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Trade Facilitation in ASEAN Member Countries: Measuring Progress and Assessing Priorities

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Abstract

This paper reviews recent progress and indicators of trade facilitation in member countries of the Association of Southeast Asian Nations. The findings show that import and export costs vary considerably in the member countries, from very low to moderately high levels. Tariff and non-tariff barriers are generally low to moderate. Infrastructure quality and services sector competitiveness range from fair to excellent. Using a standard gravity model, the authors find that trade flows in Southeast Asia are particularly sensitive to transport infrastructure and information and communications technology. The results suggest that the region stands to make significant economic gains from trade facilitation reform. These gains could be considerably larger than those from comparable tariff reforms. Estimates suggest that improving port facilities in the region, for example, could expand trade by up to 7.5 percent or $22 billion. The authors interpret this as an indication of the vital role that transport infrastructure can play in enhancing intra-regional trade.

This paper—a product of the Trade Team, Development Research Group—is part of a larger effort in the department to examine the relationships between trade costs, business facilitation, and economic development. The work is aligned with work under a Trust Fund of the U.K. Department for International Development and also Multi-donor Trust Fund for Trade and Development Project on Trade Costs.. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at jswilson@worldbank.org or bshepherd@worldbank.org.

Trade Facilitation in ASEAN Member Countries: Measuring Progress and Assessing Priorities

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[†] The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the view of the World Bank, its Executive Directors, or the countries they represent.

1 Introduction

Two conflicting dynamics in today's international trading system suggest that trade facilitation is particularly important to development prospects. On the one hand, tariffs have been significantly cut through a combination of multilateral, regional, and unilateral efforts. Large distortions still remain, particularly in agriculture. It is important to recognize, however, the increasingly important role of other factors in driving a wedge between export and import prices—and the role of trade facilitation policies in reducing that wedge.

The second dynamic relates to the institutional nature of the trade reform process. Ensuring a successful conclusion to the Doha Development Agenda is an important aim for all WTO members. The practical reality, however, is that progress at the multilateral level is increasingly difficult, in part due to the lack of willingness among some members to engage in substantive reform. Countries eager to move forward on trade reform, therefore, seek new alternatives. Trade facilitation represents an attractive one. Reform can often be pursued on a regional basis and unilaterally, yet usually does not conflict with the principle of non-discrimination. In sum, countries moving forward in an open way on trade facilitation can reap the gains from lower trade costs, while at the same time allowing the multilateral negotiating process to move forward. Indeed, countries that make progress on trade facilitation will be well placed to ensure that they benefit to the maximum possible extent from any future multilateral liberalization.

Trade facilitation is a multi-faceted area. Unlike cutting tariffs or eliminating quotas, progress on trade facilitation can involve substantial resource costs related to improving trade-related infrastructure, or streamlining customs administrations. Before investing in these measures, it is important for policymakers to have an idea of where the priorities are for their countries.

This paper is intended as first contribution to the research and policy process in ASEAN member countries, as it relates to trade facilitation.[1] In the next Section, we provide a brief overview of trade facilitation and its potential economic impacts. Then in Section 3, we review recent progress on trade facilitation within the region. We emphasize the multi-dimensional nature of trade facilitation policies by focusing on four areas where trade transactions costs matter: port infrastructure, air transport infrastructure, services sector development, and customs administration. In Section 4, we conduct an econometric analysis of trade flows in Southeast Asia using the gravity model. This allows us to identify the sensitivity of trade flows to different trade facilitation indicators. In order to provide a general idea of the orders of magnitude involved in potential policy reforms, we then conduct some counterfactual simulations to show the potential gains to Southeast Asia from a feasible but ambitious program of trade facilitation reform. We find that those gains are substantial, and in excess of the trade gains from tariff cuts of similar ambition. Section 5 presents conclusions and suggestions for future research.

2 Trade Facilitation: What are the Stakes?

At its most general, "trade facilitation" refers to the set of policies that reduce the costs of importing and exporting. In defining the term in this way, we are consciously taking a broad approach to the type of policy measures that it includes (cf. Wilson et al., 2005). On the one hand, we include customs formalities, administrative procedures, and regulatory transparency directly linked to the trading process. This is essentially what is covered by the current WTO negotiations on trade facilitation. However, we also include a broader range of measures such as

[1] ASEAN has ten member countries: Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam.

infrastructure, institutional transparency and good governance, and domestic regulations (cf. Wilson, 2005). All of these factors can impact trade performance through the cost channel.[2]

Estimates in the existing literature suggest that the gains from trade facilitation are large. Wilson et al. (2005) use econometric estimates from a gravity model to show that improved trade facilitation in a sample of 75 countries could increase trade by 10%, or $377bn. For the Asia-Pacific region, Wilson et al. (2002) estimate that improving trade facilitation along four dimensions could increase intra-APEC trade by around 10% ($280bn). Using the GTAP computable general equilibrium (CGE) model, Hertel and Keeney (2006) find that the worldwide gains from improved trade facilitation ($110bn) are of comparable magnitude to the results of full liberalization of goods and services trade ($150bn).[3] Moreover, the authors' results indicate that the benefits of trade facilitation reforms are strongly skewed towards developing countries—particularly in Asia.[4]

It is important to note that the above studies treat trade facilitation measures as affecting only the marginal costs of trading across borders. However, there are many instances in which exporters will also have to pay a fixed cost in order to access foreign markets. Examples include making contact with shippers and freight handlers, establishing the necessary pro forma paperwork, setting up a foreign distribution network, and adapting manufactured goods to comply with foreign technical regulations. To the extent that trade facilitation measures can reduce both

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[2] Recent work has shown that both "hard" and "soft" infrastructure (i.e., institutions) matter for trade performance: see Francois and Manchin (2007).

[3] These figures do not account for the costs involved in carrying out trade facilitation reforms. Those costs are substantial, and do not apply in the same way to trade policy reforms—which are essentially "free" in terms of direct resource requirements. However, recent work on road infrastructure by Shepherd and Wilson (2006), and Buys et al. (2006) shows that trade gains can still be quantitatively large even once costs are netted out.

[4] A number of other CGE studies arrive at similar results using alternative assumptions as to underlying economic behavior: see e.g., Walkenhorst and Yasui (2003), Francois et al. (2005), and Decreux and Fontagné (2006).

marginal and fixed costs, then recent trade theories suggest additional channels through which countries can gain.[5]

We start from the well established empirical regularity that only a small minority of firms in each country actually export, and that those which do export tend to be larger and more productive than those which do not.[6] One powerful explanation for this phenomenon is self-selection: only high productivity firms (with low marginal production costs) are able to make a profit whilst meeting the additional costs associated with exporting. Low productivity (high cost) firms cannot do so. These companies produce for the domestic market only and are not directly influenced by the costs of exporting.

Within this framework, falling trade costs have a number of other effects on firms and the national economy. First, as the costs of exporting fall, it is more likely that there is at least one firm with high enough productivity to successfully export. Export propensity should therefore increase as trade costs fall. Second, less productive firms at the fringes of the export market will find that it becomes profitable to start exporting. Lower export costs can therefore facilitate entry of small and medium enterprises (SMEs) into export markets, thereby expanding the number of people and firms that are in direct contact with the world market. Third, lower trade costs tend to promote the reallocation of resources from low-productivity to high-productivity firms. The overall effect will be to increase the economy's level of productivity, which may have important implications for future growth prospects.

[5] We have in mind the heterogeneous firms framework of Melitz (2003) or Chaney (2006).

[6] See Bernard et al. (2007) for a recent consolidation of this literature.

Summarizing the above, we would argue that Southeast Asia stands to reap significant potential gains from improved trade facilitation. This can be achieved both through increased trade flows and entry into new export markets and higher productivity. The measures included in any reform program will necessarily cut across a number of policy areas that are relevant to the specific costs facing exporters. These will include infrastructure, customs services, regulatory reform, efficiency of trade-related services, and governance. Policymakers and stakeholders therefore need to prioritize reforms: they are often costly and difficult to implement, and therefore they cannot all be tackled simultaneously or to the same extent. The remainder of this paper aims to provide some first indications as to what the priorities might be in Southeast Asia.

3 Moving Goods across Borders in Southeast Asia

This Section provides a "snapshot" of the costs of exporting and importing in Southeast Asia. It then examines recent progress towards trade facilitation goals, by comparing scores on key indicators over the period 2000-2005. We follow the approach of Wilson et al. (2005) and adapt it, where needed, due to non-availability of certain data.

3.1 A "Snapshot" of Trade Costs in ASEAN

We now address in detail the state of trade costs in ASEAN as of 2006 (or most recent data). Data from the World Bank's *Doing Business* database show that the overall cost of importing in ASEAN is relatively low by world standards (Figure 1). For the first time in 2006, the "Trading Across Borders" component of *Doing Business* captured the total official cost for importing or exporting a standardized cargo of goods, excluding ocean transit and trade policy measures such as tariffs. The four main components of the costs that are captured are: costs related to the preparation of documents required for trading, such as a letter of credit, bill of lading, etc.; costs

related to the transportation of goods to the relevant sea port; administrative costs related to customs clearance, technical controls, and inspections; and ports and terminal handling charges. The indicator thus provides a useful cross-section of information in relation to a country's approach to trade facilitation, in the broad sense in which that term is used by Wilson et al. (2005). The data are collected from local freight forwarders, shipping lines, customs brokers, and port officials, based on a standard set of assumptions, including: the traded cargo travels in a 20ft full container load; the cargo is valued at $20,000; and the goods do not require any special phytosanitary, environmental, or safety standards beyond what is required internationally.

The average import cost across those ASEAN Members for which data are available is around $900 per container. This figure is slightly below the overall regional average for East Asia and the Pacific, of $1037 per container, and is only a little higher than the OECD average ($883). However, the average masks large variation in import costs across countries: costs in Singapore run at $333 per container—the lowest in the world—while in Laos they are over five times higher ($1690).

