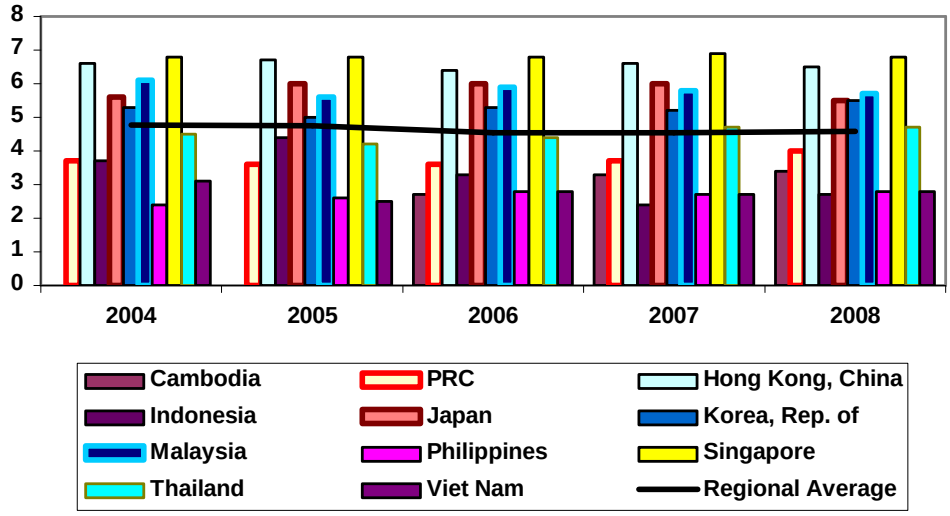
Source of basic data: World Economic Forum's Global Competitiveness Report.

### *5.4.2 Port Infrastructure*

Figure 4 showcases the quality of port infrastructure in East Asia during 2004-2008. The quality of port infrastructure in the region seems to be slightly deteriorating across time, as measured by the Executive Opinion Survey. Singapore and Hong Kong, China have the best ports in the region followed by Malaysia, Japan, Korea, and Thailand. Indonesia, the Philippines, Viet Nam, Cambodia, and PRC have port quality below regional average. However, it appears that the

quality of infrastructure in Cambodia and the Philippines are improving, while that of Indonesia and Malaysia are deteriorating.

**Figure 4**
**Quality of Port Infrastructure in East Asia, 2004-2008**




PRC = People's Republic of China.

Notes:

(i) Data for Brunei Darussalam, Lao PDR, and Myanmar are not available for all years and Cambodia data for years 2004 and 2005 are not available.

(ii) Quality of port infrastructure indicates whether port facilities and inland waterways in the economy are (1=underdeveloped, 7 = as developed as the world's best). For landlocked economies, this measures the ease of access to port facilities and inland waterways.

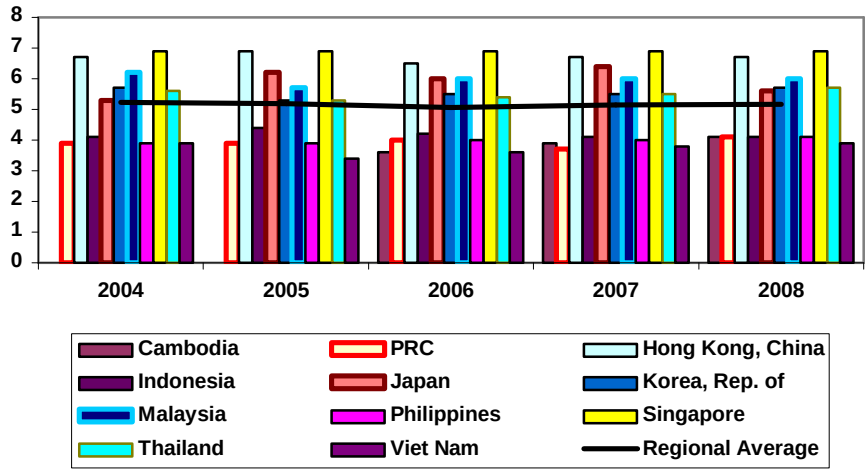
(iii) Regional average data are computed by the authors.

Source of basic data: World Economic Forum's Global Competitiveness Report.

### *5.4.3 Air Transport Infrastructure*

The quality of air transport infrastructure for each of the East Asian economies during 2004-2008 is found in Figure 5. The quality of air transport infrastructure in the region has remained the same across time, as measured by the Executive Opinion Survey. Singapore and Hong Kong, China have the best airports in the region followed by Malaysia, Korea, Thailand, and Japan. Viet Nam, Cambodia, PRC, Indonesia, and the Philippines have air transport quality below regional average. It seems that the quality of infrastructure in Cambodia is improving over time.

**Figure 5**
**Quality of Air Transport Infrastructure in East Asia, 2004-2008**




PRC = People's Republic of China.

