

South Asia's Trade

A Review of Policies and Logistics

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1. Introduction

Today's markets place high value on speed and certainty in delivery.¹ Time is not only critical for perishable agriculture and high-fashion textiles, but extensive fragmentation of production chains across national boundaries implies greater need for just-in-time intermediates.² While South Asia enjoys expertise in producing textiles and manufacturing products at competitive prices, slow delivery undermines gaining greater market shares and becomes a source of downside risk. It takes Bangladesh 25 days to process exports, while the same procedures take 21 days in PRC and 14 days in Thailand. Table 1 shows that South Asia ranks the lowest following Sub-Saharan Africa. Naturally, when competing regions ensure faster delivery, they are likely to attract greater outsourcing of business contracts, inherently changing relative notions of comparative advantage.

2. Trade Facilitation in South Asia

2.1 Time and Cost Indicators of TF in South Asia

While South Asia's trade has grown very quickly in the past few decades, trade-related infrastructural investments have remained low. Inadequate amenities today poses high time and monetary cost burden on trade flows. In particular, slow delivery undermines gaining greater market shares in exports and higher costs in transactions keeps prices high. Table 1 presents time and cost components of trading across borders across various regions. After Sub-Saharan Africa, South Asia bears the highest costs in trade, taking 27 days on average to complete procedures related to trading, along with high transactions costs. Although labor and low-technology capital costs are lower in developing regions, inadequacy of infrastructure and lack of competition among service providers pushes costs upwards.

Table1. Trading Time and Costs across Regions

Region	Time* (in Days)		Costs** (in USD)	
	Exp	Imp	Exp	Imp
East Asia & Pacific	23	24	909	953
Europe & Central Asia	25	27	1544	1714
High income: OECD	10	10	1055	1117
Latin Am. & Caribbean	19	21	1244	1481
Middle East & North Africa	22	25	1045	1221
South Asia	27	27	1364	1509
Sub-Saharan Africa	34	40	1958	2391

*This includes total time for tradables to complete procedural requirements for trading, and includes waiting time and inland transportation. Particularly, time to export begins from the producer gate till goods are loaded onto ships; time to import starts from unloading until goods complete legal formalities and reach destination markets or firms. **This includes costs for acquiring trading services, such as, warehouse rentals, terminal handling services, assembly, and transportation costs. This includes total estimated costs of trade-related legal procedures (excluding illegal costs) for twenty-foot container.

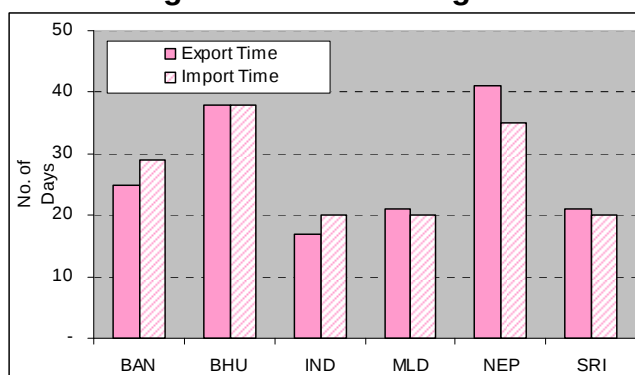
Source: *Doing Business Survey 2010*, World Bank.

¹ Hummels, David (2001). "Time as Trade Barrier". *GTAP Working Paper* 1152. Purdue University.

² Deardorff, Alan V. (1998). "Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World". *The Regionalization of the World Economy*, Cambridge, MA: NBER.

The natural question that follows is what is slowing down response time in South Asia? Do we need to expand highways to increase speed of vehicles, build additional ports to ease queues for shipments, or reduce paperwork required for trading? We first begin by providing a unique perspective on the various aspects of border procedures that bids up time in transactions. A glance at trading time (Figure 1) illustrates that least developing economies perform worse than others. Bhutan and Nepal being the only two landlocked countries with mountainous landscape spends considerable time in transit. Bangladesh and Sri Lanka spend long hours for the release of trading documents. As generally acknowledged, inadequate air and maritime port infrastructure, fewer cross-country highways and railways, and bottlenecks at transit corridors are major impediments to South Asia's trade. (Wilson and Otsuki, 2007).