In all but two countries, Laos and the Philippines, the cost of importing is lower than the Upper Middle Income group average.[7] Within ASEAN, we can identify three groups of countries. The first—Singapore and Malaysia—are very strong performers in terms of import costs, at under $500 per container. The second group—Cambodia, Indonesia, Thailand, and Vietnam—still perform well, broadly in the region of the OECD average. The third group—Laos and the Philippines—do markedly less well.

[7] Among ASEAN countries, there are two high-income countries (Brunei Darussalam, and Singapore), one upper-middle income country (Malaysia), three lower-middle income countries (Indonesia, the Philippines, and Thailand), and four low income countries (Cambodia, Laos, Myanmar, and Vietnam).

A basically similar picture emerges in relation to the cost of exporting, again sourced from *Doing Business* (Figure 2). On average, ASEAN does relatively well: $806 per container is slightly lower than the OECD average of $811. However, the range within the region is very wide, from Singapore—which at $382 per container is amongst the top 5 in the world—to Laos at $1420 per container, nearly four times higher than Singapore.

Interestingly, although the cost figures for importing and exporting are generally low even compared with the OECD, the same is not as true for time and document counts (Figures 3-4).[8] Both at export and import, the number of documents required and time taken in ASEAN countries are well in excess of the OECD average: 32 days versus 12 days for importing, and 11 documents versus 6. However, Singapore is once again one of the world leaders in relation to trade times, reinforcing the image of intra-regional heterogeneity that has already been given.

To round out our snapshot, we use results from Kee et al. (2006) to provide an overall assessment of the trade policy environment in ASEAN (excepting Cambodia, Myanmar, and Singapore, which are not included in the Kee et al. (2006) study). Those authors calculate two measures that are of interest. A country's Overall Trade Restrictiveness Index (OTRI) is the uniform tariff which, if applied, would give the same level of imports into that country as under current policy settings. Its Market Access OTRI (MA-OTRI) is the uniform tariff which, if applied by the rest of the world, would give the same level of exports out of that country as under current policy settings.

Table 4 provides OTRI and MA-OTRI measures for ASEAN member countries, in versions that include tariffs only, and both tariffs and non-tariff barriers. We also differentiate between total

[8] These data are also sourced from the World Bank's *Doing Business* database, and are constructed analogously to the cost data.

trade, agriculture, and manufactures. On average across all products, ASEAN countries are slightly more open than the world average if only tariffs are considered (9% versus 11%), but are less open when NTBs are considered as well (22% versus 18%). This result highlights the importance of non-tariff barriers in the ASEAN context. We find that, as in most other regions, ASEAN countries tend to protect agriculture more strongly than manufactures (46% versus 19% when both tariffs and non-tariff barriers are included).

Regional averages tend to obscure considerable cross-country heterogeneity, however. In terms of tariffs, for instance, three ASEAN countries are well below the world average OTRI: Indonesia, Malaysia, and the Philippines. (Singapore can also be included in this group, since it has a zero applied tariff on almost all goods; it is not included in the Kee et al. (2006) sample.) Laos and Brunei are at approximately the world average, while Thailand and Vietnam would appear to have higher tariff protection than the world average. This grouping is very different, however, once NTBs are accounted for. We find that Brunei, Indonesia, and Thailand have lower than (world) average protection, while all other ASEAN countries for which we have data are significantly more restricted than the world average.

We retain two main points from the above “snapshot” of the trade policy and facilitation environment in ASEAN. First, traditional trade policy (such as tariffs) varies considerably across the region, even though on average ASEAN is slightly more open that the world as a whole. Similar variation is also apparent in terms of the role of NTBs, with ASEAN being slightly less open than the world average. Second, the direct costs of exporting and importing are generally quite low compared with other regions, even though there is once again considerable heterogeneity across countries. Despite this, the number of documentary formalities for exporting and importing—as well as the time taken for these transactions—is less impressive.

3.2 Evolution of Trade Facilitation Measures in Southeast Asia, 2000-2005

It is also important to analyze the trade facilitation environment in the context of recent reform efforts. As in Wilson et al. (2005), we source our trade facilitation indicators from the annual *Global Competitiveness Report* issued by the World Economic Forum. Based on a large survey—over 11,000 business leaders in 125 countries—the CGR presents perception indices covering various aspects of infrastructure quality, trade policy, governance, and regulatory reform. Scores are calculated based on responses to survey questions in which executives are asked to indicate their opinion on a scale of 1 (bad) to 7 (good). The survey nature of these data means that we should be cautious in interpreting changes from one year to the next: small differences may well reflect sampling error rather than genuine substantive differences.

In light of changes in the survey questions over time, as well as data availability for ASEAN member countries, we choose to assess regional progress on trade facilitation through the lens of four indicators. Our approach is broadly similar to that of Wilson et al. (2005). To capture physical infrastructure, we examine the quality of maritime port infrastructure and air transport infrastructure. As an indicator of customs administration, we use the extent of irregular payments connected with import and export permits. And we use the quality of competition in the Internet Service Provider (ISP) sector as a proxy for services sector infrastructure.[9]

In the case of our two transport infrastructure indicators (Figures 7-8), it is difficult to see any clear trend over time. Singapore is consistently ranked very highly for its port infrastructure, while Malaysia and Thailand appear to have improved slightly over time. The remaining countries for which we have data have remained approximately stable, with the possible

[9] The first three indicators are also used by Wilson et al. (2005). However, the Wilson et al. (2005) indicator for service sector infrastructure does not appear in later GCRs, so we are forced to use an alternative measure.

exception of Indonesia, which discloses a worsening trend. That pattern is approximately the same for air transport infrastructure, although the movements involved are even less clear than in the case of ports.

In terms of the extent of irregular payments for import/export licenses (Figure 9), we observe that Malaysia and Thailand would appear to have improved slightly over the sample period. Other countries have remained much the same, with the possible exception of Indonesia—it seems, once again, to be on a downwards trend. As was the case for infrastructure, Singapore is well ahead of the other ASEAN member countries on this criterion.

Interestingly, the quality of competition in the internet services sector (Figure 10) discloses more homogeneous performance than was the case for the other indicators. At the end of the sample period, all ASEAN member countries except Vietnam are clustered at around 5 on the 1-7 scale. This represents a slight improvement over the sample period in most cases. Strangely, Singapore would appear to have regressed slightly since the beginning of the sample. We do not, however, put too much weight on this, since its performance is relatively stable through time if the first observation (2000) is disregarded.

3.3 Consolidation: Where Does Southeast Asia Stand?

It is difficult on the basis of these data to highlight any strong trends in trade facilitation in Southeast Asia. While Malaysia and Thailand appear to have improved in recent years on some dimensions, the rest of the region has remained approximately stable. The most important stylized fact is therefore cross-country heterogeneity, which appears to be persistent over time. This heterogeneity is reflective both of income differences across countries, and explicit policy choices (such as free trade in Singapore). The presence of strong performers such as Singapore and, to a lesser extent, Malaysia and Thailand, shows that significant progress is possible for the

remaining ASEAN member countries. Indeed, data from *Doing Business* suggest that even Malaysia and Thailand have room for further streamlining and simplification of customs procedures.

One caveat in relation to these conclusions relates to data availability. Tables 1-3 summarize the extent of the available information for the period 2000-2005 across ASEAN member countries. Our dataset is most complete for trade data (export and import flows). Table 1 shows that data are missing over all years only for Laos and Myanmar. Although Vietnam, Brunei, and Cambodia are each missing one or two years of information, the dataset is reasonably complete as regards other ASEAN member countries. In relation to applied tariffs, Table 1 indicates that data are available for all ASEAN member countries, albeit with some missing observations for around half of them.

The picture is generally less detailed in relation to our other indicators. While *Doing Business* indicators on the cost and time of exporting and importing have good country coverage—all except Brunei and Myanmar—they are only available for two years (time) or one year (cost). However, data from the Global Competitiveness Report are not available at all for Brunei, Cambodia, Laos, or Myanmar.

This short review of the available data highlights two issues that will need greater attention in future work. First, lack of data across these basic indicators means that there are a number of ASEAN countries—Brunei, Cambodia, Laos, and Myanmar—for which it will be very difficult to perform individualized analysis and to tailor policy measures to their particular situations. For the moment, we will essentially be extrapolating from other countries' experiences, which is not entirely satisfactory. Second, we have only addressed one subset of the possible indicators that might be of interest in a trade facilitation setting. Other indicators, such as the pervasiveness of

non-tariff measures or the compliance costs related to non-harmonized product standards, are notoriously difficult to compile, even for high income OECD countries. But as tariff rates continue to fall in ASEAN as elsewhere, it will become increasingly important to invest resources in assembling these data.

4 What Does Southeast Asia Stand to Gain?

In this Section, we use a standard modeling framework to provide an indication of the possible trade gains for Southeast Asia in pursuing additional trade facilitation reforms. To do so, we will apply the gravity model. According to Leamer and Levinsohn (1995, p.1384), it has produced "some of the clearest and most robust empirical findings in economics". In sum, the model suggests that trade between two countries is a function of their economic "mass" (usually GDP), and observable factors that impact trade costs between them. The observable factors included in gravity models usually cover distance (to capture the effect of transport costs), geographical and historical connections (such as colonization or a common language), and trade policy factors (such as tariffs).

By applying the gravity model to trade data for Southeast Asia, we can obtain statistical estimates of the sensitivity of bilateral trade flows to changes in various trade facilitation indicators.[10] To do this, we build on the approach of Wilson et al. (2005). The indicators that we consider here cover the following dimensions of trade facilitation: efficiency of maritime and air ports, the extent of irregular payments in relation to export/import licenses, and the level of competition amongst internet service providers (a proxy for regulation of backbone services

[10] Although the focus of this paper is on ASEAN member countries, we estimate the model using data for all Southeast Asian countries for which we have information. This is to compensate for the lack of data on a number of ASEAN countries, as noted above.

sectors).[11] Data on these variables are sourced from the World Economic Forum's *Global Competitiveness Report*. We also control for the presence of tariffs (sourced from WITS-Trains), in addition to standard geographical and historical factors (Mayer and Zignago, 2006). Our trade data come from WITS-Comtrade, and are disaggregated by BEC 1-digit sector.[12] We estimate the model over the period 2000-2005. (See Tables 5-6 for a description of our data, sources, and sample.)