Notes:

(i) Data for Brunei Darussalam, Lao PDR, and Myanmar are not available for all years and Cambodia data for years 2004 and 2005 are not available.

(ii) Quality of air transport infrastructure indicates whether passenger air transport in the economy is (1=infrequent, limited, and inefficient, 7 = as frequent, extensive, and efficient as the world's best).

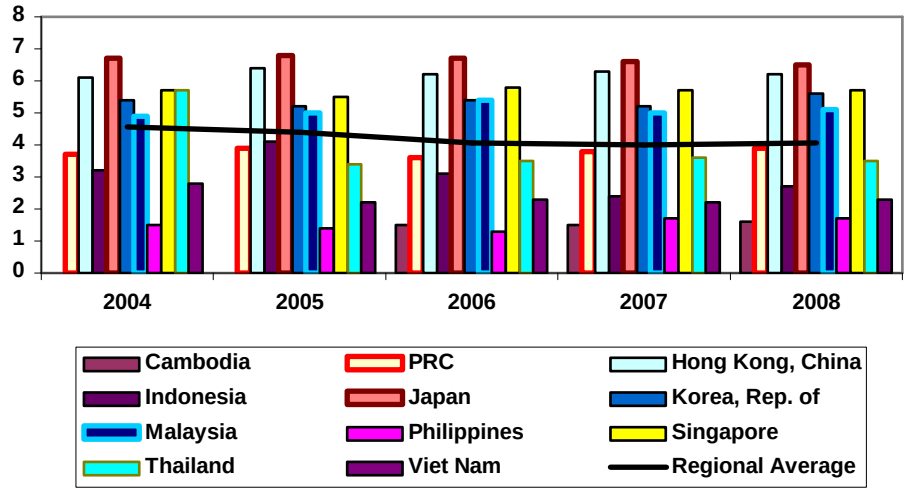
(iii) Regional average data are computed by the authors.

Source of basic data: World Economic Forum's Global Competitiveness Report.

### *5.4.4 Railroad Infrastructure*

Figure 6 depicts the quality of railroad infrastructure in the region covering the period 2004-2008. The quality of railroad infrastructure in the region has been on a steady decline across time, as measured by the Executive Opinion Survey. Japan and Hong Kong, China still have the best railroads in the region followed by Singapore, Korea, and Malaysia. Cambodia, the Philippines, Viet Nam, Indonesia, Thailand, and PRC have railroad infrastructure below regional average. It appears that the quality of infrastructure in Thailand, Indonesia, and Viet Nam are deteriorating over time.

**Figure 6**
**Quality of Railroad Infrastructure in East Asia, 2004-2008**




PRC = People's Republic of China.

Notes:

(i) Data for Brunei Darussalam, Lao PDR, and Myanmar are not available for all years and Cambodia data for years 2004 and 2005 are not available.

(ii) Quality of railroad infrastructure indicates whether railroads in the economy are (1= underdeveloped, 7 = as extensive and efficient as the world's best).

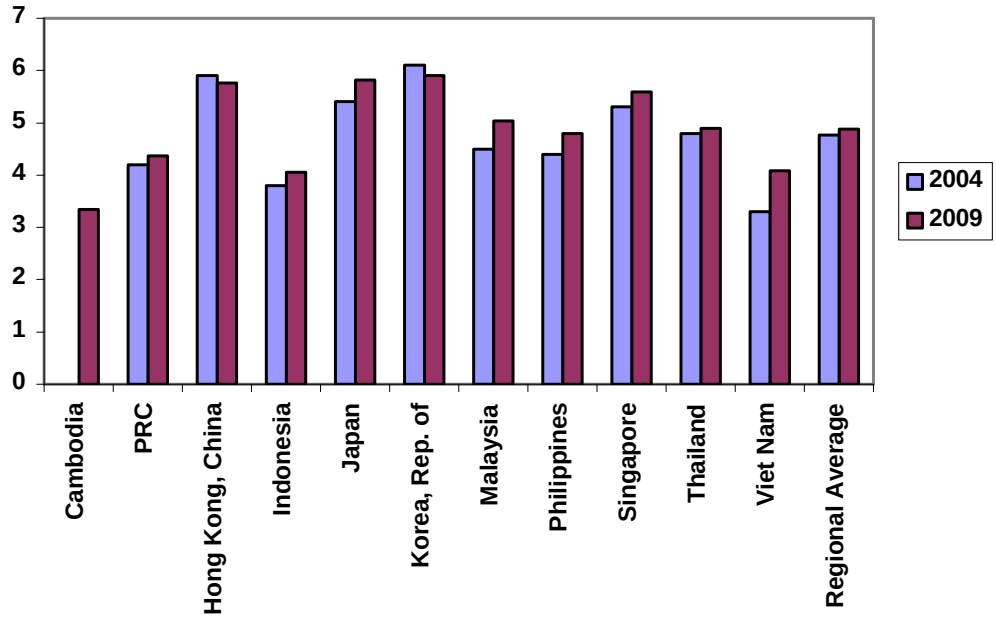
(iii) Regional average data are computed by the authors.

