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Trade Costs in the India-Mekong Subregion: Identifying Policy Priorities for Trade Facilitation

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Abstract

This paper explores the trade facilitation performance of India and Mekong countries using a new measure of bilateral comprehensive trade costs, complemented by a review of specific trade policy and trade facilitation-related indicators. A model of comprehensive trade costs is then developed and estimated using these specific indicators in an effort to identify policies and measures that have a significant effect on trade costs, and to prioritize them. The trade costs between India and Mekong countries are found to be high: from 20% to 100% higher than those prevailing among Mekong countries. However, the fact that India, China, Thailand, and most of the other India-Mekong countries made more progress in reducing trade costs with each other than with developed countries – such as Japan and the USA - is encouraging, showing signs of slow but steady improvements in regional connectivity. Econometric results suggest that countries should prioritize policies aimed at further developing maritime and ICT services to reduce trade costs.

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Table of Content

List of Tables

List of Figures

Trade Costs in the India-Mekong Subregion: Identifying Policy Priorities for Trade Facilitation?[1]

International trade costs faced by developing countries remain high. This is also the case in Asia, where trade facilitation performance varies greatly across subregions, as well as within countries in each subregion. As shown in table 1, non-tariff comprehensive costs of trade in goods, which capture all direct and indirect cost of trade other than tariff costs, range from 49% of value of goods for intraregional trade among Southeast Asian countries, to a prohibitive 259% for trade in goods between South and Central Asia countries. Trade costs between South and Southeast Asia stand in between these two extremes, suggesting ample room for improvements in trade facilitation in the India-Mekong subregion.

Table 1: Intra-regional Non-Tariff Comprehensive Trade Costs (2007; Tariff Equivalent)

	Southeast Asia	South Asia	East and North-East Asia	North and Central Asia	Australia-New-Zealand	European Union	North America
Intra-Asia trade							
Southeast Asia	49%						
South Asia	117%	113%					
East and North-East Asia	132%	201%	105%				
North and Central Asia	259%	258%	193%	148%			
Extra-Asia trade							
Australia-New-Zealand	85%	145%	143%	313%	61%		
European Union	105%	124%	127%	161%	122%	59%	
North America	101%	137%	109%	244%	122%	104%	50%

Source: ESCAP (2011), Asia-Pacific Trade and Investment Report 2011, United Nations.

But how can improvements be made? What measures and policies affect trade costs the most? A wide range of factors affect trade facilitation and the level of trade costs, which makes it particularly difficult to answer this question. Some of the cost factors are inherent to the location, culture or history of the trading partners and may be difficult to address through policy, at least within a reasonable time frame. Others, such as the availability of logistics infrastructure and services, a favorable exchange rate, a conducive business environment, or transparent and streamlined border procedures, may be influenced by policy makers. After defining and reviewing comprehensive trade cost and related indicators in the India-Mekong subregion, this paper evaluates the relative importance of a number of both policy-related and other factors in reducing trade costs in an effort to identify policy priorities for trade facilitation.

[1] This paper is a companion paper to Duval and Uthoktam (2011). It was developed after presentation of the original paper at an international conference on 'Mekong-India Cooperation: Linking Markets, Fostering Trade' organized on 23-24 June 2011 by Research and Information System for Developing Countries (RIS), New Delhi, in collaboration with the Institute of Foreign Policy Studies (IFPS), Calcutta University, Kolkata. Comments and suggestions received from Saikat Sinha Roy, Ajitava Raychaudhuri and other participants during to the conference are gratefully acknowledged.

A. Comprehensive Trade Costs: Definition and Calculation

As shown by Jack, Meissner, and Novy (2008; 2009), gravity equations derived from the Anderson and van Wincoop (2003) trade model as well as other leading trade models such as the model with heterogeneous firms of Melitz and Ottaviano (2008), can be solved for an expression of bilateral comprehensive trade costs. This bilateral measure of trade costs is truly comprehensive in the sense that it includes *all additional costs involved in trading goods internationally with another partner (i.e. bilaterally) relative to those involved in trading goods intranationally (i.e., internally or domestically)*. It captures trade costs in its wider sense, including not only international transport costs and tariffs but also other trade cost components discussed in Anderson and van Wincoop (2004), such as costs associated with the use of different language and currencies. Direct and indirect costs associated with completing trade procedures or obtaining necessary information are also included.

Following Chen and Novy (2009), such all-inclusive trade costs may be defined as follows:

$$\tau_{ij} \equiv \left(\frac{t_{ij} t_{ji}}{t_{ii} t_{jj}} \right)^{\frac{1}{2}} = \left(\frac{x_{ii} x_{jj}}{x_{ij} x_{ji}} \right)^{\frac{1}{2(\sigma-1)}} \qquad \textbf{(1)}^{2}$$

where τ_{ij} denotes geometric average trade costs between country i and country j
t_{ij} denotes international trade costs from country i to country j
t_{ji} denotes international trade costs from country j to country i
t_{ii} denotes intranational trade costs of country i
t_{jj} denotes intranational trade costs of country j
x_{ij} denotes international trade flows from country i to country j
x_{ji} denotes international trade flows from country j to country i
x_{ii} denotes intranational trade of country i
x_{jj} denotes intranational trade of country j
σ denotes elasticity of substitution between all goods[3]

According to this equation, trade costs are directly inferred from observable bilateral and intranational (domestic) trade data, showing how much more expensive bilateral international trade is relative to intranational trade. Intranational trade is ideally defined as gross output less export. However, since gross output data is not available for most developing countries in Asia, alternative measures are needed.

Following Novy (2008) and others (e.g., Shepherd, 2010), we first define x_{ii} and x_{jj} as gross domestic product (GDP) less export and apply equation (1) to calculate trade costs. In an effort to improve on previous studies, however, we call the resulting cost estimates "upper-bound" trade costs (τ_{ij}^{UB})[4] and calculate "lower-bound" trade costs (τ_{ij}^{LB}) where x_{ii} and x_{jj} is adjusted for the

[2] As in Jack, Meissner, and Novy (2008), trade costs may be expressed in tariff-equivalent form, defined as $TET_{ij} = T_{ij}-1$. See Annex 1 for the full derivation of trade cost from the micro-founded gravity equation of Anderson and van Wincoop.

[3] See Anderson and van Wincoop (2003) for detailed discussion of elasticity of substitution between goods. For the purpose of comparing results to past literatures, this paper follows Anderson and van Wincoop (2004) and Novy (2008) by setting $\sigma = 8$.