4.1 Model Specification

Initially used because of its explanatory power in empirical settings, the gravity model is now known to be consistent with a rigorous theoretical derivation. In this paper, we use the micro-founded gravity model of Anderson and Van Wincoop (2003, 2004). It is now the standard approach taken in the trade literature.

From basic microeconomic principles, Anderson and Van Wincoop (2003, 2004) show that it is possible to derive a gravity-like model of exports from country i to country j in sector k at time t (X_{ijt}^{k}):

$$\log\left(X_{ijt}^{k}\right)=\log\left(E_{jt}^{k}\right)+\log\left(Y_{it}^{k}\right)-\log\left(Y_{t}^{k}\right)+\left(1-\sigma_{k}\right)\log\left(t_{ijt}^{k}\right)-\left(1-\sigma_{k}\right)\log\left(P_{jt}^{k}\right)-\left(1-\sigma_{k}\right)\log\left(\Pi_{it}^{k}\right)+\varepsilon_{ijt}^{k} \qquad (1)$$

Where: Y_{it}^{k} = Output of country i in sector k for year t; E_{jt}^{k} = Expenditure of country j in sector k for year t; Y_{t}^{k} = Aggregate (world) output in sector k for year t; σ_{k} = Elasticity of substitution in

[11] For technical reasons, we have to take the average of our trade facilitation indicators across the importing and exporting countries. This is because importer- and exporter-specific measures, although time varying, are very strongly correlated with the time-invariant fixed effects we use to take account of market size and relative price effects. Estimation using separate measures of exporter and importer infrastructure does not produce meaningful results because of the strength of this correlation.

[12] This is a very broad product classification, and is intended to give a first indication of potential cross-sectoral differences in the impact of trade facilitation measures.

sector k; t_{ijt}^{k} = Trade costs facing exports from country i to country j in sector k for year t; ω_{it}^{k} = Country i's output share in sector k for year t; ω_{jt}^{k} = Country j's expenditure share in sector k for year t; and ε_{ijt}^{k} = Random error term, satisfying the usual assumptions. Inward resistance $\left(P_{jt}^{k}\right)^{1-\sigma_k} = \sum_{i=1}^{N} \Pi_{it}^{\sigma_k - 1} \omega_{it}^{k} \left(t_{ijt}^{k}\right)^{1-\sigma_k}$ captures the fact that j's imports from i depend on trade costs across all suppliers. Outward resistance $\left(\Pi_{it}^{k}\right)^{1-\sigma_k} = \sum_{j=1}^{N} P_{jt}^{\sigma_k - 1} \omega_{jt}^{k} \left(t_{ijt}^{k}\right)^{1-\sigma_k}$, by contrast, captures the dependence of exports from i to j on trade costs across all importers.

Before we can implement this model in an empirical setting, we need to specify bilateral trade costs t_{ijt}^{k} in terms of observable variables. As is common in this literature, we postulate that trade costs are a function of distance (a proxy for transport costs), geographical and historical factors, tariffs, and trade facilitation indicators:

$$\begin{aligned}\log\left(t_{ijt}^{k}\right) = {} & \beta_1 \log\left(dist_{ij}\right) + \beta_2 \log\left(1+\tau_{ijt}^{k}\right) + \beta_3 \log(sea_{ijt}) + \beta_4 \log(air_{ijt}) + \beta_5 \log(irreg_{ijt}) + \ldots \\ & \ldots + \beta_6 \log(isp\_comp_{ijt}) + \beta_7 contig_{ij} + \beta_8 comcol_{ij} + \beta_9 comlang\_off_{ij} + \beta_{10} smctry_{ij}\end{aligned} \tag{2}$$

We define $dist_{ijt}$ as the distance between the two countries, proxied by the great circle distance between their respective capital cities. The power of the importer's applied tariff is $\left(1+\tau_{ijt}^{k}\right)$. The quality of sea and air ports are captured by sea_{ijt} and air_{ijt} respectively, while $irreg_{ijt}$ is the extent of irregular payments in trade transactions, and isp_comp_{ijt} is the level of competition among ISPs. The remaining trade cost observables are binary dummy variables. $Contig_{ij}$ is equal to one only if two countries share a common border. The role of historical factors is proxied by $comcol_{ij}$ and $smctry_{ij}$, which are respectively equal to one only if two countries were colonized by the

same power or were once part of the same country. Finally, $comlang\_off_{ij}$ equals one only if two countries have at least one official language in common.

Before combining (1) and (2) to give a standard empirical gravity model, we adopt the common simplification of using fixed effects to account for output, expenditure, and resistance terms, rather than seeking to estimate them directly (cf. Anderson and Van Wincoop, 2003). A strict derivation from (1) suggests that fixed effects are required in the importer-sector-time, exporter-sector-time, and sector-time dimensions (cf. Baldwin and Taglioni, 2006). To take account of the possibility of cross-sectoral variation in the elasticity of substitution, the parameters in the trade cost function should also be allowed to vary by sector. However, it is often impractical to estimate such a large number of parameters. This is a particular concern in the present case, since our effective sample is relatively small by gravity standards (just under 1,500 observations). We therefore propose using time- and sector-invariant fixed effects by importer and exporter (μ_i and χ_j), in addition to fixed effects in the sector and time dimensions (ψ_k and θ_t). Experience suggests that this often represents an acceptable compromise between theoretical consistency and empirical tractability.[13]

Our baseline empirical specification therefore takes the following form:

$$\log\left(imports_{ijt}^{k}\right) = \mu_i + \chi_j + \psi_k + \theta_t + \beta_1 \log\left(dist_{ij}\right) + \beta_2 \log\left(1+\tau_{ijt}^{k}\right) + \beta_3 \log(sea_{ijt}) + \beta_4 \log(air_{ijt}) + \ldots$$
$$\ldots + \beta_5 \log(irreg_{ijt}) + \beta_6 \log(isp\_comp_{ijt}) + \beta_7 contig_{ij} + \beta_8 comcol_{ij} + \beta_9 comlang\_off_{ij} + \beta_{10} smctry_{ij} + \varepsilon_{ijt}^{k} \quad (3)$$

[13] As a robustness check, we also estimated models using the complete fixed effects specification suggested by theory. Results were qualitatively similar to those reported here, but estimates were often imprecise due to the elimination of most of the variation in the data due to the inclusion of such a large number of fixed effects. A number of point estimates also had implausible magnitudes. These factors led us to prefer the simplified model used here.

We estimate (3) using ordinary least squares (OLS), as implemented in Stata SE 9.2. Standard errors are robust to heteroskedasticity and clustering by country pair. It is not possible in this case to use alternative econometric methods such as Poisson pseudo-maximum likelihood (Santos Silva and Tenreyro, 2006) or Heckman sample selection (Helpman et al., 2007). Such methods address the presence of bilateral trade flows that are zero or missing from the dataset. However, they require that the independent variables be observed for those flows. In our dataset, it is in fact the extent of data availability for the independent variables that is the binding constraint for our estimation sample, not the presence of zero trade flows.

4.2 Results

Estimation results for our preferred specification are reported in Table 7 column 1. Broadly speaking, we find that the model performs well. From its R^2 statistic, we can see that it accounts for around 64% of observed variation in bilateral trade within our sample. All estimated parameters have the expected signs: distance and tariffs impact bilateral trade negatively, while improvements in trade facilitation or closer historico-cultural ties have a positive impact. With the possible exception of air transport infrastructure, their magnitudes are sensible and broadly similar to the results of Wilson et al. (2005).[14]

However, some estimated coefficients are not statistically significant at the standard 10% level. This is the case for applied tariffs, the quality of maritime ports, and the extent of irregular payments in import/export transactions, as well as the common colonizer and same country dummy variables. We expect this to be due to the relatively small (by gravity model standards) dataset we are using in this case, and the resulting correlations amongst the explanatory

[14] While it is impossible to make a formal comparison between our Table 7 and Table 2 in Wilson et al. (2005) due to the different modeling approaches adopted, the two sets of coefficients are generally quite similar.

variables. Future work using an expanded sample would most likely produce more precise coefficient estimates than these ones. We continue with them on the basis that they represent the current best state of knowledge in this area, but which will of course be refined in the future.

Despite their relative lack of precision in some cases, the estimated coefficients in Table 7 column 1 provide us with some useful information as to the determinants of trade flows in Southeast Asia. First, we see that distance is relatively less important than is commonly found in the gravity model literature: a 1% increase in bilateral distance decreases trade by only 0.4%, rather than the more common 1%. Interestingly, trade in Southeast Asia appears to be particularly sensitive to the quality of air transport infrastructure and the level of competition in the internet services sector: a 1% improvement in the former boosts trade by nearly 5%, while a similar change in the latter leads to a trade increase of just over 1%.[15] This is suggestive of the emergence of electronic trade and business in the region, as well as an increasing shift towards relatively high value merchandise (which can profitably be transported by air).[16] These observations might be consistent with the growing importance of transnational production networks in Southeast Asia (Ng and Yeats, 1999), since these organizations need to exchange goods rapidly and reliably, and they tend to be intensive users of communications and information technology. However, our data do not yet allow us to address that issue in detail.

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[15] It would, however, be premature to put too much weight on air transport in policy terms. This is because measures of air and maritime infrastructure are strongly correlated, which makes it difficult to distinguish between their independent effects on trade. It may be that what this very large coefficient is in fact capturing is partly related to the general quality of transport infrastructure in the region. This is a point that will need development in future work, based on the collection of more detailed data.