Source of basic data: World Economic Forum's Global Competitiveness Report.

### *5.4.5 Telecommunications Services*

It has been noted in the literature that telecommunications services can potentially affect bilateral trade, and possible proxies for this variable include the level of competition among internet service providers or ISPs (see Shepherd & Wilson 2009) or the use and speed of the internet (see Wilson, Mann, & Otsuki 2004). Figure 7 depicts the quality of competition of ISPs in East Asia for 2004 and 2009. On a regional basis, there has been a slight improvement in the quality of competition in the ISP sector. Majority of East Asian economies posted an improvement in their respective scores between 2004 and 2009 with Viet Nam, Malaysia, the Philipines and Japan being the largest gainers. In 2009, the top economies with the best quality of ISP competition are Korea followed by Hong Kong, China, Japan, and Singapore. On the other hand, Cambodia has the lowest score with 3.1, which indicates the relatively poor quality of ISP competition in that economy.

**Figure 7**
**Quality of Competition of Internet Service Providers in East Asia, 2004 and 2009**




PRC = People's Republic of China.

Notes:

(i) Brunei Darussalam, Lao PDR, and Myanmar data are not available for both years. Cambodia 2004 data is not available.

(ii) Regional average data are computed by the authors.

Source of basic data: World Economic Forum's Global Competitiveness Report.

### *5.5 Access to Finance*

It has been documented that access to finance is associated with international trade, with firms having greater access to loans being more likely to trade with their foreign counterparts. An acceptable proxy for access to finance is the depth of credit information (see Duval & Utoktham 2009). Table 8 illustrates the depth of credit information in East Asia covering the 2005-2009 period. At the regional level, it appears that the depth of credit information is, at best, modest. Currently, Japan, Korea, and Malaysia, have attained the highest score of 6, suggesting that credit information in these economies are highly available. At the other end of the spectrum are economies like Brunei Darussalam, Cambodia, and Lao PDR, all of which significantly lack credit information based on their scores are all 0.

**Table 8**
**Depth of Credit Information in East Asia, 2005-2009**

| | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|
| **Brunei Darussalam** | — | — | — | 0 | 0 |
| **Cambodia** | 0 | 0 | 0 | 0 | 0 |
| **PRC** | 2 | 2 | 4 | 4 | 4 |
| **Hong Kong, China** | 4 | 4 | 4 | 4 | 4 |
| **Indonesia** | 2 | 2 | 2 | 3 | 4 |
| **Japan** | 6 | 6 | 6 | 6 | 6 |
| **Korea, Rep. of** | 5 | 5 | 5 | 5 | 6 |
| **Lao PDR** | 0 | 0 | 0 | 0 | 0 |
| **Malaysia** | 6 | 6 | 6 | 6 | 6 |
| **Philippines** | 3 | 3 | 3 | 3 | 3 |
| **Singapore** | 4 | 4 | 4 | 4 | 4 |
| **Thailand** | 4 | 4 | 5 | 5 | 5 |
| **Viet Nam** | 2 | 3 | 3 | 3 | 4 |
| **Regional Average** | 3 | 3 | 4 | 3 | 4 |

— = data not available, PRC = People's Republic of China.
Notes:
(i) Myanmar data are not available.
(ii) Depth of credit information index ranges from 0 (lowest) to 6 (highest).
(iii) Regional average data are computed by the authors.
Source: World Bank's Doing Business.

### *5.6 Contract Enforcement*

The level of enforcing contracts in an economy is found to be important in influencing its merchandise trade with another economy (see Duval & Utoktham 2009, Ranjan & Lee 2007). Table 9 showcases the number of procedures in enforcing contracts for East Asia during 2004-2009. The simple average of the number of procedures to enforce a contract for all 13 East Asian economies climbed from 34 in 2004 to 36 in 2006 and stayed at that level until 2009; this upswing was mainly due to Brunei Darussalam, which had its data made available starting in 2006. Overall, however, there was no substantial change in the number of contract enforcement procedures for the region during this period. In 2009, Brunei Darussalam had the largest number of procedures at 58, followed by Cambodia (44), Lao PDR (42), and Indonesia (39). Conversely, Singapore has the least number of contract enforcement procedures with 21 followed by Hong Kong, China (24), Japan (30), and Malaysia (30).