[4] Novy (2008) finds that the percentage change of trade costs over time using GDP in the calculation is similar to those computed with gross output. Novy (2008) also shows high correlation between gross output

share of services in GDP.[5] T_{ij}, referred to as "comprehensive trade costs" (CTC) in the rest of the paper, is then calculated as the simple average of the upper-bound and lower-bound trade costs.[6]

Following Anderson and van Wincoop (2004), non-tariff CTC (NT-CTC), which encompasses *all additional costs other than tariff costs involved in trading goods bilaterally rather than domestically,* are also calculated as T_{ij} /(1+$tariff_{ij*ji}$) where $tariff_{ij*ji}$ is the geometric average of $tariff_{ij}$ and $tariff_{ji}$, and $tariff_{ij}$ is the trade-weighted average effective import tariff imposed by country *i* on country *j*. Bilateral CTC and NT-CTC for over 40 OECD and Asia-Pacific countries are available online in the ESCAP Trade Cost Database.[7]

B. Trade Cost and Facilitation Performance in the India-Mekong Subregion

Table 2 shows bilateral comprehensive trade costs prevailing in the India and Mekong subregion. Bilateral trade costs of India and Mekong countries with Japan and the USA are also shown for benchmarking purpose. Trade costs of Myanmar and Lao PDR are not included due to the absence of data underlying their measure.

Trade costs of Cambodia and India are generally high compared to those of other subregional members. In contrast, bilateral trade costs of China are generally low, with the exception of its trade costs with Cambodia. Overall, China bilateral trade costs with other Mekong countries are found to be often 40% lower than India's. Comprehensive trade costs of Thailand are generally the lowest in the India-Mekong subregion, after those of China.

While Viet Nam's trade costs are higher than those of Thailand (as of 2008), they have decreased more sharply than those of Thailand since 2001. Indeed, trade costs of Viet Nam with all the trading partners shown in table 2 decreased by at least 30% between 2001 and 2008. Trade costs between Viet Nam and India decreased by an impressive 40% during the period, a performance that only China came close to match (-39%). In contrast, Cambodia made much slower progress in reducing trade costs during the period although its trade costs were already higher than those of Viet Nam in 2001.

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and GDP, which makes GDP as a proxy of gross output still theory consistent. Novy (2008) notes however that using GDP data overstates intranational trade and thus the level of trade costs because GDP includes (non-tradable) services.

[5] $x_{ii}^{for\ \tau_{ij}^{LB}} = NS\,(x_{ii})$, where NS is the average non-service sector share of GDP of countries in the income group to which country *i* belongs to. Income group definition follows that of the World Development Indicator database. The same applies to country *j*.

[6] As shown in Duval and Utoktham (2011), these CTC estimates are found to provide a better approximation of gross output based trade costs than simply using GDP based upper bounds trade costs.

[7] CTC and NT-CTC presented in this paper are calculated using data from COMTRADE, TRAINS and the World Development Indicators. See the ESCAP Trade Cost Database website for details: http://www.unescap.org/tid/artnet/trade-costs.asp .

Table 2: Bilateral Comprehensive Trade Costs of India and Selected Mekong Countries (2008 tariff equivalent; percentage changes from 2001 in parenthesis)

	India	Cambodia	China	Thailand	Viet Nam	Japan
Cambodia	212% (-19%)					
China	75% (-39%)	143% (-1%)				
Thailand	88% (-23%)	83% (-23%)	49% (-29%)			
Viet Nam	103% (-40%)	63% (-34%)	59% (-35%)	46% (-37%)		
Japan	114% (-18%)	163% (-3%)	47% (-20%)	48% (-17%)	59% (-30%)	
USA	90% (-23%)	119% (-24%)	56% (-18%)	71% (-1%)	81% (-40%)	69% (1%)

Source: ESCAP Trade Cost database

India made consistent progress with all countries, reducing trade costs by about 20% or more with both Mekong developing countries and developed countries. While the cost between India and Mekong countries remain high, the fact that China, Thailand, and most of the other India-Mekong countries made more progress in reducing trade costs with each other than with Japan and the US is encouraging, showing signs of slow but steady increased in regional connectivity. That being said, an examination of average bilateral tariff costs shown in table 3 reveals that progress in reducing comprehensive trade costs was achieved in no small part through the reduction in tariff rates. Tariff rates indeed decreased in many cases by 50 to 60% between 2001 and 2008, such that tariff costs typically now account for 10% or less of comprehensive trade costs.

Table 3: Bilateral Tariff Costs of India and Selected Mekong Countries (2008; percentage changes from 2001 in parenthesis)[8]

	India	Cambodia	China	Thailand	Vietnam	Japan
Cambodia	37%[9] (101%)					
China	6% (-66%)	8% (-55%)				
Thailand	6% (-64%)	7% (-44%)	6% (-67%)			
Viet Nam	15% (-33%)	8% (-39%)	9% (-68%)	4% (-59%)		
Japan	5% (-65%)	9% (-11%)	5% (-47%)	5% (-36%)	6% (-30%)	
United States	4% (-71%)	12% (-24%)	5% (-50%)	4% (-22%)	8% (-34%)	2% (8%)

Source: ESCAP Trade Cost Database

As explained earlier, comprehensive trade costs are a highly aggregated measure of trade facilitation performance. A selection of additional trade facilitation related indicators are therefore briefly presented below in an effort to provide a more detailed overview of the trade facilitation performance of India and Mekong countries. Each of the indicators below capture some components of the comprehensive trade costs measure and the empirical work presented later in the paper will aim at determining the relative importance of each of these indicators in trade costs.

The *Trading Across Border* indicators reported in the annual Doing Business Reports include estimates of import and export cost and time, where export cost and time are defined roughly as the direct cost and time it takes to complete all regulatory and logistics procedures necessary to prepare and move a 20-foot container of goods from a factory near the capital city to the deck of a ship at the nearest seaport (see table 4). India's costs of export and import are 20 to 40% higher than those of all other Mekong countries except Lao PDR. Lao PDR faces the highest export and import cost of all countries in table 4, but this is partly explained by the fact that Lao is not only a least developed country but also a landlocked country with no seaport of its own. China has the lowest export and import costs, followed by Viet Nam and Thailand.

[8] Values shown are the geometric average of $tariff_{ij}$ and $tariff_{ji}$, where $tariff_{ij}$ is the trade-weighted average effective import tariff imposed by country *i* on goods from country *j*.

[9] A closer examination of the underlying tariff data from UNCTAD TRAINS reveals that the trade-weighted average of Cambodia's tariff on Indian goods increased from 4.39% in 2001 to 11.69% in 2008, while India's trade-weighted tariff on Cambodian goods increased from 33.77% in 2001 to 76.82%. In contrast, Cambodia's simple average tariff on India remained stable around 14% since 2001 and those of India even decreased to less than 15% in 2008 from 26% in 2001. This huge difference between simple and trade-weighted tariff average is partly explained by the lack of diversification of Cambodia's exports.

Table 4: Ease of Doing Business: Trading across Border

	Cost to export (US$ per container)		Cost to import (US$ per container)		Time to export (days)		Time to import (days)	
	2006	2010	2006	2010	2006	2010	2006	2010
India	864	1055	1244	1025	27	17	41	20
Cambodia	722	732	852	872	37	22	45	26
China	390	500	430	545	21	21	24	24
Lao PDR	1420	1860	1690	2040	66	48	78	50
Thailand	848	625	1042	795	24	14	22	13
Viet Nam	468	555	586	645	24	22	23	21
Japan	989	1010	1047	1060	10	10	11	11
USA	960	1050	1160	1315	6	6	5	5

Source: Ease of Doing Business Report 2007 and 2011, World Bank.