Figure1. Total Trading Time



Source: Doing Business Survey 2010, World Bank (WB).

Complementing the literature that presents aggregate measures on total trading time, we present new data on time spent on various procedures at the borders. Here we investigate which of the procedural requirements are most costly in terms of time. The data for disaggregated procedures are available only until 2007. We compute shares from the 2007 data to split aggregated time data in 2010.

Figure2. Trading Time to Export, by Procedure

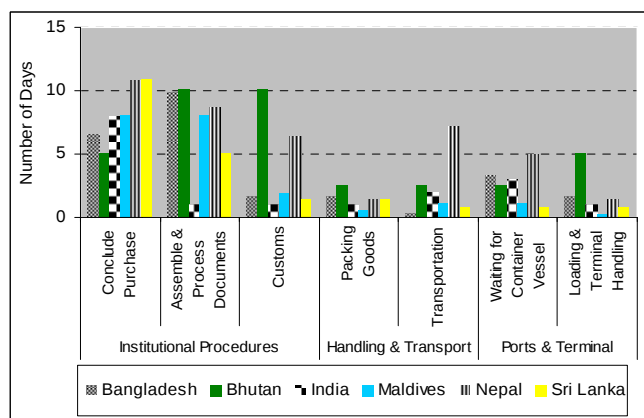
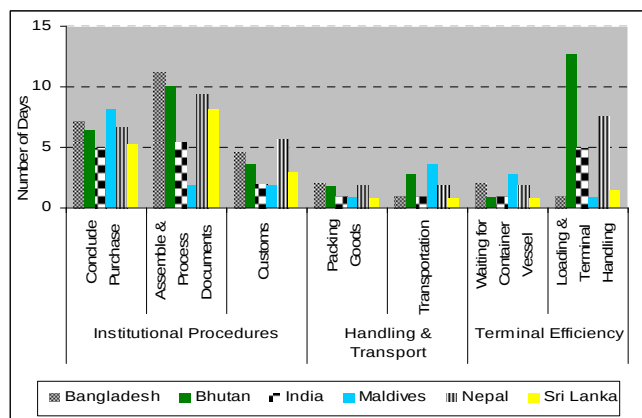


Figure3. Trading Time to Import, by Procedure



Figures 2 and 3 categorize these into time spent on completing legal procedures, handling and transportation, and ports and terminals. South Asia on average takes 19 days to complete legal procedures that involve the processing of documents and customs clearance. All countries rank relatively lower in the finalization of purchase and assembly of documents; Bhutan and Nepal

takes as long as 10 and 6 days for clearing customs. Time spent on the remaining activities is relatively smaller, but still large if internationally compared. South Asia spends on average 5 days at ports and terminal, of which more than half of the time is spent on simply waiting for a container vessel.

Institutional procedures that oversee the arrangement and processing of documents for importing goods are equally lengthy. Nearly 60-80% of the time is spent on legal formalities rather than in the physical handling and transportation of goods. One interesting observation is that Bangladesh takes much longer to clear import goods through customs, relative to exporting goods. These artificially constructed barriers demonstrate a clear discrimination in administrative practices that seemingly advocates domestic protection.

In fact, trade through South Asia requires completing the largest number of documents relative to any other region in the world. Much of the delays arise simply from lack of procedural requirements as opposed to the physical or high-technology infrastructure (Roy and Banerjee, 2008). For instance, non-tariff barriers include dispute over the classification of goods, requirement of chemical tests, customs valuation, non-acceptance of certificates of rules of origin, permits and license requirements, imposition of countervailing and anti-dumping duties, sanitary and phytosanitary measures, and more. These suggest that simplification of procedures involving stronger institutions and efficient procedures may become the corner stone of freer trade.