**Table 9**
**Number of Contract Enforcement Procedures in East Asia, 2004-2009**

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|
| **Brunei Darussalam** | — | — | — | 58 | 58 | 58 |
| **Cambodia** | 44 | 44 | 44 | 44 | 44 | 44 |
| **PRC** | 35 | 35 | 35 | 35 | 35 | 34 |
| **Hong Kong, China** | 24 | 24 | 24 | 24 | 24 | 24 |
| **Indonesia** | 39 | 39 | 39 | 39 | 39 | 39 |
| **Japan** | 30 | 30 | 30 | 30 | 30 | 30 |
| **Korea, Rep. of** | 35 | 35 | 35 | 35 | 35 | 35 |
| **Lao PDR** | 42 | 42 | 42 | 42 | 42 | 42 |
| **Malaysia** | 30 | 30 | 30 | 30 | 30 | 30 |
| **Philippines** | 37 | 37 | 37 | 37 | 37 | 37 |
| **Singapore** | 21 | 21 | 21 | 21 | 21 | 21 |
| **Thailand** | 35 | 35 | 35 | 35 | 35 | 35 |
| **Viet Nam** | 34 | 34 | 34 | 34 | 34 | 34 |
| **Regional Average** | 34 | 34 | 34 | 36 | 36 | 36 |

— = data not available, PRC = People's Republic of China.
Notes: Myanmar data are not available. Regional average data are computed by the authors.
Source: World Bank's Doing Business.

# 6. Methodology

We employ a standard gravity model following a panel regression specification in order to empirically determine the "behind-the-border" determinants of bilateral trade flows in East Asia.[3] The East Asian economies that we considered in our model are the PRC; Hong Kong, China; Indonesia; Japan; Korea; Malaysia; the Philippines; Singapore; Thailand; and Viet Nam (see Table 10). Other Southeast Asian economies, namely, Brunei Darussalam, Cambodia, Lao PDR, and Myanmar, were not included due to incomplete data. Furthermore, the time period covered is 2006-2008.

**Table 10**
**List of Importer and Exporter Economies**

| Economy Group | Economy |
|---|---|
| Importer | PRC; Hong Kong, China; Indonesia; Japan; Republic of Korea; Malaysia; the Philippines; Singapore; Thailand; and Viet Nam |
| Exporter | PRC; Hong Kong, China; Indonesia; Japan; Republic of Korea; Malaysia; the Philippines; Singapore; Thailand; and Viet Nam |

PRC = People's Republic of China.

The gravity model that we utilize is similar to Shepherd and Wilson (2009), which is based on the theoretically-robust gravity model of Anderson and Van Wincoop (2003, 2004). That is, our model is in a fixed effects form that includes dummy variables for importer ($\lambda_i$), exporter ($\rho_j$), sector ($\xi_k$), and year ($\sigma_t$), in order to capture expenditure, output, and (inward and outward) resistance terms. Formally,

$$\begin{aligned}\text{logimp}^{k}_{ij} = {} & \lambda_i + \rho_j + \xi_k + \sigma_t + \beta_1 \text{logdist}_{ij} + \beta_2 \text{comlang\_off}_{ij} + \beta_3 \text{comcol}_{ij} + \beta_4 \text{contig}_{ij} + \\ & \beta_5 \text{smctry}_{ij} + \beta_6 \text{logtime\_ave}_{ij} + \beta_7 \text{logqpi\_ave}_{ij} + \beta_8 \text{logisp\_ave}_{ij} + \\ & \beta_9 \text{logcredit\_ave}_{ij} + \beta_{10} \text{logcontract\_ave}_{ij} + \varepsilon_{ij}\end{aligned}$$

In this model, the "behind-the-border" variables include time delays in importing, quality of port infrastructure (which is a proxy for physical infrastructure), competition in the ISP sector (which is a proxy for telecommunications services), depth of credit information (which is a proxy for access to finance), and contract enforcement. Each of the "behind-the-border" indicators is an average for both the importer and exporter economies. We didn't include tariffs due to its incomplete time-series for few economies in our sample.[4] In addition to our baseline model, we also conduct, as a robustness check, regression that includes one of the "behind-the-border" variables together with the other explanatory variables.

[3] As shown in the literature review, the gravity regression model is widely used in showing that international trade between two countries is a function of their economic size, geographical and historical characteristics, tariff policy, and trade facilitation measures—customs procedures, physical infrastructure, telecommunication services, etc.

[4] For example, Indonesia, Korea, Malaysia, the Philippines, Thailand, and Viet Nam do not have complete 2008 tariff data on imports coming from the rest of East Asia.

Aside from the panel data regression specification, we also estimate a cross-section regression model by product group, following the BEC's 1-digit product classification, with fixed effects for importer, exporter, and year. This is made as another robustness check, given that it is possible for heterogeneity across product groups to exist, and that such heterogeneity is not fully captured in a panel data regression model.

The definition and source of each of the variables in the model, as well as the time period used in the model, are shown in Table 11.