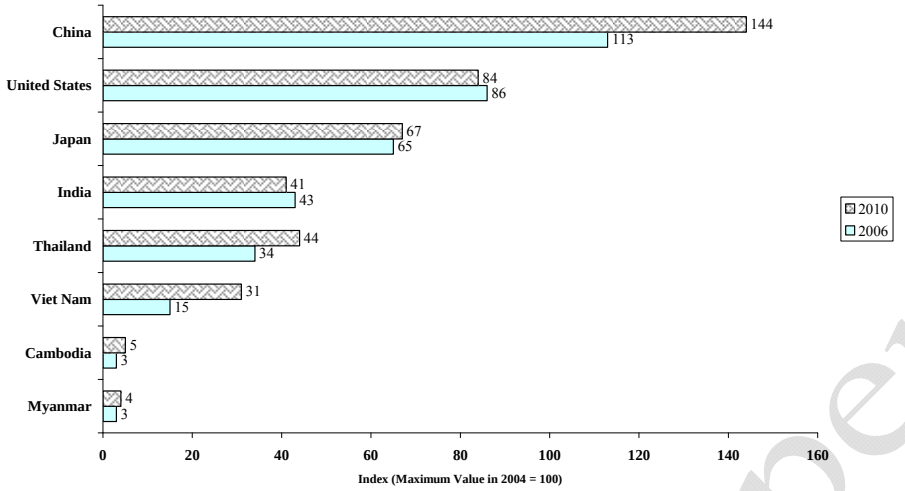
In terms of time to import and export, which captures some of the indirect costs of international trade, India is found to do better than all Mekong countries except Thailand. While still lagging far behind, both Lao and Cambodia reduced time to import or export by 30% or more since 2006, reducing the performance gap between them and other countries of the India-Mekong subregion. China showed no improvement since 2006 according to these indicators. Overall, India and Mekong countries appear to have a lot of room to streamline import and export processes, as it still takes twice as much time to export and import in these countries that it does in developed countries such as Japan and the US.

The *Trading Across Border* indicators presented above capture many behind and at-the-border costs but not international shipping costs and related services availability and efficiency. In contrast, the Liner Shipping Connectivity Index (LSCI) is composed of the following five quantitative indicators: (a) number of ships providing services to and from a country, (b) combined TEU (20-foot equivalent unit: standard size container) carrying capacity of these ships, (c) number of services provided, (d) number of liner companies providing these services, and (e) maximum vessel size available in a country. These five indicators together provide a comprehensive view of the maritime services available – and the implied quality of the port infrastructure.

Based on the LSCI index, China has the highest port connectivity in the world, well ahead of countries such as Japan and North America (see Figure 1). India has adequate connectivity but has made little progress in this area since 2006, while both Thailand and Viet Nam have made significant improvements. Cambodia and Myanmar still have very poor liner shipping connectivity.[10]

[10] Air freight services play an increasingly important role in international trade. However, as 80% of goods traded still take place using sea vessels, the LSCI index is thought to adequately capture the international logistics services efficiency dimension of trade costs.

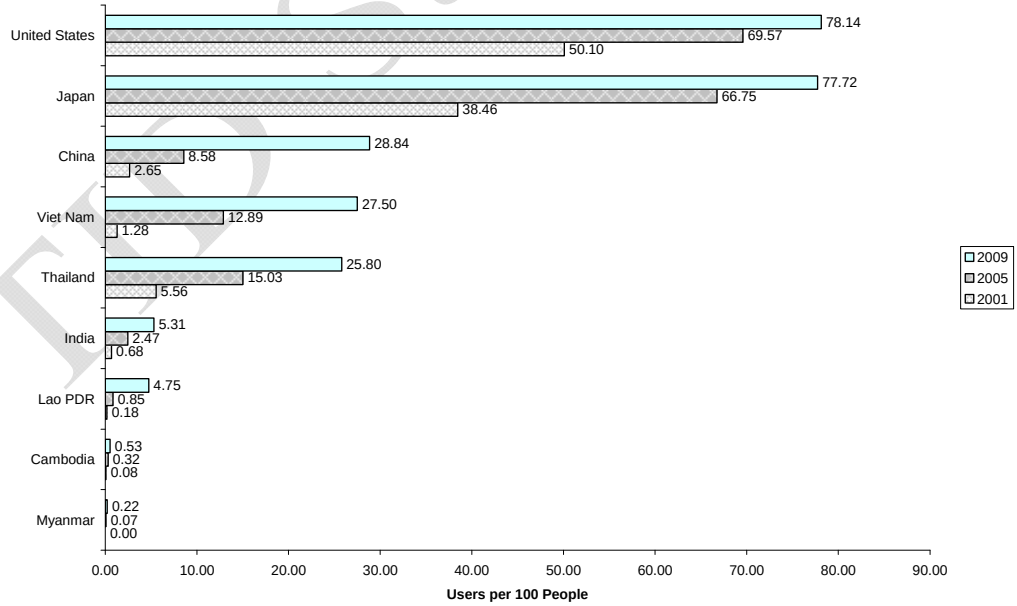
Figure 1: Liner Shipping Connectivity Index (LSCI), 2010



Source: Authors based on UNCTAD LSCI, World Development Indicators, World Bank

In addition to maritime and logistics services, availability and affordability of information and communication technology services can be expected to facilitate trade and the overall cost of trade, particularly since ICT use can greatly facilitate and reduce the cost of exchanging the often complex and sizeable volume of information, data and documents associated with an international trade transaction. China, Viet Nam, and Thailand are found to have achieved similar level of ICT usage, with a quarter of the population using the Internet. In contrast, ICT usage in India, Laos, Cambodia and Myanmar remained extremely low, making it certainly more difficult to reduce trade costs, particularly for small and medium-size enterprises.