2.2. Trade in South Asia

South Asia does not trade much with the rest of the world, accounting for only 2% of total world trade. Intra-regional trade accounts for only 3.4% of total trade in South Asia, with particularly small shares for India and Bangladesh. While aggregate levels are small, trade in South Asia has been growing rapidly in the past decades. The signing of many bilateral and multilateral trade agreements has largely lowered tariff costs. Nearly, one-third of South Asia's exports comprises of textiles and apparel, with even larger shares in Bangladesh (75%) (World Bank, 2010). While the availability of low-cost labor brings a competitive edge in production, higher costs at the borders imply that only the lower valued products (where the time premium is insignificant) reach global markets. This results in an effective barrier to market access for many potential firms.

With a growing emphasis on trade facilitation, the region is taking significant initiatives to mobilize resources that can facilitate trade. Recently, the private sectors have also become involved that has facilitated the provision of internationally competitive services. For instance, the use of electronic data exchange (EDI) and paperless transactions have become widespread in South Asia (Domus, 2005). Recently, the Maldivian Customs and Re-engineering Program launched a major modernization project that identifies bottlenecks and redesigns operations systems (Maldives Customs Service, 2009). Growing at a rate of 8-12% annually, National Highways in India have expanded largely, carrying 40% of India's passenger and freight traffic; connecting major cities to industries and ports, it is said to be designing India's 'Grey Revolution' following on the 'Green Revolution' of the 1960s (World Highways, Feb 2007).

Despite significant progress in some aspects, there are a number of areas where greater investments are needed. Examples include regional corridors that form the gateway for goods in transit, as well as intraregional trade. At the regional level, countries may cooperate to reform

policies and systems at a few critical ports of entry, such as Birgunj for Nepal and India, and Benapole for Bangladesh and India. Table 2 shows that much more time is required to move goods through the Kolkata port relative to the port of Colombo. It costs US\$1300 more to ship a carpet from Nepal to Europe through Kolkata rather than Mumbai illustrating high costs at transport corridors. On a similar note, lack of well-integrated rail and road networks across the region and non-cooperation in transit permits lead to a loss in connectivity across the region. Increasing multimodal linkages, facilitating low-cost transshipment facilities, and improving administration to avoid rent-seeking, will greatly ease pressure. Another central facility in critical need of modernization is the Chittagong Port (CP). This port handles about 90% of Bangladesh's total shipments. CP charges unusually high costs for services, and suffers high congestion and delays resulting from operational inefficiencies. These examples are illustrative of some of the existing complexities faced by traders across borders.

Table2. Transport Time via Transshipment Hubs (Number of Days)

Region	From Kolkata	From Colombo
North Europe	25-32	13-20
US East Coast	36-41	26-29
Mediterranean	24-29	12-17

Source: Arnold, J. 2007. The Role of Trade Facilitation in Export Growth. *South Asia: Growth and Regional Integration*. Washington, D.C., World Bank.

In contrast to South Asia, East Asia has made significant progress in recent years. As one of the top reformers, the PRC, Hong Kong, the Republic of Korea, and Singapore have implemented public-private partnerships to accelerate trading processes by using paper free electronic data interchange system and pre-arrival customs declaration, arbitrary inspection of products, improving and expanding port and berthing facilities, to name a few³. In fact the cost of completing importing procedures for a 20-foot container in East Asia is now only, US\$950, even less than high income OECD economies of US\$1050. PRC is the fourth most important maritime state in the world commanding large volumes of merchant fleet.⁴ Improved infrastructure largely increased potentials for trade giving countries in East Asia a greater momentum for sustained growth.

2.3 Validating Causality

In this section we apply empirical techniques to predict the relationship between the duration of procedures and the volume of trade. Particularly, we estimate the importance of time as a trade barrier, and to what extent reducing time may expand bilateral trade. To increase our confidence on the precision of the estimated elasticity, we use a range of econometric methodologies and establish consistency. (For a more detailed explanation see Technical Appendix).