**Table 11**
**List of Variables, Period, and Data Sources**

| Variable | Definition | Year | Source |
|---|---|---|---|
| $logimp^{k}_{ij}$ | Natural logarithm of economy i's imports of product k from economy j. | 2006-2008 | Comtrade |
| $logdist_{ij}$ | Natural logarithm of distance, measured in kilometers, between economies i and j. | 2006-2008 | CEPII |
| $comlang\_off_{ij}$ | Dummy variable that is equal to 1 if economies i and j have a common language, and 0 otherwise. | 2006-2008 | CEPII |
| $comcol_{ij}$ | Dummy variable that is equal to 1 if economies i and j were colonized by the same country, and 0 otherwise. | 2006-2008 | CEPII |
| $contig_{ij}$ | Dummy variable that is equal to 1 if economies i and j share the same border, and 0 otherwise. | 2006-2008 | CEPII |
| $smctry_{ij}$ | Dummy variable equal to 1 if economies i and j were once part of the same country, and 0 otherwise. | 2006-2008 | CEPII |
| $logtime\_ave_{ij}$ | Average number of days to import in economies i and j. Converted into natural logarithm. | 2006-2008 | World Bank's Doing Business |
| $logqpi\_ave_{ij}$ | Average quality of port infrastructure in economies i and j. Converted into natural logarithm. | 2006-2008 | WEF's Global Competitiveness Report |
| $logisp\_ave_{ij}$ | Average quality of the level of competition among internet service providers (ISPs) in countries i and j. Converted into natural logarithm. | 2006-2008 | WEF's Global Competitiveness Report |
| $logcredit\_ave_{ij}$ | Average depth of credit information in economies i and j. Converted into natural logarithm. | 2006-2008 | World Bank's Doing Business |
| $logcontract\_ave_{ij}$ | Average number of contract enforcement proceduries in economies i and j. Converted into natural logarithm. | 2006-2008 | World Bank's Doing Business |

GDP = gross domestic product, TRAINS = Trade Analysis and Information System,

UNCTAD = United Nations Conference on Trade and Development, WEF = World Economic Forum

Import data is used as a proxy for bilateral trade flows. This is because import value is typically measured as cost, insurance, and freight (c.i.f.), which is seen to be a better measure compared to export (or import) value measured by freight on board (f.o.b.). The product classification of our import data is based on BEC's 1-digit classification with the products being disaggregated into seven groups: 1) Food and beverages; 2) Industrial supplies; 3) Fuels and lubricants; 4) Capital goods (except transport equipment), including accessories and parts; 5) Transport equipment, including accessories and parts; 6) Consumption goods; and 7) Goods (not elsewhere classified).

In estimating our model, we make use of ordinary least squares (OLS) with standard errors robust to heteroskedasticity and clustering using the distance between two trading economies.

# 7. Results

Table 12 presents our panel data regression results based on 1,878 observations. Our baseline regression model, i.e., Model 1, is robust as its F-statistic of 155.16 is highly significant (i.e., statistically significant at 1 percent). Furthermore, based on our model's $R^2$-statistic, about 67 percent of variation in bilateral trade is accounted for in our model.

Distance is found to be highly significant and inversely related to bilateral trade flows. That is, a 1 percent increase in the distance between two East Asian economies lowers trade between the two by 0.55 percent. Coefficients for that of economies with a common language and for that of economies that were once part of the same country were both highly significant as well, indicating that both characteristics positively affects bilateral trade.

The results also depict statistical significance and correct signs for most of the trade facilitation or "behind-the-border" measures. First, time delays in importing is found to be (weakly) significant and negatively associated to bilateral trade, with a 1 percent increase in the number of days to import translating into a 0.56 percent fall in bilateral trade. This is consistent with the findings of Djankov, Freund, Pham (2010), which confirm the negative relation between time delays and trade. Secondly, quality of port infrastructure is found to be (weakly) significant and positively related to bilateral trade; specifically, a 1 percent increase in the quality of port infrastructure would raise bilateral trade by 1.55 percent. This finding is similar to that of Shepherd and Wilson (2009); Wilson, Mann, and Otsuki (2005), and Nordås and Piermartini (2004). Telecommunication services, which is represented by the competition in the ISP sector, is also found to be statistically significant and positively related to bilateral trade; that is, a 1 percent increase in the level of competition in the ISP sector would boost trade by 1.21 percent. These results are broadly consistent with that of Shepherd and Wilson (2009), Wilson, Mann, and Otsuki (2005), and Nordås and Piermartini (2004). Depth of credit information is found to be highly and positively significant to bilateral trade; a 1 percent increase in the depth of credit information increases bilateral trade by 1.25 percent. These findings are broadly consistent with Duval and Utoktham (2009).

As a robustness check, we make use of regression specifications that take into account each of the "behind-the-border" measures, and these are presented as Models 2 to 6 in Table 12. All of these other models are statistically robust, as proven by their high F-statistics and there is also considerable variation in bilateral trade that is being captured in these models, as their $R^2$-statistic hovers at 67 percent. Furthermore, all models, except model 4, confirm the significance of their respective "behind-the-border" measure and other explanatory variables.