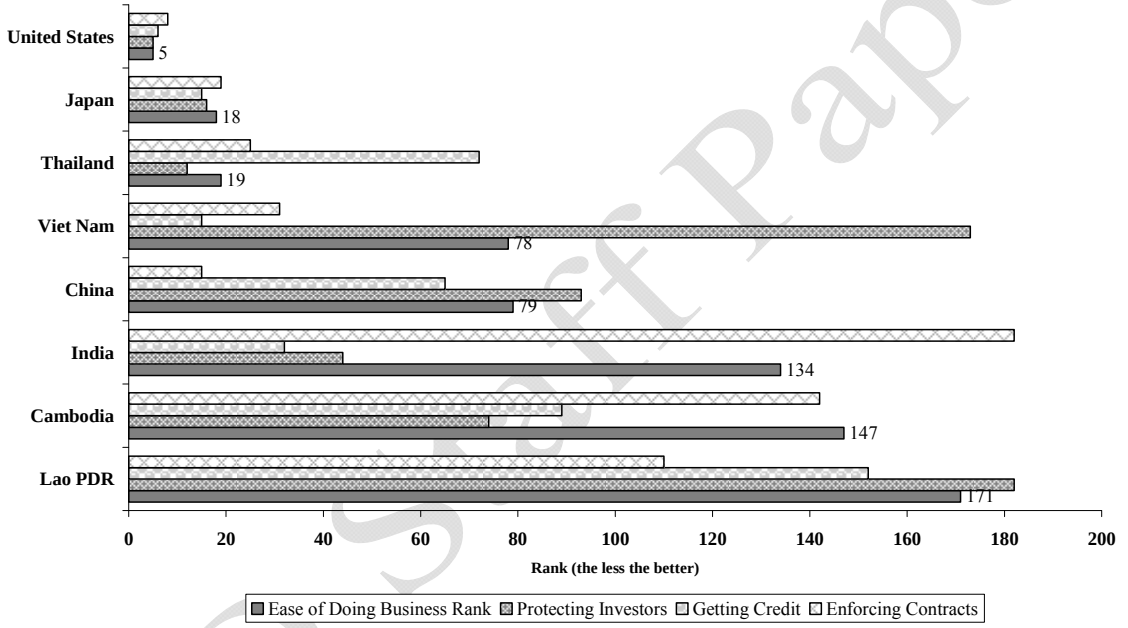
Figure 2: Information and Communication Technology Usage in India and Mekong Countries (Internet users per 100 people; 2001, 2005 and 2009)



Source: Authors based on World Development Indicators (DataBank), World Bank

While logistics and ICT services efficiency play an important role in trade facilitation, an increasing number of studies have shown that the quality and transparency of the business environment in importing and exporting countries significantly affect trade flows.[11] An inefficient domestic regulatory environment can indeed be expected to increase international trade costs given that international transactions almost systematically involve additional and often more complex interactions with regulators and service providers, as compared to domestic transactions. In this context, Figure 3 shows the Ease of Doing Business (EDB) ranking of India and Mekong Countries. Thailand is found to rank significantly better than any of the other countries in the subregion, with an EDB rating on par with that of Japan. Viet Nam and China trail about 30 ranks behind Thailand but are found to have a business regulatory environment far more conducive than India, Cambodia, Lao PDR, all ranking in the last tier of the world ranking.

Figure 3: Ease of Doing Business (EDB), Investor Protection, Credit Information and Contract Enforcement: 2010 Ranking



Source: Authors, based on data from the Doing Business Report 2011, World Bank

In an effort to distinguish essential dimensions of the business environment thought to affect overall trade costs, we also show country rankings for three underlying indicators of the EDB covering key areas of business regulations - credit, investment, and rule of law.[12] In terms of investor protection, Lao PDR and Viet Nam rank significantly lower than others in the subregion. In terms of contract enforcement (number of steps needed to enforce a contract), India performs the worst, followed by Cambodia. In terms of getting credit, Lao PDR and Cambodia perform poorly, while Viet Nam and to a lesser extent, India, rank highest in the subregion. Overall, the regulatory business environment in India and Mekong countries - as measured by these three indicators – suggest that all countries in the subregion have much progress to make before they can come close to matching the performance of developed countries.

[11] See Duval and Utoktham (2010b) for a review.

[12] These three indicators also have the particularity of being least correlated with each other, among all other underlying indicators of the EDB, making it feasible to include all of them as explanatory variable of trade costs in the empirical analysis that follows. The choice and nature of these indicators are discussed in details in Duval and Utoktham (2010b).

C. Empirical Analysis: Which Policies and Factors Affect Trade Costs the Most?

While high level of bilateral comprehensive trade cost (CTC) are helpful to draw attention to policy makers on the need to reduce them, they provide limited guidance to policy makers on which measures or policies they need to change to achieve that goal. To address this important issue, we develop a simple model of comprehensive trade cost and then estimate that model to identify which trade-related policies and other factors affect bilateral CTC the most.

Based on the existing trade modeling literature, geographic distance between countries as well as cultural distance, such as the use of different languages, are used to capture "natural" trade costs, i.e, the part of comprehensive trade costs that cannot be reduced through policy reform.[13] In turn, Tariff rates, *Trading Across Border* factory-to-seaport (export) and seaport-to-warehouse (import) trade costs, liner shipping connectivity, and selected EDB credit, investment and contract enforcement indicators are used to reflect performance of policies related to trade liberalization, trade procedures, logistics services, and the business environment, respectively. Internet usage is also used to capture policies related to access and availability of ICT services, as this has also been identified in the literature as an important trade facilitation factor.[14]

Comprehensive trade costs are therefore modeled as follows:

$$CTC_{ijt} = Dist_{ij}^{\beta_1} Tariff_{ij*ji}^{\beta_3} LSCI_{ij}^{\beta_4} ICT_{ij}^{\beta_5} DirectC_{ij}^{\beta_7} e^{\beta_0 + \beta_2 Cult_{ij} + \beta_6 Doingbiz_{ij} + \varepsilon_{ijt}} \quad \textbf{(2)}$$

where,

$Dist_{ij}$	is bilateral distance between trading partners in kilometers
$Cult_{ij}$	is a set of dummy variables of cultural distance, which consists of **contig** (contiguity): dummy variable indicating "1" if 2 countries are contiguous and "0" otherwise **comlang_off** (common official language): dummy variable indicating "1" if 2 countries shares official language and "0" otherwise
$Tariff_{ij*ji}$	is a geometric average of $tariff_{ij}$ and $tariff_{ji}$
$LSCI_{ij}$	is a geometric average of $lsci_i$ (liner shipping connectivity index) and $lsci_j$
ICT_{ij}	is a geometric average of $internetusers\_per100ppl_i$ (number of internet users per 100 inhabitants) and $internetusers\_per100ppl_j$
$Doingbiz_{ij}$	is a geometric average of ease of doing business indicators of i and j, which consist of **getloan_creditinfo**: depth of credit information index (0-6) **investprotect_disclosure**: extent of disclosure index (0-10) **contractenforce_steps**: procedure of enforcing contract (number of steps)
$DirectC_{ij}$	is a geometric average of direct monetary cost of moving a container from factory-to-port and from port-to-warehouse

Linearizing the model, we obtain:

$$\ln(CTC_{ij}) = \beta_0 + \beta_1 \ln(Dist_{ij}) + \beta_2(Cult_{ij}) + \beta_3 \ln(tariff_{ij*ji}) + \beta_4 \ln(LSCI_{ij}) + \beta_5 \ln(ICT_{ij}) + \beta_6(doingbiz_{ij}) + \beta_7 \ln(DirectC_{ij}) \quad \textbf{(3)}$$

[13] Anderson and van Wincoop (2004): "The death of distance is exaggerated"; Chen and Novy (2009); Jack, Meissner, and Novy (2008).
[14] For example, see Wilson, Mann and Otsuki (2005), among others.