The first column in Table 3 shows results from the ordinary least squares estimation (OLS). The elasticity of trade with respect to exporting time is estimated to be -0.43. This implies that

³ Strachan, A. 2009. Beyond Investment: Engaging the Private Sector in Trade Facilitation. International Forum on Advising, Empowering and Inspiring Trade, International Trade Center, 4.

⁴ Review of Maritime Transport 2007. United Nations Conference on Trade and Development (UNCTAD).

reducing time at the exporter's border by 10% increases bilateral trade between any pair of countries by 4.3%. The trade-increasing effect of importer's reforms is estimated to be -0.20. Comparing standardized coefficients suggest that reforms are likely to have larger impacts on exports rather than imports. This is consistent with earlier findings in the literature, and implies that improvements in border efficiency are likely to induce more domestic producers to export rather than induce more domestic producers to import intermediates or consumers to import.

For other variables, coefficient estimates are consistent with expectations and are statistically significant at the 1 % level⁵. As expected, GDP has a positive and significantly high impact on merchandise trade. The coefficient for distance is negative and highly significant indicating that if countries are further apart by 10% the value of merchandise trade would decrease by around 10%. Coefficient estimates for the dummies of landlocked (-0.15), common language (0.76) and common border (1.36) have the expected signs, and their magnitudes closely correspond with those estimated in the literature. The regression also has a reasonably large explanatory power with an R^2 of 0.82.

Table3. Regression Results with Models Using Time (as a proxy for trade facilitation measures)

Dependent Variable: Ln Trade		Using Original	Using Trading Time	
		Trading Time	covariates derived from PCA	
		covariates	PCR	IV
		OLS		
Ln Exp Time		-0.43	-0.41	-0.45
Ln Imp Time		-0.20	-0.27	-0.18
Ln Size		1.12	1.06	1.06
Ln Income		-0.05	-0.17	-0.16
Ln Tariff		-2.60	-2.19	-2.56
Ln Distance		-1.00	-0.94	-0.95
Landlocked		-0.15	-0.08	-0.00
Common Language		0.76	0.78	0.74
Border		1.37	1.35	1.40
Constant		-11.4	-10.7	-10.5
R-squared		0.82	0.82	0.82

Note: Number of observations: 4445

All continuous variables are log transformed and are statistically significant at the 1% level, except for Income in OLS, and Landlocked in PCR and IV;

Source: Staff estimates.

To account for potential biases related to measurement error and reverse causality we re-estimate the model using two alternative techniques. A new index is created to minimize noise in the data using the principal components analysis; this index is used to conduct the principal component regression (PCR) and the instrumental variables regression (IV)⁶. As shown in the second and third columns of Table 3, the elasticity estimates are close to previous estimates (-

⁵ Only income is not significant, partly due to high correlation with time.

⁶ Technical information regarding each methodology is detailed in the Appendix.

0.41, -0.45 for exporter's effect, and -0.27, -0.18 for importer's effects). Finding similar estimates across a range of techniques⁷ significantly increases our confidence in the magnitude of the estimate. Given the robustness of these estimates, we use these to project gains on South Asia's trade.

2.4 Estimating Benefits from Improved Trade Facilitation

Reducing Time to Trade

Given scarce economic resources, governments should prioritize areas where investments will reap maximum benefits. In this section, we identify which trade facilitation components should governments be focusing on. The simulation exercises focus on three areas of logistics: (i) institutional procedures, (ii) handling and transportation, and (iii) ports and terminals. Three policy simulations are analyzed, namely Policy 1: all individual South Asia countries meet the average level across the region; Policy 2: all individual South Asia countries reach the average level as in East Asia and the Pacific⁸; and Policy 3: all individual South Asia countries reach halfway up to best practices in East Asia and the Pacific.