[16] An alternative explanation of our results could be that maritime transport is based on hub-and-spokes arrangements, in which it is not just the importing and exporting ports that matter in determining costs and delays. This is an interesting issue for future research, but without detailed data on shipping routes, we cannot fully address it at this stage.

4.3 Robustness Checks

In this Section, we briefly present results of alternatives to our preferred gravity model specification (Table 7 column 1). The results presented address two issues. First, we provide further detail on the relative importance of maritime versus air transport. Second, we address the issue of cross-sectoral heterogeneity as it might affect our regression results.

4.3.1 Transport Infrastructure: Sea versus Air Ports

As already noted, the magnitude of the estimated coefficient on air transport in Table 7 appears to us to be too large. One possible driving force for this unexpectedly high estimate is that infrastructure quality is correlated across the air and maritime sectors. Thus, the coefficient on air transport could in fact be picking up broader infrastructure quality effects not directly related to airports themselves. To demonstrate this point, columns 2-3 of Table 7 set out regression results for a model with the same form as in column 1, but with the two infrastructure quality variables included separately. The Table shows that both coefficients are higher when only one infrastructure variable is included. The effect is stronger (in relative terms) for maritime transport than for air transport: the coefficient is around four times larger. We interpret these results as being consistent with the argument that the estimated coefficients in Table 7 column 1—and the simulations conducted using them (see below)—probably overstate the importance of air transport infrastructure as such.

4.3.2 Cross-Sectoral Heterogeneity

The gravity model regressions in Table 7 use data for six BEC 1-digit product categories. They distinguish among them using fixed effects. However, it is possible that different product groups react differently to improved trade facilitation, and that such heterogeneity expresses itself in a

way that cannot be captured simply through fixed effects. For instance, reduced-form trade elasticities might vary from one sector to another. To address this issue, Table 8 presents results from gravity models in the same form as Table 7 column 1, but estimated separately for each product category and for total (aggregate) bilateral trade.

It is immediately apparent from Table 8 that estimating separate gravity models by sector greatly reduces the number of observations that we have to work with. When estimated by fixed effects, we find (not unexpectedly) that the model estimates often lack precision as compared with their counterparts in Table 7. We therefore interpret the results in Table 8 as only an approximate guide to the types of cross-sectoral heterogeneity that might be present in these data.

With this caveat in mind, the results in Table 8 disclose some evidence of cross-sectoral heterogeneity. The distance elasticity, for instance, is much larger in absolute value for food and capital goods than for fuels, which stands to reason. In terms of our trade facilitation indicators, we find that the fuel sector is highly sensitive to the quality of maritime port infrastructure, but that there is not a statistically significant relationship for any other sector. Given that fuels are unlikely to be transported by air, this relationship makes sense—although the lack of significance (and perversity of sign) for other sectors is surprising. Air transport infrastructure, on the other hand, is statistically significant for all sectors except food and fuels. This result reinforces the conclusion above to the effect that air transport plays an important role in ASEAN trade, although the magnitude of these coefficients is still relatively high, perhaps due to the indicator picking up measures of infrastructure quality more broadly. The two remaining indicators, irregular payments and ISP competition, are only statistically significant for industrial supplies and (in the latter case only) consumer goods. In the case of industrial supplies, these results could be consistent with an expanding role for transnational production networks in Southeast Asia,

indicating that they need to be able to communicate reliably amongst their various offices, and that they are sensitive to the cost/price uncertainty that extensive irregular payments can imply.

While these results are suggestive, we stress that our relatively small samples render our estimates imprecise, and we do not therefore use Table 8 to draw any strong policy conclusions at this stage.

4.4 Counterfactual Simulations

In order to give our analysis more concrete policy content, it is useful to construct basic monetary estimates of the trade gains that could be associated with improved trade facilitation in Southeast Asia. We follow the approach in Wilson et al. (2005), in which the estimated coefficients from the gravity model are used as the basis for counterfactual simulations which can then be analyzed comparatively. We emphasize that this approach is only designed to give a broad idea of the relative impacts of different policy reforms, and is subject to numerous technical caveats (see below).

Our analysis includes five counterfactual scenarios. In *Scenario 1*, the quality of maritime port infrastructure as measured by our Global Competitiveness Report data is improved so that no country scores below the current regional average (4.6 out of 7). *Scenario 2* performs the same exercise for airport infrastructure (regional average = 5.1/7), while *Scenarios 3* and *4* consider improvements in the control of irregular payments and competition among internet service providers (regional averages of 4.6/7 and 4.9/7 respectively). As a point of comparison for the other counterfactuals, *Scenario 5* considers a cut in applied tariffs to the current regional average (8.6%). Our reason for choosing the current regional average as our benchmark in each case is that it represents an ambitious but feasible program of reform, given current regional capacities.

It is a more pertinent benchmark than, say, the average amongst high income countries, or OECD members.

We conduct the counterfactual simulations as follows. We take 2005 as our base year. We then recalculate (for example) our maritime infrastructure indicator with the condition that those countries under the regional average for 2005 have their score increased to that value. This allows us to calculate the percentage change in the indicator for each country pair, which we map to an approximate trade impact using the gravity model elasticities.

Results for our five simulations are presented in Tables 9-13, and are compared in Table 14. In line with the results cited at the beginning of this paper, we find that the expected intraregional trade gains from improved trade facilitation are very substantial, and would appear to be greater than the gains from tariff reductions of comparable ambition. Cutting applied tariffs to the regional average would increase intraregional trade by about 2% ($6.3bn). Improving port facilities, limiting unofficial payments, and improving competitiveness in the internet services sector would boost trade by 7.5% ($22bn), 2.3% ($6.8bn), and 5.7% ($17bn) respectively. According to our results, improving air transport could increase trade by a very substantial margin: 42% or nearly $125bn. However, we consider this estimate likely high for the reasons set out earlier. As noted, air transport infrastructure quality is strongly correlated with the quality of other types of infrastructure, including maritime ports. We therefore interpret this result as an indication of the vital role that transport infrastructure can play in enhancing intra-regional trade.

In terms of policy priorities, our results suggest the following ranking based on estimated trade flow impacts. First, transport infrastructure is clearly a major issue for Southeast Asia to address in ongoing and future reform programs (see *Scenarios 1* and *2*). Trade flows appear to be very sensitive to transport infrastructure quality. ASEAN member countries may therefore find it

beneficial to concentrate initially on improving transport links with regional partners. In saying this, we are conscious that infrastructure upgrading can involve significant costs. Whereas we emphasize the relative benefits of different options in this paper, informed policymaking would of course need to be based on a rigorous cost-benefit assessment in each case.

Second, e-business and connectivity would also seem to be very important for the region (see *Scenario 4*). ASEAN member countries may therefore also benefit from giving priority to improvement of information technology infrastructure and, more generally, the competitiveness of backbone services sectors. Such an agenda could include both domestic regulatory reforms, and increased openness to international services trade in these sectors under the GATS.

Finally, there is still progress to be made in reducing "traditional" trade barriers (such as tariffs), and in improving governance and transparency in such a way as to limit the role of unofficial payments in import/export transactions. While significant economic benefits could flow from these steps, the data indicate at this stage that it may be preferable from a trade flow point of view to concentrate most heavily on the other two areas in the short-term. These conclusions are broadly consistent with the data presented earlier indicating that tariff protection in Southeast Asia is generally at a low to moderate level. However, those same data—based on the Kee et al. (2006) OTRI—suggest that non-tariff barriers may play a significantly more important role. Due to lack of information at this point, we have not explicitly considered the role of non-tariff barriers in our gravity model. This would be an important point for future research to elaborate on, so as to give reform of these measures an appropriate place in the policy ranking we are suggesting.

Before concluding this Section, it is important to stress that our results, like all simulation results, are subject to a number of caveats. First, our results in relation to tariffs, maritime port

infrastructure, and irregular payments are subject to very real uncertainty because the coefficient estimates in Table 7 column 1—on which the simulations are based—are not statistically significant. They should therefore be treated as approximate indications of relative impacts only. Second, our impact estimates are expressed as trade effects, not economic welfare as such. Third, our results apply only to intra-regional trade, and do not take account of possible extra-regional effects. Were the policy reforms contemplated in each scenario to be implemented in a non-discriminatory manner, there would be considerable scope to produce gains for economies outside the region as well. Our results in that case would be a lower bound for the likely range of overall (worldwide) effects. Fourth, our simulations implicitly assume that the elasticities on which they are based remain constant before and after the policy shock. While this may be the case for small policy changes, it is unlikely to hold for major regime shifts. Finally, none of the scenarios take account of the existence of quantitative restrictions that may represent binding constraints on bilateral trade even following reforms. This is due to limited availability of detailed data on such measures, and is a feature that we would hope future work could address in greater detail. In particular, we would hope that analysis using a computable general equilibrium model could complement the results we have presented here.

5 Conclusions and Future Research

As the results presented in this paper make clear, ASEAN member countries have much to gain from improved trade facilitation. While a comprehensive reform program would need to cover areas as diverse as infrastructure, services sector regulation, “traditional” trade policy, and customs administration, our results suggest that ASEAN has a particular interest in focusing on just two of those areas in the first instance: transport infrastructure, and information technology.

We emphasize that the results presented in this paper are targeted at stimulating discussion and helping policymakers and stakeholders arrive at a tentative prioritization of their efforts in this area. In the future, more detailed analysis is required in relation to particular reform programs, covering both benefits and costs. This will require collection of new datasets covering all ASEAN member countries. As noted at the outset, the sources we have used here—*Doing Business*, the *Global Competitiveness Yearbook*, and WITS—are sometimes missing data for ASEAN. It would be desirable to correct this in the future. More generally, consistent and reliable data on non-tariff barriers are currently scarce. Given trade facilitation's ability to act on such barriers, it will be increasingly important in the future to ensure that data collection in this area is adequately and sustainably resourced.