Another robustness check is to conduct a regression for each product group or sector in order to check for possible heterogeneity. Table 13 presents the regression results with fixed effects by importer, exporter, and year, by BEC's 1-digit product classification. Each of the regression models is robust, as confirmed by the F-statistic, which is highly significant across all product groups. Furthermore, each of these models captures a relatively high degree of variation in bilateral trade, as the $R^2$-statistic ranges from 72 percent to 91 percent across product groups

**Table 12**
**Results of Panel Data Regression Model With Fixed Effects By Importer, Exporter, Period, and Product Classification**

| | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| logdist | –0.5463*** (0.1022) | -0.5700*** (0.1072) | -0.5446*** (0.1087) |
| logtime_ave | –0.5559* (0.3264) | -0.5515*(0.3231) | |
| logisp_ave | 1.2078** (0.5323) | | 1.3140** (0.5924) |
| logqpi_ave | 1.5462* (0.8025) | | |
| logcredit_ave | 1.2505*** (0.2728) | | |
| logcontract_ave | –0.2476 (0.2629) | | |
| contig | –0.0103 (0.1313) | -0.0375 (0.1317) | -0.0038 (0.1297) |
| comlang_off | 0.4887*** (0.1363) | 0.5408*** (0.1402) | 0.5038*** (0.1367) |
| comcol | 0.1042 (0.2417) | -0.0234 (0.2345) | 0.0638 (0.2894) |
| smctry | 1.2916*** (0.2357) | 1.3144*** (0.2370) | 1.2748*** (0.2279) |
| | | | |
| Observations | 1,878 | 1,878 | 1,878 |
| F | 155.16*** | 133.22*** | 123.37 |
| $R^2$ | 0.6695 | 0.6684 | 0.6683 |
| | **Model 4** | **Model 5** | **Model 6** |
| logdist | -0.5326*** (0.1053) | -0.5429*** (0.1099) | -0.5473*** (0.1092) |
| logtime_ave | | | |
| logisp_ave | | | |
| logqpi_ave | 1.0189 (0.8816) | | |
| logcredit_ave | | 1.2733*** (0.3016) | |
| logcontract_ave | | | -0.3909 (0.2561) |
| contig | 0.0015 (0.1249) | -0.0168 (0.1331) | -0.0143 (0.1300) |
| comlang_off | 0.4771*** (0.1383) | 0.5042*** (0.1343) | 0.5083*** (0.1370) |
| comcol | 0.1426 (0.2907) | 0.0671 (0.2856) | 0.0541 (0.2867) |
| smctry | 1.2878*** (0.2273) | 1.2862*** (0.2285) | 1.2902*** (0.2292) |
| | | | |
| Observations | 1,878 | 1,878 | 1,878 |
| F | 147.24 | 128.26 | 122.72 |
| $R^2$ | 0.6682 | 0.6686 | 0.6681 |

Notes: *** = significant at 1%, ** = significant at 5%, * = significant at 10%. Standard errors are in parenthesis. Estimation is OLS with robust standard errors and clustered by distance.

.

**Table 13**
**Results of Cross-Section Regression Model By Product Group With Fixed Effects By Importer, Exporter, and Period**