We use a cross-country cross sectional dataset of 64 countries in 2006 to estimate the model.[15] The list of countries included in the dataset is provided in Annex 2. Definition, source of data and expected effect (signs) of each variable included in the model are summarized in table 5.

Table 5: Definition, sources, expected signs and data description for regression

Variable Name (in STATA)	Source	Expected Sign	Description
ln_ctc	ESCAP/TID		Natural log of comprehensive trade costs CTC (T_{ij}).
ln_ctcxtariff	ESCAP/TID		Natural log of non-tariff comprehensive trade costs NT-CTC (T_{ij}^{nt})
ln_dist	CEPII	+	Natural log of geodesic distance, following the great circle formula, which uses latitudes and longitudes of the most important cities/agglomeration (dense of population) in kilometers between reporting country and its trade partner.
contig	CEPII	-	Dummy variable indicating "1" if 2 countries are contiguous and "0" otherwise.
comlang_off	CEPII	-	Dummy variable indicating "1" if 2 countries share official language and "0" otherwise.
ln_tariff_ij_ji_ga		+	Natural log of geometric average of $tariff_{ij}$ and $tariff_{ji}$
ln_lsci	WB TI*	-	Natural log of liner shipping connectivity index (maximum value in 2004 = 100): The higher the LSCI, the better port connectivity, which implies lower trade costs.
ln_internetusers_per100ppl	WB TI*	-	Natural log of internet users (per 100 people): the more internet users, the better ICT infrastructure and services, which implies lower trade costs.
getloan_creditinfo_ij	WB TI*/WB DB**	-	Getting credit: depth of credit information index (0-6): the more credit information available, the easier and cheaper the credit, which implies lower trade costs.
investprotect_disclosure_ij	WB TI*/ WB DB**	-	Protecting investors: extent of disclosure index (0-10): the more measures to protect investors (i.e., higher level of disclosure), the lower the risks, which implies lower trade (and business) costs.
contractenforce_steps_ij	WB TI*/ WB DB**	+	Enforcing contracts: procedures (number of steps): the more steps and complicated the procedures, the more difficult to enforce contracts, which implies higher risks and higher trade costs.
ln_trade_usd_ij	WB TI*/ WB DB**	+	Natural log of geometric average of import and export cost (US$ per container): the higher the import cost, the higher trade costs.

* World Bank Trade Indicator Database, available at: http://info.worldbank.org/etools/wti/1a.asp ;
** World Bank Doing Business Data, available at: www.doingbusiness.org

We estimate the baseline CTC model using Ordinary Least Squares (OLS) with robust clustered standard error by country pair (model 1). As a robustness check, we also use Poisson Pseudo Maximum Likelihood (PPML) as an alternative estimator (model 3). A model of non-tariff comprehensive trade costs (NT-CTC), defined earlier, is also estimated using OLS and PPML to further confirm our results (model 2 and 4, respectively).[16]

All results are summarized in table 6.[17] We find that results are consistent across both the models and the estimation techniques. Signs (direction of effect) for all factors included in the model are fully consistent with expectations. All factors included have a statistically significant effect in all models, except for the investor protection indicator, which is found not to be significant in PPML models.

[15] Estimating the model using data only for India and Mekong countries is not feasible due to the limited number of observations available.
[16] Referring to the definition of NT-CTC provided earlier in the paper, since the tariff cost component has been extracted from CTC to calculate NT-CTC, the geometric average of bilateral tariffs is not included as an explanatory variable in the NT-CTC models.
[17] All the models in table 6 were estimated using data for the year 2006. As a robustness check, we also estimated these models for the years 2005 and 2007. The results are nearly identical, with the exception that, for the year 2007, investor protection indicator is always statistically insignificant.

Referring to model (1), which has the best fit of all 4 models presented in table 6 (R^2=56.7%), the results suggest that a 10% increase in the geographical distance between partner countries may increase comprehensive trade costs by 1.5%. Having a common border with a partner country also has a significant impact on trade cost and contributes to reducing them by approximately 13% on average.[18]

Table 6: Results of CTC and NT-CTC Model Estimations

Model:	(1)	(2)	(3)	(4)
VARIABLES	OLS:CTC:2006	OLS:NT-CTC:2006	PPML:CTC:2006	PPML:NT-CTC:2006
ln_dist	0.155***	0.150***	0.171***	0.164***
	[22.62]	[23.69]	[20.19]	[21.55]
contig	-0.138***	-0.144***	-0.166***	-0.169***
	[-4.793]	[-4.952]	[-5.233]	[-5.323]
comlang_off	-0.0205	-0.0182	-0.00432	-0.00296
	[-0.986]	[-0.876]	[-0.139]	[-0.0947]
ln_tariff_ij_ji_ga	0.579***		0.635***	
	[3.275]		[3.041]	
ln_lsci_ij	-0.183***	-0.183***	-0.203***	-0.202***
	[-18.76]	[-18.63]	[-16.78]	[-16.73]
ln_internetusers_per100ppl_ij	-0.0611***	-0.0539***	-0.0633***	-0.0583***
	[-6.418]	[-5.967]	[-5.407]	[-5.242]
getloan_creditinfo_ij	-0.0203***	-0.0197***	-0.0249***	-0.0244***
	[-4.814]	[-4.695]	[-5.113]	[-5.057]
investprotect_disclosure_ij	-0.00712**	-0.00668**	-0.00591	-0.00502
	[-2.418]	[-2.289]	[-1.627]	[-1.411]
contractenforce_steps_ij	0.00720***	0.00637***	0.00904***	0.00817***
	[3.978]	[3.564]	[3.677]	[3.396]
ln_trade_usd_ij	0.0810***	0.0812***	0.0954***	0.0908***
	[3.558]	[3.577]	[3.249]	[3.158]
Constant	-0.351*	-0.322*	-0.547**	-0.477*
	[-1.888]	[-1.715]	[-2.228]	[-1.960]
Observations	3,320	3,320	3,320	3,320
R-squared	0.569	0.523	0.481	0.441
Clustered SE	Country pair	Country pair	Country pair	Country pair
Adj. R-squared	0.567	0.522	.	.

Note: Dependent variable in (1) and (2) are ln(ctc) and ln(ctcxtariff) respectively; Dependent variable in (3) and (4) are ctc and ctcxtariff respectively

*** p<0.01, ** p<0.05, * p<0.1

t-stat. in square brackets

In terms of policy-related factors, average bilateral tariffs are found to be highly significant, with a 10% reduction implying an almost 6% change in comprehensive trade costs. A 10% improvement in the liner shipping connectivity index also potentially reduces trade costs by approximately 2%, while a 10% reduction in direct behind- and at-the border trade costs may reduce comprehensive trade costs by 1%. Improving ease of getting credit, protecting investors and enforcing contracts[19] could reduce CTC by at least 3%. Finally, the results suggest that a 10% improvement in the number of internet users could reduce CTC by an additional 0.6%.