Another way in which policy-relevant research can add value is by complementing existing data with information on the ways in which trade facilitation reforms impact different sections of the supply chain, given particular industry and firm characteristics. One starting point for this line of policy research might be the World Bank's Logistics Performance Index (e.g., Hausman et al., 2005). Alternatively, one could imagine expanding the *Doing Business* data on "trading across borders" in order to assemble more detailed data on these questions. Such data would be an important input into the policymaking process, since they would help stakeholders target reforms—and resources—where they are most needed in particular countries.

In addition, our results have only addressed the static impacts of trade facilitation reform. We do not assess the possible effects on productivity, growth, or economic development as such. However, as we have discussed in this paper, there are good reasons to believe that better trade facilitation can impact each of these positively. Although the net balance of costs and benefits cannot yet be stated with certainty—since we have not estimated the costs of improving trade

facilitation in ways consistent with our simulations—we expect that it will be positive even once these costs are netted out. However, that assessment can only be made within the framework of specific project appraisals, and will need to be addressed on a case-by-case basis.

This paper has analyzed the impacts of trade facilitation reform at the aggregate level. We expect, however, that trade facilitation may have larger effects on certain types of trade, such as parts and components that are used by transnational production networks. This is because such networks are based on the idea of efficient cross-border sourcing of selected inputs, and this is an area where trade facilitation reforms can impact directly. The importance of these networks in Southeast Asia could be one factor explaining the strong results we have found in relation to transport infrastructure and information and communications technology. Future policy research will, we hope, provide more quantitative detail on these issues, and explore the ways in which policymakers can use trade facilitation reforms to help achieve greater international integration.

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Tables

Table 1: Availability of trade and trade policy data for ASEAN member countries.

Country	Exports	Imports	Applied tariffs	Hidden trade barriers	Prevalence of trade barriers
Brunei Darussalam	2001-2003	2001-2003	2001-2005	NA	NA
Indonesia	2000-2005	2000-2005	2001-2005	2000-2004	2005-2006
Cambodia	2000-2004	2000-2004	2001-2003	NA	NA
Laos	NA	NA	2000-2001; 2004	NA	NA
Myanmar	NA	NA	2001-2005	NA	NA
Malaysia	2000-2005	2000-2005	2001-2003; 2005	2000-2004	2005-2006
Philippines	2000-2005	2000-2005	2000-2005	2000-2004	2005-2006
Singapore	2000-2005	2000-2005	2001-2005	2000-2004	2005-2006
Thailand	2000-2005	2000-2005	2000-2001; 2003; 2005	2000-2004	2005-2006
Vietnam	2000-2003	2000-2003	2001-2004	2000-2004	2005-2006

Sources: WITS (columns 1-3), and the Global Competitiveness Report (columns 4-5).

Table 2: Availability of trade facilitation data for ASEAN member countries.

Country	Documents/time for export/import	Cost export/ import	Port/air Infra.	Internet access	Internet users per 1,000 people	ISP comp.
Brunei Darussalam	NA	NA	NA	NA	NA	NA
Indonesia	2005-2006	2006	2000-2006	2001	2000-2004	2001-2006
Cambodia	2005-2006	2006	NA	NA	2000-2004	NA
Laos	2005-2006	2006	NA	NA	2000-2004	NA
Myanmar	NA	NA	NA	NA	2000-2004	NA
Malaysia	2005-2006	2006	2000-2006	2001	2000-2004	2001-2006
Philippines	2005-2006	2006	2000-2006	2001	2000-2004	2001-2006
Singapore	2005-2006	2006	2000-2006	2001	2000-2004	2001-2006
Thailand	2005-2006	2006	2000-2006	2001	2000-2004	2001-2006
Vietnam	2005-2006	2006	2000-2006	2001	2000-2004	2001-2006

Sources: Doing Business (columns 1-2), Global Competitiveness Report (columns 3, 4, and 6), and WDI (column 5).

Table 3: Availability of transparency data for ASEAN member countries.

Country	Transparency	Control of Corruption	Policy/reg. information	Irreg. payments in exports/imports
Brunei Darussalam	NA	2000; 2002-2005	NA	NA
Indonesia	2000-2006	2000; 2002-2005	2006	2000-2006
Cambodia	NA	2000; 2002-2005	NA	NA
Laos	NA	2000; 2002-2005	NA	NA
Myanmar	NA	2000; 2002-2005	NA	NA
Malaysia	2000-2006	2000; 2002-2005	2006	2000-2006
Philippines	2000-2006	2000; 2002-2005	2006	2000-2006
Singapore	2000-2006	2000; 2002-2005	2006	2000-2006
Thailand	2000-2006	2000; 2002-2005	2006	2000-2006
Vietnam	NA	2000; 2002-2005	2006	2000-2006

Sources: World Competitiveness Yearbook (column 1), World Governance Indicators (column 2), Global Competitiveness Report (columns 3-4).

Table 4: Trade restrictiveness in ASEAN member countries.

	Tariffs Only		Tariffs & NTBs		Tariffs & NTBs Ag. Only		Tariffs & NTBs Mfg. Only	
	OTRI	**MA-OTRI**	**OTRI**	**MA-OTRI**	**OTRI**	**MA-OTRI**	**OTRI**	**MA-OTRI**
Brunei Darussalam	0.095	0.081	0.139	0.126	0.410	NA	0.097	0.126
Indonesia	0.056	0.066	0.098	0.145	0.341	0.324	0.061	0.129
Cambodia	NA	NA	NA	NA	NA	NA	NA	NA
Laos	0.115	0.174	0.248	0.235	0.288	0.382	0.241	0.219
Myanmar	NA	NA	NA	NA	NA	NA	NA	NA
Malaysia	0.061	0.041	0.260	0.079	0.553	0.341	0.236	0.067
Philippines	0.040	0.062	0.240	0.094	0.477	0.649	0.212	0.060
Singapore	NA	NA	NA	NA	NA	NA	NA	NA
Thailand	0.130	0.093	0.153	0.140	0.579	0.675	0.112	0.084
Vietnam	0.160	0.157	0.368	0.238	0.541	0.535	0.349	0.170
ASEAN	*0.094*	*0.096*	*0.215*	*0.151*	*0.456*	*0.484*	*0.187*	*0.122*
World	*0.107*	*0.099*	*0.181*	*0.166*	*0.357*	*0.422*	*0.156*	*0.110*

Source: Kee et al. (2006).

Table 5: Data and sources.

Variable	Description	Year	Source
comcol$_{ij}$	Dummy variable equal to 1 if countries i and j were colonized by the same power, else zero.	NA	Mayer and Zignago (2006)
comlang_off$_{ij}$	Dummy variable equal to 1 if countries i and j have a common official language, else zero.	NA	Mayer and Zignago (2006)
contig$_{ij}$	Dummy variable equal to 1 if countries i and j share a land border, else zero.	NA	Mayer and Zignago (2006)
lair$_{ijt}$	Simple average of air infrastructure quality in countries i and j. Converted to logarithms. Based on responses to the question: "Passenger air transport in your country is (1=infrequent, limited, and inefficient, 7=as frequent, extensive, and efficient as the world's best)".	2000-2005	Global Competitiveness Report
ldist$_{ij}$	Great circle distance between the largest cities in countries i and j. Converted to logarithms.	NA	Mayer and Zignago (2006)
limports$_{ijkt}$	Imports of country i from country j in sector k for year t. Converted to logarithms. Aggregated to the BEC 1-digit level.	2000-2005	WITS-COMTRADE
lirreg$_{ijt}$	Simple average of the extent of irregular payments in import/export transactions for countries i and j. Converted to logarithms. Based on responses to the question: "In your industry, how commonly would you estimate that firms make undocumented extra payments or bribes connected with import and export permits (1=common, 7=never occur)".	2000-2005	Global Competitiveness Report
lisp_comp$_{ijt}$	Simple average of ISP sector competition index in countries i and j. Converted to logarithms.	2000-2005	Global Competitiveness Report
lsea$_{ijt}$	Simple average of maritime infrastructure quality in countries i and j. Converted to logarithms. Based on responses to the question: "Port facilities and inland waterways are (1=underdeveloped, 7=as developed as the world's best)".	2000-2005	Global Competitiveness Report
ltariff$_{ijkt}$	Simple average tariff effectively applied to imports of country i from country j in sector k for year t. Converted to logarithm of 1+tariff.	2000-2005	WITS-TRAINS
smctry	Dummy variable equal to 1 if countries i and j were once part of the same country, else zero.	NA	Mayer and Zignago (2006)

Table 6: Countries included in the dataset.

Country Group	Members
Importers	Brunei, China*, Hong Kong China*, Indonesia*, Cambodia, Laos, Myanmar, Malaysia*, Philippines*, Singapore*, Thailand*, Taiwan*, Vietnam*.
Exporters	Brunei, China*, Hong Kong China*, Indonesia*, Cambodia, Laos, Myanmar, Malaysia*, Philippines*, Singapore*, Thailand*, Taiwan*, Vietnam*.

*Note: * indicates countries included in the effective sample for the regression in the following Tables.*

Table 7: Baseline regression results.