Using the estimated elasticity discussed in Section IV, and assuming it remains the same across individual components⁹, we estimate gains in trade as shown in Table 4. Gains are much larger from institutional reforms for exports than investments in any other dimension. This is reflective of the fact that variability in performance across countries is the largest for institutional procedures, this being the major weakness in South Asia. Countries on average may gain up to 6% additional exports from creating stronger institutions at borders. All countries could gain tremendously from the prompt processing of documents. Simulation results predict impacts to be much smaller for handling and transport and terminal efficiency.¹⁰

Table4. Estimated Trade Gains (%) from Improving Time Efficiency up to the Average Level in South Asia (Policy 1)

Country	Institutional Procedures		Handling & Transport		Terminal Efficiency	
	Exp	Imp	Exp	Imp	Exp	Imp
Bangladesh	5	4	-	-	1	-
Bhutan	13	2	2	7	4	1
India	2	-	-	-	2	-
Maldives	2	2	-	-	-	4
Nepal	6	3	8	2	2	-
Sri Lanka	7	-	-	-	-	-
<i>Average</i>	<i>6</i>	<i>2</i>	<i>2</i>	<i>2</i>	<i>2</i>	<i>1</i>

Source: Staff estimates. Note: Dash (-) indicates that the country already enjoys as good as or better than average practices

Turning to the other policy simulations, on average South Asia may increase exports up to 17% from institutional reforms for Policy 2 and 18% for Policy 3 respectively (Table 5). Impacts on trade from handling, transport, and terminal reforms are much smaller in magnitude. The main

⁷ The methodology of using the PCA technique to combine disaggregated indicators of TF is a new contribution to this literature

⁸ Following the World Bank definition of regional categories, East Asia and the Pacific comprises PRC, Fiji, Hong Kong, Indonesia, Kiribati, Malaysia, Marshall Islands, Micronesia, Mongolia, Palau, Philippines, Samoa, Singapore, Taiwan, Thailand, Tonga, and Vanuatu.

⁹ Including each of these variables in a regression is likely to lead to biased estimates due to multi-collinearity.

¹⁰ It is worth noting that trade impacts are expected to be even larger than those estimated here, because trade is not only expected to increase in volumes of existing products, but lowering costs will also allow new products to enter the market for which trade was initially non-existent.

meSAGE is that trade gains are largest from institutional reforms and this is corroborated across the alternative scenarios considered.

Table5. Estimated Trade Gains (%) from Alternative Policies (2 and 3), SA Average ¹¹

Country	Institutional Procedures		Handling & Transport		Terminal Efficiency	
	Exp	Imp	Exp	Imp	Exp	Imp
Policy 2	17	6	1	3	3	1
Policy 3	18	7	1	2	2	1

Source: Staff estimates.

Reducing Costs of Trade

We also estimate the effects of reducing costs of fees and charges at the borders for the provision of services and amenities. Costs are measured in US dollars for a twenty-foot container of traded goods. We employ the same trade model as in Section IV, except time measures of efficiency are now replaced with cost measures.

Table6. Regression Results with Models Using Cost (as a proxy for trade facilitation measures)

Dependent Variable:		Using Original Trading Cost covariates	Using Trading Cost covariates derived from PCA	
		OLS	PCR	IV
Ln Exporter Cost		-0.64	-0.53	-0.65
Ln Importer Cost		-0.37	-0.62	-0.08
Ln Size		1.13	0.97	1.03
Ln Income		0.00	-0.06	-0.02
Ln Tariff		-2.19	-1.49	-2.59
Ln Distance		-0.99	-0.89	-0.93
Landlocked		0.05	0.39	0.06
Common Language		0.90	1.05	0.93
Border		1.35	0.99	1.16
Constant		-7.29	-	-
			11.12	12.37
R-squared		0.81	0.84	0.83

Source: Staff estimates. Note: Number of observations: 4470

All continuous variables are log transformed and are statistically significant at the 1% level, except for Income in OLS and IV, Importer cost and Landlocked in IV.