The effects of the different factors on CTC mentioned above are actually based solely on the estimated elasticities of model (1). While these are broadly similar across models, they are only

[18] $e^{-0.138*1} - e^{-0.138*0} = e^{-0.138} - 1 = 0.1289 = 12.89\%$

[19] Improving each indicator by one discrete level (e.g., increasing the credit information quality and availability rating from 4 to 5).

valid for marginal changes in the value of the factor/indicator under consideration, and assuming all other factors remain constant. More importantly, improving one indicator by 1% (or 10%) may be much more difficult and costly than improving another by the same percentage, such that one cannot conclude that the policy indicator with the highest trade cost elasticity should be prioritized for action. It may therefore be more insightful to look instead at the contribution of each factor to the actual total variation of trade costs in our sample of countries.

Following Fields (2003), κ_h, the contribution (in percentage) of explanatory variable x_h to trade costs T_{ijt}, is defined as follows:

$$\kappa_h = \frac{\beta_h \operatorname{cov}(x_h, T_{ijt})}{\operatorname{var}(T_{ijt})}$$

where β_h denotes the estimated regression coefficient associated with x_h.

The contributions of each explanatory variable to CTC and NT-CTC are calculated using coefficient estimates in Model (1) and (3), respectively, and summarized in Table 7. Natural barriers contribute approximately 22 percent of the variation in trade costs, largely due to the effect of geographic distance between partner countries on trade costs. Trade-specific policies and facilitation measures included in the model, namely tariff, liner shipping connectivity (maritime logistics services), and direct factory-to-port and port-to-warehouse costs, explain approximately 20 percent of the variation in trade costs across countries.

Differences in maritime logistics services alone explain more than 16% of the variations in trade costs, suggesting the need to give highest priority to policies aimed at facilitating access to such services, including support to maritime infrastructure development and competition policy reforms. For landlocked countries, this result implies the importance for them to negotiate and implement effective transit arrangements with transit countries – inherently implying the need for them to also improve the quality and efficiency of their transport and logistics services.

Trade-related (but not trade-specific) behind-the-border business regulations, namely depth of credit information, extent of information disclosure and steps of contract enforcement, account together for nearly 7 percent of trade cost variations. More than half of the trade cost effect is accounted for by the *getting credit* indicator, providing support for the prioritization of behind-the-border policies and measures aimed at increasing the availability of trade finance, in particular through increasing transparency and availability of information on creditworthiness of exporters and trade partners. The *ease of enforcing contracts* is also found to have a relatively important effect on trade costs, while regulations to protect investors seem less important. These results are consistent with earlier empirical analyses on these effects on bilateral trade flows.[20]

[20] See Duval and Uthoktham (2010) for a brief review of that literature.

Table 7: Contribution of natural barriers, behind-the border facilitation and trade-related practice to trade costs

	(1)	(2)
"Natural" cost component		
Geographic distance (ln_dist)	20.4%	19.3%
Contiguity (Contig)	1.7%	1.9%
Common Official language (Comlang_off)	0.1%	0.1%
Tariff costs (ln_tariff_ij_ji_ga)	3.1%	
Non-tariff cost component:		
Maritime logistic services (ln_lsci_ij)	16.6%	17.9%
ICT services (ln_internetusers_per100ppl_ij)	7.2%	5.9%
Business regulatory environment		
Ease of getting credit (getloan_creditinfo_ij)	3.5%	3.4%
Investor protection (investprotect_disclosure_ij)	1.0%	1.0%
Ease of enforcing contract (contractenforce_steps_ij)	2.4%	1.9%
Direct factory-to-ship/ship-to-warehouse costs (ln_trade_usd_ij)	0.8%	0.9%
Total variation explained by Model	56.87%	52.32%
Unexplained variation	43.13%	47.68%

Differences in the use of ICT emerges as the second most important policy-related factor, accounting for more than 6% percent of trade costs variations across countries. This implies that policies and measures aimed at enhancing ICT infrastructure and services – and their usage through, e.g., education – should receive special attention in countries that want to facilitate trade. This result is broadly consistent with the existing literature, although IT services were identified in some previous studies as the most important policy-related factor for trade facilitation (e.g., Wilson, Mann and Otsuki, 2005).[21]

Differences in tariff rates account for about 3% of the variation in trade costs in our sample. This result gives support to the view that continued negotiations on reducing tariff rates may still be worthwhile even though tariff rates already came down significantly since the mid 1990s. It is indeed worth noting that the imposition of tariff not only create a direct cost amounting to the customs duties collected, but also create indirect trade costs in the form of additional documentation requirements and controls – both of which are included in CTC. Decreasing average tariff (assuming at least some tariff lines are brought to zero) may therefore be expected to have a multiplier effect on the reduction of CTC.

The direct cost of moving goods from/to factory to/from ship deck, including inland transportation, customs clearance and preparing documents, while significant, is found to ultimately only account for less than 1% of the variation in comprehensive trade costs. While the direct cost indicator used here has been used as a proxy for trade facilitation in general in gravity model exercises – due to its high correlation with other trade facilitation indicators (including trade time) - it can only reasonably be interpreted as direct trade cost in our trade cost modeling exercise. In that context, this finding is not fully surprising as these costs have been found to

[21] IT services were identified as the most important trade facilitation factor affecting bilateral trade flows in that gravity model-based study, followed by port efficiency.

account for less than 1% of the value of goods in developing countries of the region.[22] This result does not apply for landlocked countries, for which the cost of moving goods to or from a sea port located in a transit country can be extremely high, as they could not be included in our sample due to missing data for a number of factors – notably LSCI.

An important result of the analysis is also that almost half of the variation in comprehensive trade cost observed (43 to 48%) are not explained by any of the factors included in our model. This implicitly highlights the importance of indirect and hidden costs in overall international trade costs, e.g., the costs (risk premium) associated with uncertainties regarding the time and costs of the international trade transaction due to lack of transparent procedures, or those associated with the lack of the institutions and infrastructure needed to meet the regulatory and consumer requirements in the foreign partner country, such as recognized laboratories and quality certification institutions.[23] Disentangling – and modeling - these factors and their costs will remain a challenge given the dearth of appropriate proxies and indicators.

D. Non-tariff Policy-Related Trade Costs in the India-Mekong subregion

On the basis of the CTC model defined in equation (2), it is possible, by removing the tariff cost component as well as the "natural" cost component from CTC, to isolate the bilateral trade cost component that can be actually influenced by policy changes other than tariff cuts. Following Anderson and van Wincoop (2004) and Duval and Utoktham (2011), non-tariff policy-related trade costs are defined as:

$$PC^{nt} = \frac{CTC}{TC \times NC}$$

where
PC^{nt} refers to non-tariff policy-related trade costs
CTC refers to comprehensive trade costs
TC refers to tariff costs, which is defined as $tariff_{ij*ji}^{\beta_3}$
NC refers to "natural" geographical and cultural trade costs, which is defined as $Dist_{ij}^{\beta_1} e^{\beta_2 Cult_{ij}}$.