Variable	Model 1	Model 2	Model 3
ldist	-0.355***	-.359***	-.353***
	[0.118]	[0.118]	[0.122]
ltariff	-1.266	-1.27	-1.33
	[1.271]	[1.27]	[1.28]
lsea	0.686		2.71**
	[1.244]		[1.29]
lair	4.873***	5.56***	
	[1.421]	[1.64]	
lirreg	0.481	0.704	0.211
	[0.673]	[0.52]	[0.706]
lisp_comp	1.186*	1.06*	2.23***
	[0.603]	[0.592]	[0.591]
contig	0.256*	0.251	0.243
	[0.152]	[0.151]	[0.16]
comcol	0.345	0.319	0.313
	[0.209]	[0.199]	[0.214]
comlang_off	0.354**	.351**	.373**
	[0.151]	[0.155]	[0.154]
smctry	0.304	0.303	0.339
	[0.215]	[0.216]	[0.226]
constant	1.578	1.37	4.85**
	[2.271]	[2.43]	[1.89]
Observations	1481	1481	1481
F	62.49***	63.40***	67.17***
R2	0.64	0.64	0.64

Notes: Estimation is by OLS. Robust standard errors, clustered by country pair, are in square brackets.
All models include fixed effects by exporter, importer, sector, and year.
20 outlying observations dropped from sample.
Dependent variable is limports.

Table 8: Gravity models estimated by BEC 1-digit sector.

	Total Trade	Food	Indust. Supplies	Fuels	Capital Goods	Transport Equipment	Consumer Goods
ldist	-.281**	-.482***	-.32*	-0.0376	-.57***	-0.154	-.384**
	[0.121]	[0.182]	[0.166]	[0.451]	[0.151]	[0.293]	[0.165]
ltariff	-0.0317	-0.389	1.17	-8.5	-5.57	-4.42*	-1.79
	[1.65]	[2.07]	[1.79]	[7.05]	[3.57]	[2.64]	[1.37]
lsea	-0.136	-0.0991	-0.145	7.62*	0.111	-1.26	-1.27
	[0.997]	[1.73]	[1.08]	[4.01]	[3.15]	[2.07]	[1.38]
lair	2.71**	0.803	3.89***	2.67	4.92**	7.12*	7.01***
	[1.03]	[1.89]	[1.11]	[4.88]	[2.03]	[3.63]	[1.89]
lirreg	0.721	0.221	.872*	0.222	-0.842	1.46	0.908
	[0.593]	[0.983]	[0.483]	[2.2]	[1.55]	[1.15]	[0.637]
lisp_comp	1.26**	0.681	1.22***	4.51	0.932	0.411	1.14*
	[0.607]	[1.21]	[0.456]	[2.82]	[0.666]	[1.63]	[0.67]
contig	.211*	-0.0832	.233*	0.782	-0.235	.651*	0.208
	[0.113]	[0.221]	[0.132]	[0.579]	[0.256]	[0.385]	[0.231]
comcol	0.324	0.226	0.244	0.287	0.218	.862*	0.222
	[0.225]	[0.32]	[0.241]	[0.924]	[0.24]	[0.467]	[0.3]
comlang	.339**	0.0523	0.0492	0.853	0.419	.559**	0.137
	[0.169]	[0.286]	[0.164]	[0.619]	[0.271]	[0.258]	[0.202]
smctry	0.00212	-.805***	0.465	1.33*	-0.034	0.597	0.537
	[0.194]	[0.27]	[0.318]	[0.766]	[0.336]	[0.556]	[0.376]
_cons	7.37***	13***	4.86*	-19*	7.84*	-3.52	2.28
	[2.43]	[3.39]	[2.6]	[10.2]	[4.09]	[6.32]	[2.45]
Obs.	211	251	251	228	251	249	251
F	75.11***	26.73***	82.55***	11.89***	62.24***	28.01***	31.41***
R2	0.92	0.79	0.93	0.65	0.89	0.7	0.85

Notes: Estimation is by OLS. Robust standard errors, clustered by country pair, are in square brackets.
All models include fixed effects by exporter, importer, and year.
Outlying observations dropped from sample.
Dependent variable is limports by BEC 1-digit sector.

Table 9: Simulation results, Scenario 1 (in million USD and percentage of baseline).

Country	Import Gain ($m)	Percent	Export Gain ($m)	Percent
China	7296.0	10.2	8326.9	10.9
Hong Kong, China	309.9	2.0	1129.0	7.0
Indonesia	1522.1	17.5	4109.6	13.3
Malaysia	1589.7	3.9	2149.7	3.0
Philippines	2164.8	17.7	766.0	16.5
Singapore	2371.7	3.8	1659.3	4.3
Thailand	2305.6	6.8	1704.1	4.9
Taiwan	2471.5	5.9	1083.3	6.0
Vietnam	2372.8	20.6	1476.2	19.9

Notes: Trade impacts estimated using elasticities from Table7 column 1 applied to total trade (value).
Sample includes all listed countries, for the base year 2005.
Simulation involves improving maritime port infrastructure in China, Indonesia, the Philippines, Thailand, and Vietnam to the regional average (4.6).

Table 10: Simulation results, Scenario 2 (in million USD and percentage of baseline).

Country	Import Gain ($m)	Percent	Export Gain ($m)	Percent
China	45911.3	64.5	51783.4	68.0
Hong Kong, China	1106.1	7.2	7349.3	45.8
Indonesia	7644.7	87.8	19265.5	62.4
Malaysia	9667.4	23.9	13341.8	18.9
Philippines	8801.7	71.9	2605.1	56.0
Singapore	14283.8	23.2	10041.8	26.0
Thailand	9542.2	28.1	7962.5	22.9
Taiwan	14997.0	35.8	4720.9	26.2
Vietnam	13005.3	113.0	7889.0	106.2

Notes: Trade impacts estimated using elasticities from Table7 column 1 applied to total trade (value).
Sample includes all listed countries, for the base year 2005.
Simulation involves improving air transport infrastructure in China, Indonesia, the Philippines, and Vietnam to the regional average (5.1).

Table 11: Simulation results, Scenario 3 (in million USD and percentage of baseline).

Country	Import Gain ($m)	Percent	Export Gain ($m)	Percent
China	974.0	1.4	1291.1	1.7
Hong Kong, China	192.0	1.2	211.3	1.3
Indonesia	702.0	8.1	2374.7	7.7
Malaysia	473.9	1.2	484.8	0.7
Philippines	1171.8	9.6	454.5	9.8
Singapore	805.6	1.3	465.4	1.2
Thailand	565.9	1.7	0.0	0.0
Taiwan	653.4	1.6	697.3	3.9
Vietnam	1276.1	11.1	835.5	11.2

Notes: Trade impacts estimated using elasticities from Table7 column 1 applied to total trade (value).
Sample includes all listed countries, for the base year 2005.
Simulation involves improving control of irregular payments in Indonesia, the Philippines, and Vietnam to the regional average (4.6).

Table 12: Simulation results, Scenario 4 (in million USD and percentage of baseline).

Country	Import Gain ($m)	Percent	Export Gain ($m)	Percent
China	5819.3	8.2	6510.8	8.5
Hong Kong, China	310.1	2.0	724.6	4.5
Indonesia	668.4	7.7	1750.9	5.7
Malaysia	1355.6	3.4	1761.9	2.5
Philippines	182.1	1.5	45.0	1.0
Singapore	2027.9	3.3	1494.1	3.9
Thailand	1909.5	5.6	1757.2	5.1
Taiwan	1551.6	3.7	919.9	5.1
Vietnam	3197.4	27.8	2057.5	27.7

Notes: Trade impacts estimated using elasticities from Table7 column 1 applied to total trade (value).
Sample includes all listed countries, for the base year 2005.
Simulation involves improving ISP sector competition in China, Indonesia, Thailand, and Vietnam to the regional average (4.9).

Table 13: Simulation results, Scenario 5 (in million USD and percentage of baseline).

Country	Import Gain ($m)	Percent	Export Gain ($m)	Percent
China	2958.2	4.2	1802.3	2.4
Hong Kong, China	0.0	0.0	604.3	3.8
Indonesia	109.8	1.3	515.0	1.7
Malaysia	1146.9	2.8	780.6	1.1
Philippines	64.8	0.5	32.0	0.7
Singapore	0.0	0.0	799.6	2.1
Thailand	1061.0	3.1	823.2	2.4
Taiwan	90.0	0.2	754.2	4.2
Vietnam	864.8	7.5	184.2	2.5

Notes: Trade impacts estimated using elasticities from Table7 column 1 applied to total trade (value).
Sample includes all listed countries, for the base year 2005.
Simulation involves reducing tariffs in China, Indonesia, Malaysia, the Philippines, Thailand, Taiwan, and Vietnam to the regional average (5.6%).

Table 14: Comparison of simulation results, Scenarios 1-5 (in million USD and percentage of baseline).

	Trade Gain	Percent
Scenario 1	22404.1	7.5
Scenario 2	124959.4	42.1
Scenario 3	6814.7	2.3
Scenario 4	17021.8	5.7
Scenario 5	6295.3	2.1

Notes: Sample includes all listed countries, for the base year 2005.
Scenario definitions are as set out above.

Figures

Figure 1: Estimated cost of importing, 2006. (Source: Doing Business.)

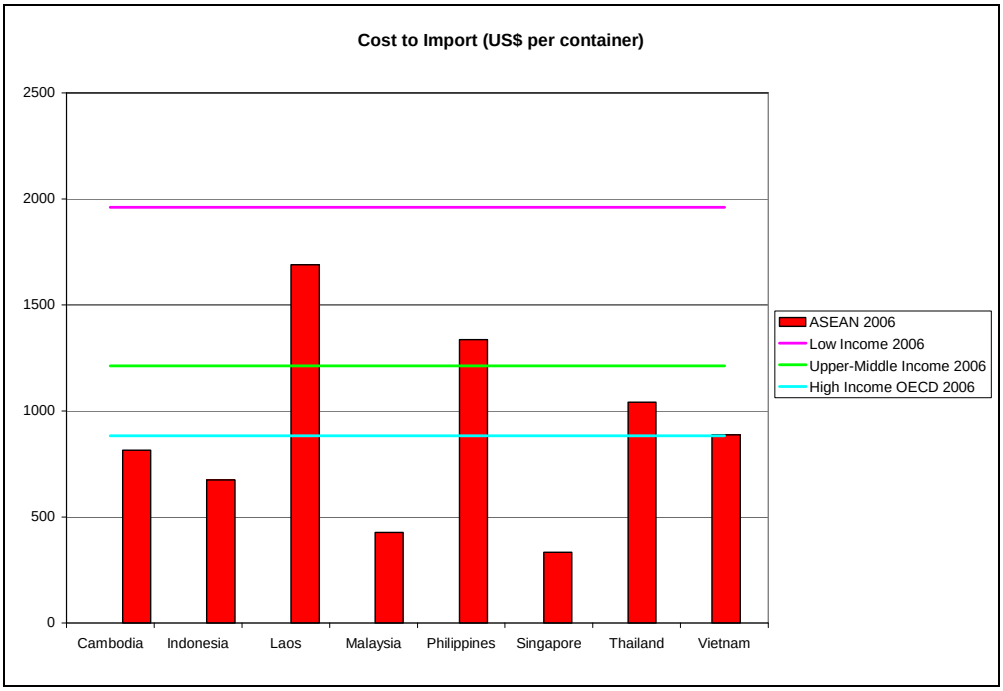

Figure 2: Estimated cost of exporting, 2006. (Source: Doing Business.)