| | Food & Beverage | Industrial Supplies (nec) | Fuels & Lubricants | Capital Goods, including parts & accessories | Transport Equipment, including parts and accessories | Consumption Goods (nec) | Goods (nec) |
|---|---|---|---|---|---|---|---|
| logdist | –0.6068*** | –0.4838***( | –0.3552* | –0.4872*** | –0.6174*** | –0.4509*** | –0.8444** |
| | (0.1289) | 0.0782) | (0.2024) | (0.1023) | (0.2012) | (0.1213) | (0.3524) |
| logtime_ave | –1.1517*** | –0.2533 | –0.7750 | –0.4301 | –1.8213** | 0.0590 | 1.1005 |
| | (0.3879) | (0.2478) | (0.8804) | (0.2735) | (0.7065) | (0.3359) | (1.0107) |
| logisp_ave | 0.0630 | 0.3422 | –1.2909 | –0.1313 | 1.1112 | 0.9368* | 8.0722*** |
| | (0.5137) | (0.4254) | (1.6547) | (0.4514) | (0.7657) | (0.4822) | (2.7039) |
| logqpi_ave | –2.0061* | 1.7435*** | 8.0956*** | 2.6450** | 2.2403 | 2.3086** | –2.3575 |
| | (1.0632) | (0.6431) | (2.9830) | (1.2855) | (1.7355) | (1.0250) | (3.0987) |
| logcredit_ave | –0.1596 | 1.6563*** | 2.3794** | 2.4317*** | 0.2515 | 1.8819*** | 1.8455 |
| | (0.5826) | (0.3142) | (1.0783) | (0.5646) | (0.6908) | (0.4236) | (1.9185) |
| logcontract_ave | –0.1917 | –0.0348 | 0.2979 | 0.0910 | 0.3156 | 0.1519 | –2.8096*** |
| | (0.3247) | (0.1831) | (0.7036) | (0.2975) | (0.4455) | (0.2359) | (1.0196) |
| contig | –0.0435 | 0.1190 | 0.8400** | –0.3176* | –0.3346 | 0.2034 | –0.4901 |
| | (0.2285) | (0.1098) | (0.3266) | (0.1596) | (0.2570) | (0.2203) | (0.5055) |
| comlang_off | 0.5492** | 0.2752* | 0.1458 | 0.5421** | 0.2143 | 0.3379 | 1.2982** |
| | (0.2467) | (0.1533) | (0.4772) | (0.2065) | (0.2980) | (0.2540) | (0.5552) |
| comcol | 0.0274 | 0.0519 | 0.3853 | 0.2157 | 0.9115 | 0.3533 | –1.1439 |
| | (0.2892) | (0.1742) | (0.6819) | (0.2624) | (0.6168) | (0.3253) | (0.6928) |
| smctry | 0.2589 | 0.5862*** | 1.4534** | 0.3842* | 2.1569*** | 1.0233*** | 3.0017*** |
| | (0.2666) | (0.1689) | (0.6047) | (0.2099) | (0.4012) | (0.3516) | (0.5203) |
| Observations | 270 | 270 | 270 | 270 | 270 | 270 | 258 |
| F | 88.88*** | 211.21*** | 22.81*** | 281.25*** | 89.21*** | 37.83*** | 109.78*** |
| $R^2$ | 0.8423 | 0.9115 | 0.7242 | 0.8908 | 0.7784 | 0.8581 | 0.7891 |

nec = not elsewhere classified.

Note: *** - significant at 1%; ** - significant at 5%; * - significant at 10%.

Standard errors are in parenthesis.

Distance between two economies is found to be a statistically significant predictor of bilateral trade in all product groups. Economies that share the same border have robust bilateral trade in fuels and lubricants; economies with the same language have strong bilateral trade in food and beverage, industrial supplies, capital goods, and other goods; while economies that were once part of the same country have significant bilateral trade in all product groups except for food and beverage.

Table 13 also presents the statistical findings for trade facilitation or "behind-the-border measures and reveals that the results are quite mixed across product groups. Time delays in imports are found to be statistically significant and negatively associated with bilateral trade in food and beverage as well as transport equipment (including parts and accessories). In the case of food and beverage, the results appear to reflect issues of perishability and maintaining quality. On the other hand, the results on transport equipment might be due to the fact that the transport equipment sector, including the automobile sector, heavily relies on production sharing across economies in East Asia and also on its use of just-in-time business practices. Indeed, as argued by Nordås and Piermartini (2004), sectors that heavily use just-in-time business practices are more

sensitive to delays in shipments of intermediate goods. Furthermore, our results on time delays are consistent with Djankov, Freund, Pham (2010), who estimated that each day of delay reduces trade by more than 1 percent and more so for time-sensitive products (e.g. agricultural products which have a shelf life of 3 weeks or less; office equipment, electric power machinery and photographic instruments). Moreover, they find that each day of delay reduces a country's relative exports of time-sensitive to time-insensitive agricultural goods by as much as 6 percent (Ibid.).

The quality of port infrastructure is also found to be significant and positively associated with respect to the bilateral trade in industrial supplies, fuels and lubricants, capital goods (including parts and accessories), and consumption goods. The coefficient for fuels and lubricants is the highest and most significant and this appears to be reasonable given that such commodities are heavily dependent on sea transport (see also Shepherd and Wilson 2009). These results might imply that public infrastructure, such as port infrastructure, is productivity-enhancing as it tends to bring down production costs incurred by firms and promote efficiency, but the magnitude of its impact varies across sectors. Also, investment in infrastructure accrues more to capital-intensive and high- technology industries than labor-intensive and low-technology industries (Mamatzakis, 2007).

Depth of credit information is found to be significant and positively related to bilateral trade in industrial supplies, fuels and lubricants, capital goods (including parts and accessories), and consumption goods. This might be because such sectors tend to have more access to financial capital from banks and other financial institutions as compared to food and beverage sector and firms producing other goods (not elsewhere classified). Moreover, telecommunication services is seen to be significant and positively associated with bilateral trade in consumption goods (not elsewhere classified) and other goods (not elsewhere classified), while contract enforcement is shown to be significant and negatively related to bilateral trade in other goods (not elsewhere classified).

The sectoral results in Table 13 may however be used with some caution because of relatively small sample size and potential presence of multicollinearity. To be sure, Table 14 illustrates a correlation matrix for behind-the-border measures and other explanatory variables used in the model. It can be gleaned that some "behind-the-border" measures are strongly correlated with each other. For instance, the time delays for imports are highly and negatively correlated with the level of competition in the ISP sector and also with the quality of port infrastructure, as their correlation coefficients are –0.70 and –0.76, respectively.