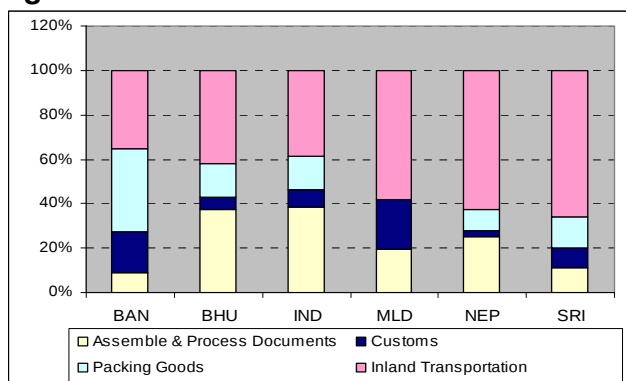
Results suggest that the elasticity of trade with respect to exporting cost is estimated to be -0.64, implying that reducing cost at the exporter's border by 10% increases bilateral trade between any pair of countries by 6.4% (Table 6). The trade-increasing effect of importer's

¹¹ See Appendix Tables 2 and 3 for impacts across countries

reforms is estimated to be -0.37.¹² Once again, the gains on exports outweigh gains on imports suggesting that trade costs have a higher incidence on the decision to export rather than on the decision to import.

Figure 4 shows the contribution of various procedures on total costs of exporting across countries. This time we see that variable costs are larger for non-institutional procedures¹³. For Bangladesh, Nepal and Sri Lanka costs for handling and transportation take more than 70% of total costs. High variable costs are indicative of two issues. First, lower investments result in poor quality of infrastructure; building efficient transport networks and terminal facilities are likely to reduce per unit costs of tradeables. Secondly, as facilities are administered within the public domain these tend to operate as state-monopolies resulting in large inefficiencies and limited market competition keeping prices high.

Figure4. Cost Shares of Border Procedures



Source: Doing Business Survey 2010, World Bank.

Table 7 shows projections for attaining the average level of costs in South Asia (Policy 1). Here the gains from handling and transport reforms could also be substantial, particularly for the least developing economies of Bangladesh, Maldives and Nepal. On average gains from handling and transportation reforms are larger than gains from institutional reforms. India and Sri Lanka already enjoy better than average costs, and so no reforms are needed here.

Table7. Estimated Trade Gains (%) from Reduced Direct Costs using Average Level in South Asia (Policy 1)

Country	Institutional Procedures		Handling & Transport	
	Exp	Imp	Exp	Imp
Bangladesh	4	3	16	6
Bhutan	10	6	1	13
India	6	2	-	-
Maldives	10	-	10	21
Nepal	6	4	25	5
Sri Lanka	-	4	-	-
<i>Average</i>	6	3	9	8

Source: Staff estimates. Note: Dash (-) indicates that the country already enjoys the average level in the region.

¹² Coefficient estimates are less robust across methodologies in this model. This may result from larger noise in the time data. We use the OLS estimates for simulations.

¹³ It is still important to remember that the largest share of the monetary costs of institutional procedures are through illegal practices, as such it will not appear in this dataset.

We also look at the alternative reform scenarios for cost measures (Table 8). In each case, trade gains are relatively larger for reducing costs of terminal handling and inland transportation. These suggest that gains from fixed investments that lower costs will also be large.

Table 8. Estimated Trade Gains (%) from Alternative Policies (2 and 3), SA Average¹⁴

Country	Institutional Procedures		Handling & Transport	
	Exp	Imp	Exp	Imp
Policy 2	12	8	12	15
Policy 3	11	7	20	12

Source: Staff estimates.

To better understand the relative gains from time vs. cost reforms, we compare export gains from Policy 1 reforms in Figures 5 (Institutional reforms) and 6 (Handling and Transportation reforms). Time gains are more effective than cost gains for institutional reforms in Bangladesh, Bhutan and Sri Lanka. As such, these countries should focus on reducing time loss at borders from the assembly and processing of documents. For the case of handling and transportation, gains from cost reductions are larger for all countries. This means that infrastructural reforms that reduce variable costs will be more effective. This provides a useful comparison of how trade impacts from time vs. cost reforms may vary across procedures, and hence needs to be well-targeted.