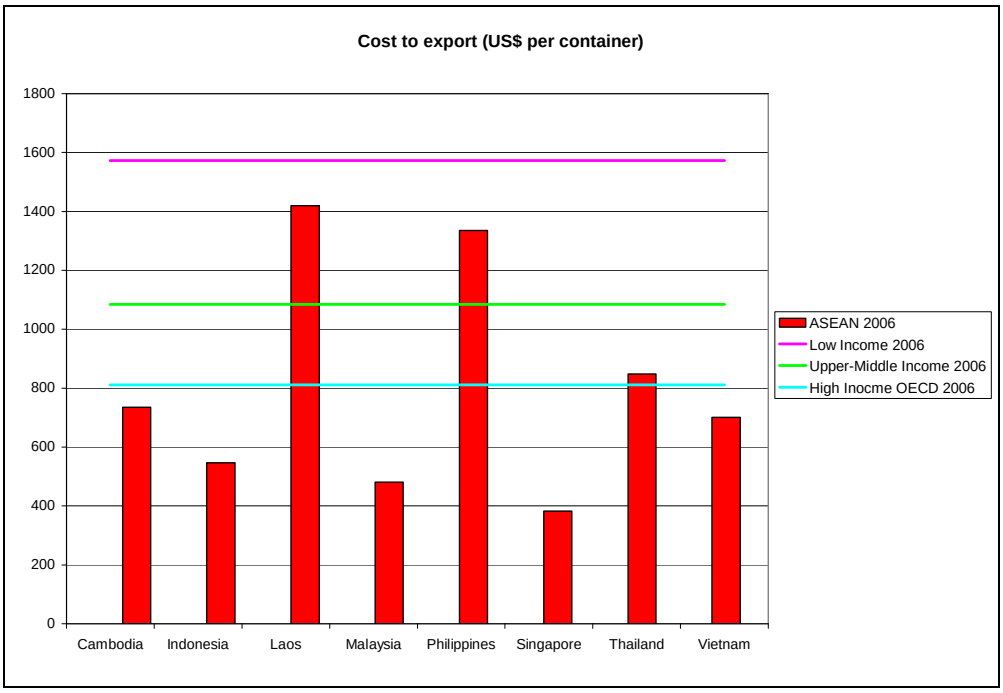

Figure 3: Time to import, 2005-2006. (Source: Doing Business.)

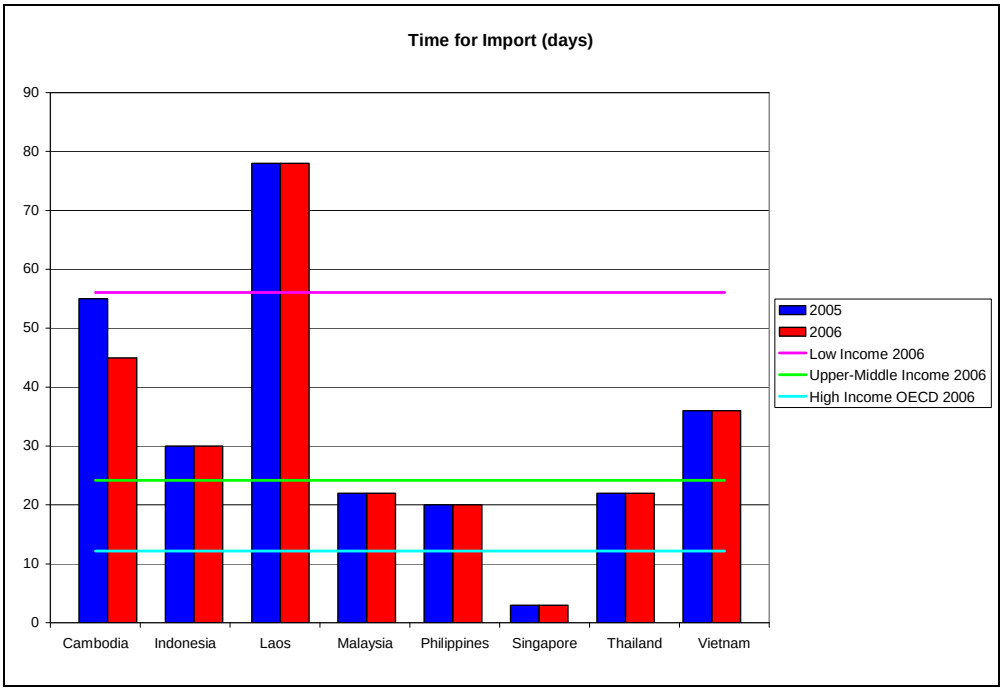

Figure 4: Time to export, 2005-2006. (Source: Doing Business.)

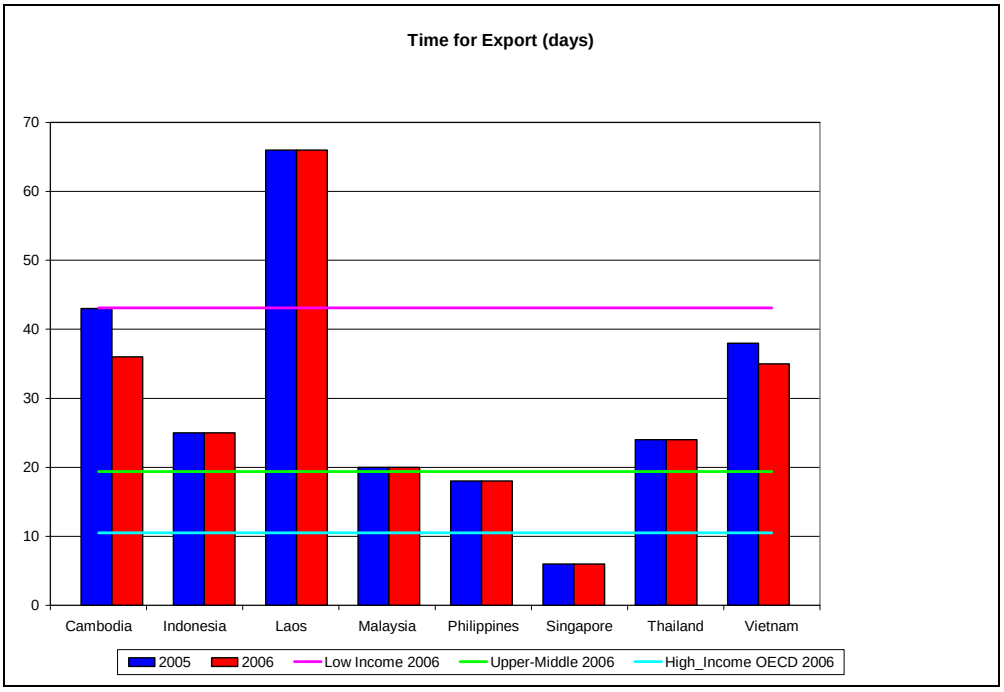

Figure 5: Documents to import, 2005-2006. (Source: Doing Business.)

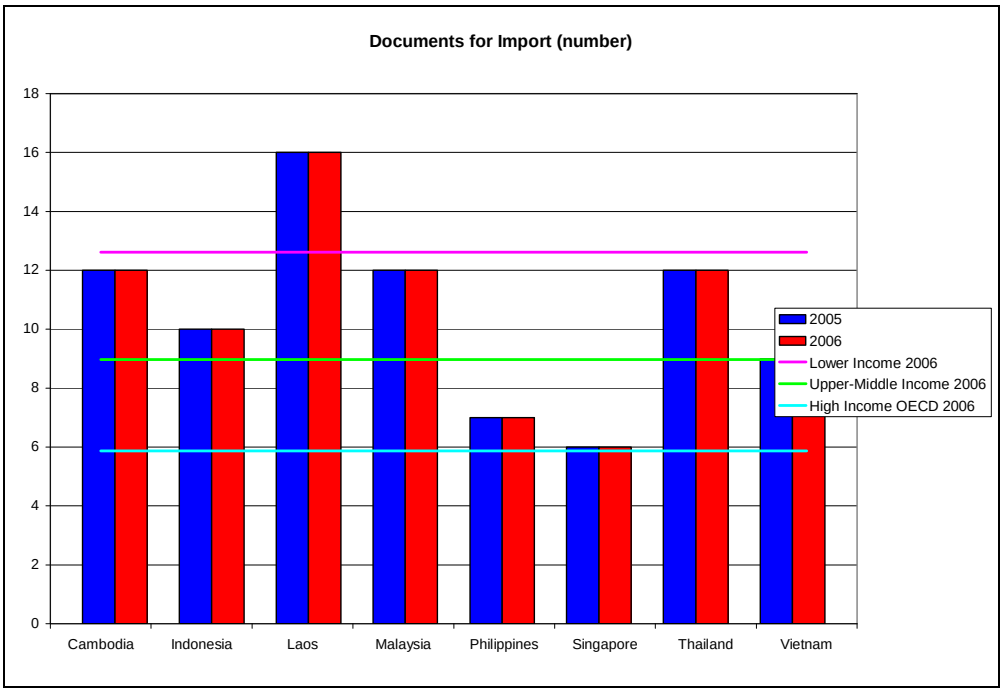

Figure 6: Documents to export, 2005-2006. (Source: Doing Business.)