**Table 14**
**Correlation Matrix for Behind-the-Border Measures and Other Explanatory Variables**

| | logtime_ave | logisp_ave | logqpi_ave | logcredit_ave | logcontract_ave | logdist_ave | contig | comlang_off | comcol | smctry |
|---|---|---|---|---|---|---|---|---|---|---|
| **logtime_ave** | 1.0000 | | | | | | | | | |
| **logisp_ave** | -0.7015 | 1.0000 | | | | | | | | |
| **logqpi_ave** | -0.7641 | 0.6858 | 1.0000 | | | | | | | |
| **logcredit_ave** | -0.4504 | 0.5558 | 0.6979 | 1.0000 | | | | | | |
| **logcontract_ave** | 0.4987 | -0.4561 | -0.6245 | -0.2612 | 1.0000 | | | | | |
| **logdist_ave** | 0.0035 | 0.1085 | -0.0621 | 0.0442 | 0.0766 | 1.0000 | | | | |
| **contig** | 0.1206 | -0.1814 | 0.0469 | 0.0827 | 0.0199 | -0.4197 | 1.0000 | | | |
| **comlang_off** | -0.3180 | 0.0899 | 0.3422 | 0.0334 | -0.3433 | -0.1441 | 0.2066 | 1.0000 | | |
| **comcol** | -0.3838 | 0.1740 | 0.3878 | 0.1850 | -0.3400 | -0.2729 | 0.1893 | 0.5755 | 1.0000 | |
| **smctry** | 0.0033 | 0.0173 | 0.0481 | 0.0470 | -0.0172 | -0.1926 | 0.2675 | 0.1818 | -0.0580 | 1.0000 |

## 8. Limitations of the Study

There are certain limitations in the study that may warrant further investigation. One, it would have been better if the study has a bigger sample size, say, by including years prior to 2006, or include more East Asian economies in the sample, especially Cambodia, Lao PDR, and Myanmar. (However, as noted earlier, these three economies do not have complete data sets, especially on the "behind-the-border" measures used in the study.) Another limitation of the study is that it did not explicitly address the possibility of having reverse causality or having an omitted variable bias; hence, future research work must be able to address these econometric issues. Third, this study did not look into more disaggregated product classifications, such as products at the 2- or 4-digit product classification levels; it might be interesting to identify the potential trade facilitation measures at these more disaggregated product groups in order to better capture those measures that affect trade in parts and components or other intermediate goods.

## 9. Conclusion

In this paper, we investigate the potential trade facilitation or "behind-the-border" determinants on bilateral trade flows in the East Asian region. We note certain "behind-the-border" factors that have been identified in the literature to have a possible impact on merchandise trade between economies. We observe that the recent trends with respect to the number of trade-related documentary requirements, time delays in trade, cost to trade, quality of physical infrastructure—including airports, ports, railroads, etc., telecommunications services, accessibility to finance by exporters and importers, and contract enforcement procedures, among others, appear to be mixed across East Asian economies and over time.

Utilizing a gravity model approach, we find that, overall, bilateral trade flows in East Asia are influenced by time delays in trade, the quality of port infrastructure, telecommunications services, and depth of credit information. We further note, however, that the potential impact of these "behind-the-border" measures vary across product groups or sectors.

Specifically, our results reveal that bilateral trade in food and beverages as well as in transport equipment are sensitive to time delays, as food and beverages reflect issues on perishability and maintaining quality, while transport equipment makes use of just-in-time production practices and are involved in production sharing. Also, the quality of port infrastructure is found to be a major determinant of trade in industrial supplies, fuels and lubricants, capital goods (including parts and accessories), and consumption goods, suggesting that these products are relatively dependent on maritime transport. Access to finance by exporters and importers (as represented by the depth of credit information) is found to be significant and positively related to bilateral trade in industrial supplies, fuels and lubricants, capital goods (including parts and accessories), and consumption goods; this imply that exporters and importers in these sectors are more dependent to financial capital as compared to the other sectors. Moreover, telecommunication services appear to be an important "behind-the-border" factor for both trade in consumption goods and other goods, whereas contract enforcement is insignificant to trade in all product categories, except for other goods.

Overall, we conclude that policymakers in East Asia must promote trade facilitation by prioritizing and addressing these "behind-the-border" measures, specifically, by reducing time

delays, improving the quality of port infrastructure and telecommunication services, and providing more access to finance to both exporters and importers, as these can lead to larger trade flows between economies in the region. However, policymakers must also recognize that the impacts of addressing these trade facilitation measures vary across sectors or product groups. In this regard, policymakers must pinpoint and address those "behind-the-border" measures that are found to be important for each key sector or product group, so as to significantly reduce trade costs and thereby promote freer trade in the region.

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