Using coefficient estimates of model (1), we calculate estimated non-tariff policy-related trade costs of India and Mekong countries (see table 8). We find that average PC^{nt} of India and Viet Nam with other countries in the India-Mekong subregion always exceed 50%.[24] The PC^{nt} of China-Thailand (41%), and to a lesser extent that of Thailand-Viet Nam (50%), are significantly lower than those of other subregional country pairs. This suggests that the set of policies implemented by Thailand has been more effective in reducing trade costs relative to that of other countries. Overall, however, the policy-related trade costs of all India-Mekong countries,

[22] See ARTNeT Working Papers No. 88, 89, 92, and 93 on improving regional trade procedures in various developing countries, December 2010 onward; available at www.artnetontrade.org.
[23] These unexplained variations may also be attributed in part to under and over-valuation of currencies, and exchange rate fluctuations. While this deserves further study, Duval and Utoktham (2011), do not find currency over/under-valuation of currency to have a significant effect on comprehensive trade costs since this factor has opposite effect on the import and export cost component of CTC.
[24] PC^{nt} as defined above may not be interpreted as a tariff-equivalent, but rather than an index whereby the higher the value of the index, the higher the level of policy-related trade costs, excluding tariff costs.

including Thailand, are found to be significantly higher than those of the United States of America (USA).

Table 8: Policy-Related Trade Costs (other than tariff costs) in India-Mekong Subregion (2006)

	India	China	Thailand	Viet Nam	Japan
China	0.55				
Thailand	0.54	0.41			
Viet Nam	0.57	0.54	0.50		
Japan	0.55	0.43	0.39	0.45	
USA	0.46	0.36	0.38	0.43	0.39

E. Conclusion and Recommendation for Future Research

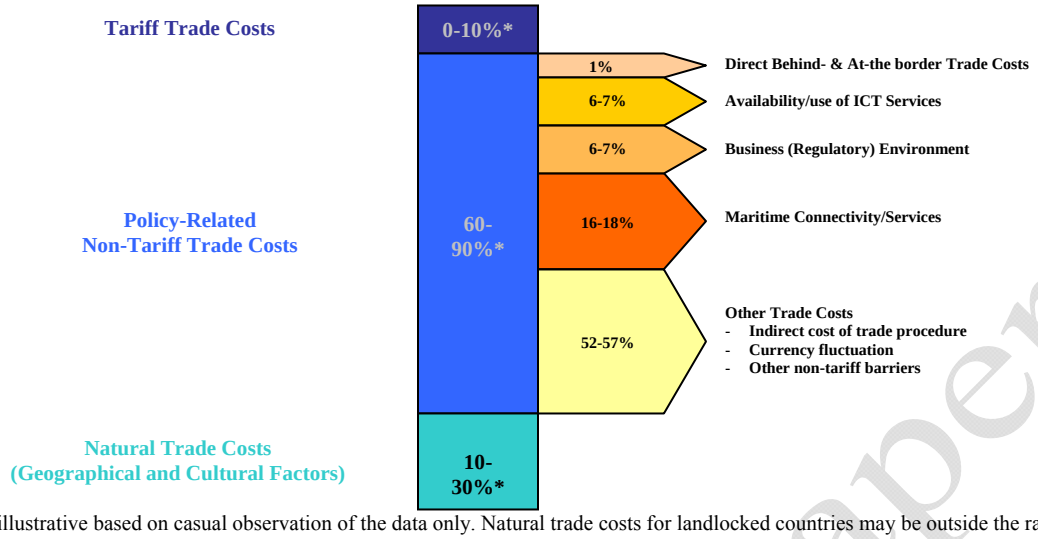
This paper explored the trade facilitation performance of India and Mekong countries using a new measure of bilateral comprehensive trade costs, complemented by a review of a selection of specific trade policy and trade facilitation-related indicators. A model of comprehensive trade costs was then developed and estimated using these specific indicators in an effort to identify policies and measures that have a significant effect on trade costs, and to prioritize them.

The trade costs between India and Mekong countries were found to be high: from 20% to 100% higher than those prevailing among Mekong countries. However, the fact that India, China, Thailand, and most of the other India-Mekong countries made more progress in reducing trade costs with each other than with developed countries such as Japan or the USA is encouraging, showing signs of slow but steady increase in regional connectivity.

Although non-tariff trade costs account for 90% of trade costs between countries, tariff cuts accounted for a significant portion of trade costs reduction between 2001 and 2008 as tariff were often cut by over 50% or more. The scope for further reduction in trade costs will therefore clearly depend on how effectively countries can tackle non-tariff trade costs in the future, hence the importance of determining policy-related factors that may affect them.

The results of our empirical analysis, aimed at determining which trade facilitation measures and policies could be most effective at reducing comprehensive trade costs, are summarized in figure 4. The analysis strongly suggested that improving access to efficient maritime services (liner shipping connectivity) as well as to information and communication technology facilities are essential to making progress. This is likely to be challenging in the least developed countries of the India-Mekong subregion given the financial cost associated with the development of the required hard infrastructure. However, policies aimed at liberalizing logistics and information technology services and increasing competition among service providers should be readily considered, with a view to maximizing efficiency at any given level of hard infrastructure development. Establishment of public-private partnerships to accelerate the development of the national information technology and the transport and logistics infrastructure may also be actively pursued. For landlocked Lao PDR, close cooperation with transit neighbors will remain essential in improving access to maritime services and bringing its trade costs to more competitive level.

Figure 4: Contribution of Various Policy-Related Factors on Changes in Trade Costs



*illustrative based on casual observation of the data only. Natural trade costs for landlocked countries may be outside the range shown for natural trade costs.

Our analysis also confirms that, given limited resources available, focusing on improving the overall business environment may be often more effective in facilitating trade than implementing soft measures solely targeted at speeding up movement of goods between factory and the port (or vice-versa). Measures to facilitate access to trade finance and financial services are found to be of particular importance in reducing trade costs and may therefore be prioritized.

In terms of future research, the results highlighted the importance of logistics and information technology services regulation as important "soft infrastructure" issues. More research on how these sectors are regulated, and how they may best be liberalized in countries at various stages of development, is needed as part of the development of integrated trade facilitation strategies aimed at delivering significant trade cost reductions. Within the India-Mekong subregion, an analysis of the experience of Thailand, and to a lesser extent, China, would be of particular interest as the two countries emerge as the best trade facilitation performers in the subregion.

The fact that nearly 50% of the comprehensive trade costs variation across county pairs could not be explained by differences in any of the factors included in our model suggest that the effect of other factors or policies will also need to be explored in future research, such as the costs associated with non-transparent and unclear procedures, exchange rate fluctuations, and also the more traditional non-tariff measures – and the inability to deliver products that meet regulatory as well as consumer requirements in the partner countries.