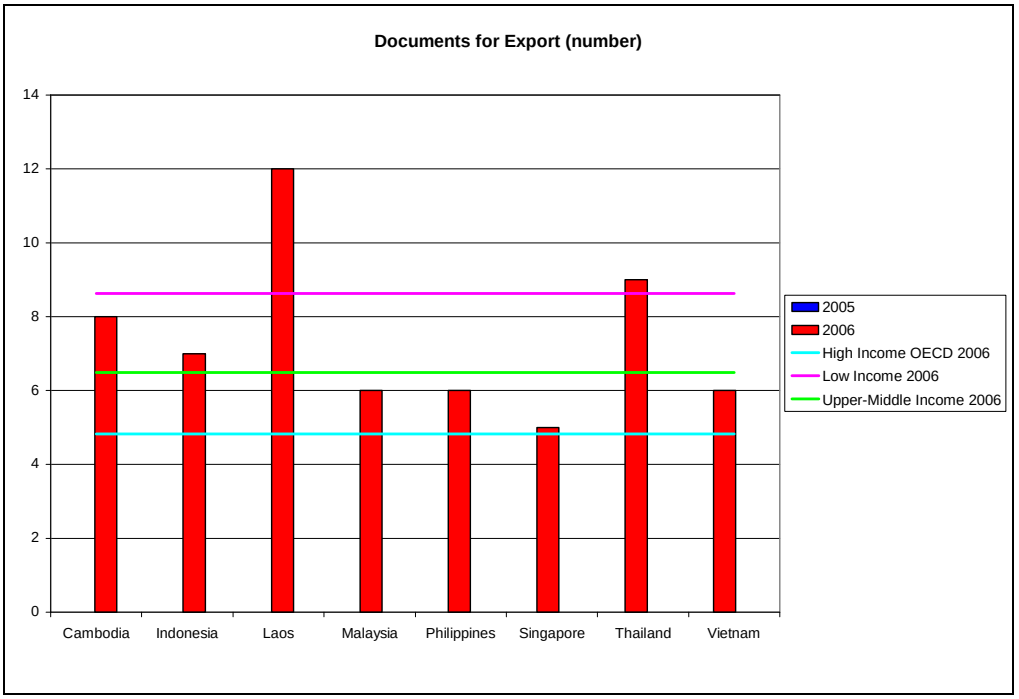

Figure 7: Quality of port infrastructure, 2000-2006. (Source: Global Competitiveness Report.)

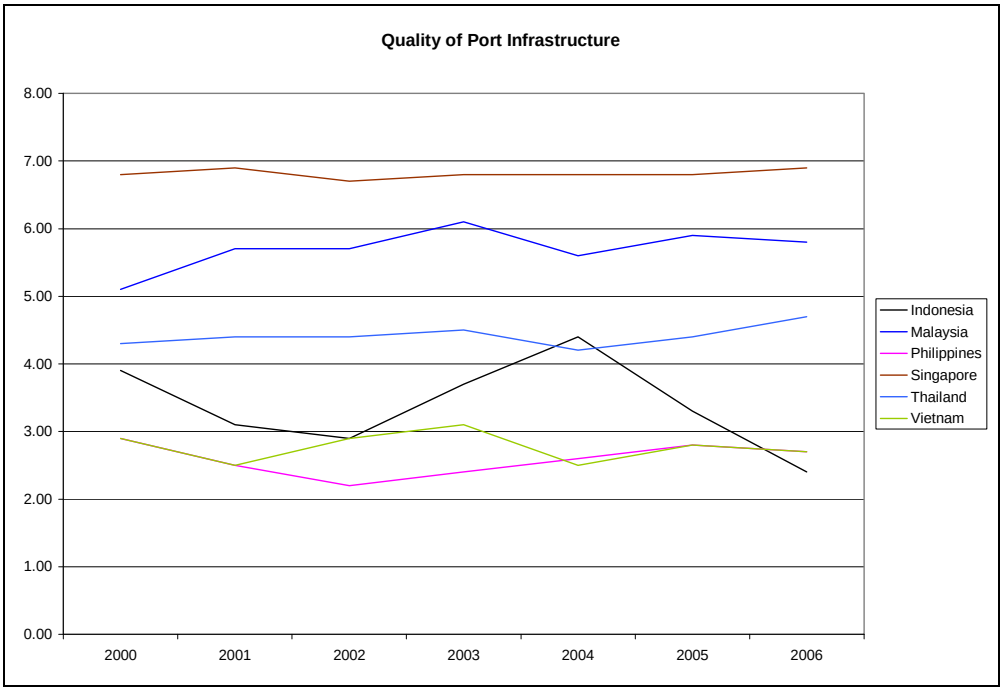

Figure 8: Quality of air transport infrastructure, 2000-2006. (Source: Global Competitiveness Report.)

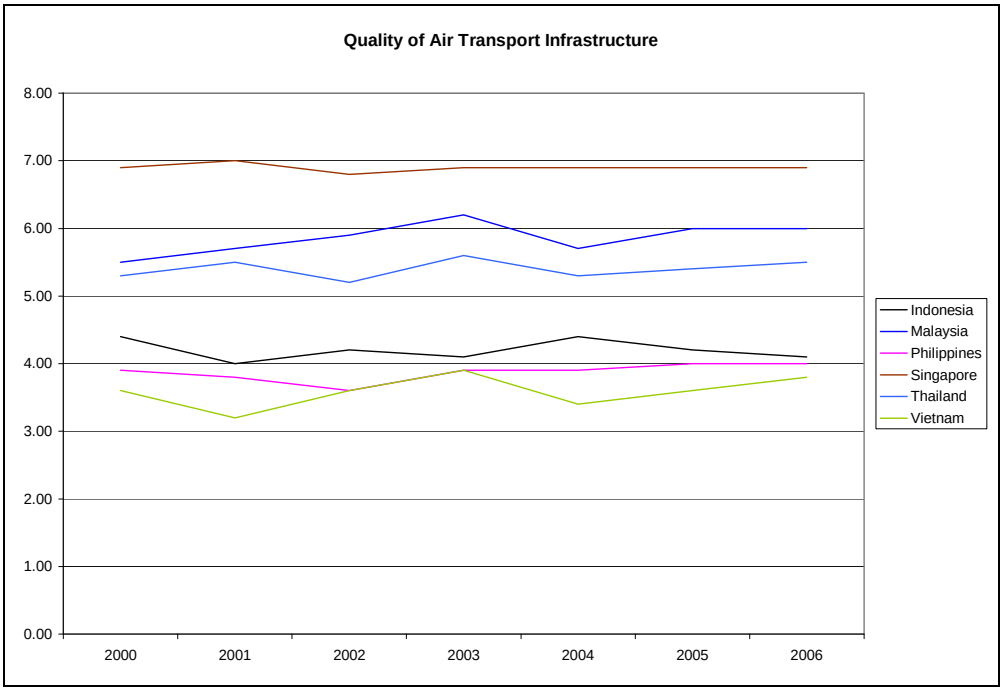

Figure 9: Extent of irregular payments for export/import licenses, 2000-2006. (Source: Global Competitiveness Report.)

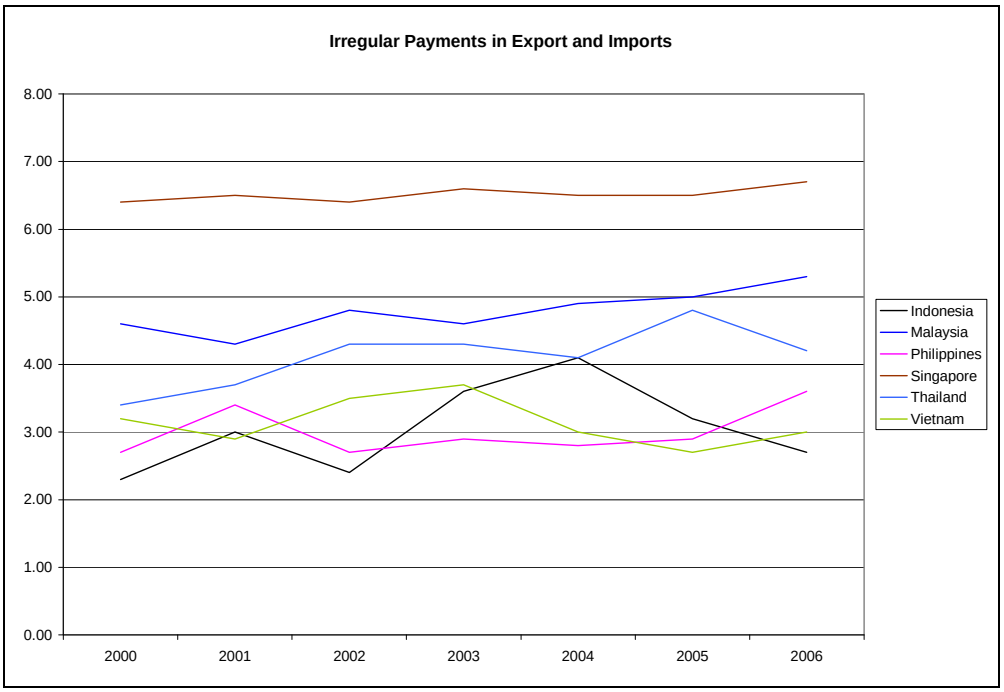

Figure 10: Quality of ISP competition, 2001-2006. (Source: Global Competitiveness Report.)