This study and the results and data presented are naturally subject to a number of limitations, some of which may be addressed in future research. First, the comprehensive bilateral trade cost measure presented in this study is by definition a highly aggregated measure. While we believe it has several advantages over other trade cost metrics available elsewhere – e.g., its theoretical foundation, its comprehensiveness, the fact that it is not based on perception data, but also its bilateral nature, providing unique insights on bilateral and intra-(sub)regional trade facilitation-, the fact that CTC is a composite of import and export costs that exist between two

trading partners make interpretation of the raw measure difficult at times.[25] This trade cost measure may also be affected by the underlying composition of trade of each country, such that calculating sectoral-level trade costs may be needed in order to increase comparability of CTC across countries. Identifying alternatives to using GDP (as done here in the absence of gross output) and/or refining ways to adjust for the related measurement bias against countries with large service sectors should also be considered in future research. Finally, alternative ways to decompose non-tariff trade costs into "natural" and non-tariff policy-related trade costs may need to be explored. Decomposing CTC in various cost components can be expected to remain challenging but is essential to deriving policy relevant implications.

[25] Although this may have made interpretation more difficult, we also avoided presenting the trade cost data in tariff-equivalent form, as we feel that the tariff-equivalent estimates may be misleading if compared with estimates in other studies using even slightly different methodologies and assumptions. Comprehensive trade costs and related measures are most useful to compare evolution of trade cost over time or across countries.

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Annex 1 - Derivation of Trade Cost Equation

Anderson and vanWincoop (2003) derived the micro-founded gravity equation with trade cost component as

$$x_{ij} = \frac{y_i y_j}{y^w}\left(\frac{t_{ij}}{\Pi_i P_j}\right)^{1-\sigma} \quad (1)$$

where x_{ij} denotes nominal exports from i to j; y_i and y_j denotes nominal income from country i and j respectively; y^w denotes world income; $\sigma>1$ denotes elasticity of substitution across goods; Π_i and P_j denotes price index of country I and j respectively; t_{ij} denotes bilateral trade costs (as one plus ad valorem term).

Anderson and van Wincoop (2003) defines Π_i and P_j as multilateral resistance term as those price indices incorporate average trade barriers with all other trading partners. Novy (2009) suggests the expression of intranational trade as

$$x_{ii} = \frac{y_i y_i}{y^w}\left(\frac{t_{ii}}{\Pi_i P_i}\right)^{1-\sigma} \quad (2)$$

where t_{ii} becomes intranational trade costs.

Re-arranging (2) as the product of multilateral resistance term as follows:

$$x_{ii} = \frac{y_i y_i}{y^w}\left(\frac{\Pi_i P}{t_{ii}}\right)^{\sigma-1}$$

$$(\Pi_i P_i)^{\sigma-1} = \frac{x_{ii} y^w}{y_i y_i} t_{ii}^{\sigma-1}$$

$$(\Pi_i P_i)^{\sigma-1} = \frac{x_{ii}/y_i}{y_i/y^w} t_{ii}^{\sigma-1}$$

$$\Pi_i P_i = \left(\frac{x_{ii}/y_i}{y_i/y^w}\right)^{\sigma-1} t_{ii} \quad (3)$$

In the same analogy, the opposite direction of trade flows in (1) can be written as

$$x_{ji} = \frac{y_j y_i}{y^w}\left(\frac{t_{ji}}{\Pi_j P_i}\right)^{1-\sigma} \quad (4)$$

Multiply (1) and (4) together and get

$$x_{ij}x_{ji} = \left(\frac{y_i y_j}{y^w}\right)^2 \left(\frac{t_{ij}t_{ji}}{\Pi_i \Pi_j P_i P_j}\right)^{1-\sigma}$$

Substitute the result from (3)

$$x_{ij}x_{ji} = \left(\frac{y_i y_j}{y^w}\right)^2 \left(\frac{\Pi_i \Pi_j P_i P_j}{t_{ij}t_{ji}}\right)^{\sigma-1}$$

$$x_{ij}x_{ji} = \left(\frac{y_i y_j}{y^w}\right)^2 \left(\frac{1}{t_{ij}t_{ji}}\right)^{\sigma-1} \left(\frac{x_{ii}/y_i}{y_i/y^w}\right) t_{ii}^{\sigma-1} \left(\frac{x_{jj}/y_j}{y_j/y^w}\right) t_{jj}^{\sigma-1}$$

$$x_{ij}x_{ji} = \left(\frac{t_{ii}t_{jj}}{t_{ij}t_{ji}}\right)^{\sigma-1} x_{ii}x_{jj}$$

$$\frac{x_{ij}x_{ji}}{x_{ii}x_{jj}} = \left(\frac{t_{ii}t_{jj}}{t_{ij}t_{ji}}\right)^{\sigma-1}$$

$$\left(\frac{t_{ij}t_{ji}}{t_{ii}t_{jj}}\right)^{\sigma-1} = \frac{x_{ii}x_{jj}}{x_{ij}x_{ji}}$$

Then, the product of bidirectional trade costs relative to the product of their intranational trade costs is equivalent to

$$\frac{t_{ij}t_{ji}}{t_{ii}t_{jj}} = \left(\frac{x_{ii}x_{jj}}{x_{ij}x_{ji}}\right)^{\frac{1}{\sigma-1}} \tag{5}$$

Therefore, geometric average of bilateral trade costs is defined as

$$T_{ij} = \left(\frac{t_{ij}t_{ji}}{t_{ii}t_{jj}}\right)^{\frac{1}{2}} = \left(\frac{x_{ii}x_{jj}}{x_{ij}x_{ji}}\right)^{\frac{1}{2(\sigma-1)}} \tag{6}$$

Tariff-equivalent term is done by deducting one from (6) and thus,

$$\tau_{ij} = \left(\frac{t_{ij}t_{ji}}{t_{ii}t_{jj}}\right)^{\frac{1}{2}} - 1 = \left(\frac{x_{ii}x_{jj}}{x_{ij}x_{ji}}\right)^{\frac{1}{2(\sigma-1)}} - 1 \tag{7}$$

Annex 2 – Countries Included in the Data Set

Asian and South Pacific Economies					Middle East	Africa
East and Northeast Asia	**Southeast Asia**	**South and Southwest Asia**	**North and Central Asia**	**South Pacific**		
China Hong Kong, China Japan Korea (Rep.of)	Brunei Indonesia Malaysia Philippines Singapore Thailand Viet Nam	Bangladesh India Iran Maldives Pakistan Sri Lanka Turkey	Georgia Russian Fed.	Vanuatu	Israel Oman Yemen	Cameroon Mozambique Namibia South Africa
AUS-NZL	**EU25 Members**			**Europe-others**	**North America**	**Other America**
Australia New Zealand	Belgium Czech Rep. Denmark Estonia Finland France Germany	Greece Ireland Italy Latvia Lithuania Netherlands	Poland Portugal Slovenia Spain Sweden United Kingdom	Bulgaria Croatia Iceland Norway Romania Switzerland	Canada Mexico United States	Argentina Brazil Chile Colombia Dominican Rep. Nicaragua