Figure 5. Trade Gains (%) from Institutional Reforms (Time vs. Costs)

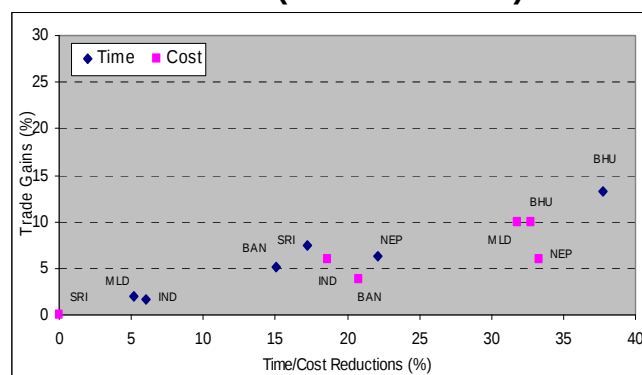
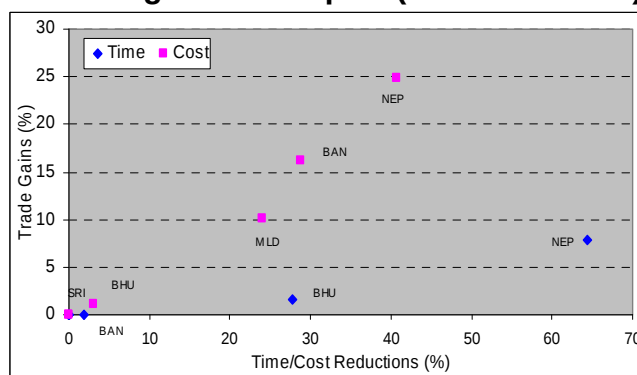


Figure 6. Trade Gains (%) from Reforms in Handling and Transport (Time vs. Costs)



Source: Authors' estimates.

4 Conclusion

While the world has become more integrated with quickly and strongly developing trade relations, South Asia has little participation (2%) in the profound global trading network. A growing literature suggests that a large part of aloofness comes from inadequacies in infrastructure and logistics facilities that bids up border trading costs. A variety of techniques in research find consistent estimates on trade expansions. These papers, however, assume exogenous increases to productivity that is free-of-cost. This only provides a partial analysis of the benefits of reforms without fully understanding the cost story. This paper provides structure

¹⁴ See Appendix Tables 4 and 5 for impacts across countries

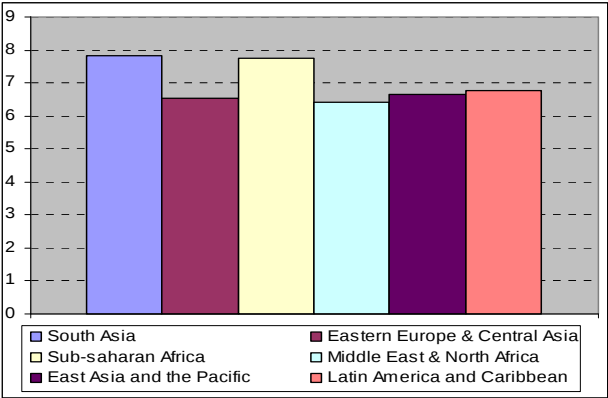
to the costs of facilitation reforms that sheds more light on why trade facilitation falters in regions such as South Asia and other similar developing countries.

The paper designs a framework to analyze impacts of trade facilitation reforms using a many-country, many-sector, general equilibrium framework. It extends the GTAP-based model and database by developing additional data to characterize investments in trading facilities. Taking a step beyond existing papers in CGE it integrates costs of reforms, and naturally overcomes ‘exogenous’ technology improvements, providing a comprehensive analysis of costs and benefits. Two scenarios are explored for funding schemes of project development in SA: i) private investments and aid-providing international institutions; and ii) funding from the national budget. Results indicate that returns to initial investments in trading capacity have positive long-term benefits that largely exceed costs, even when SA self-funds projects. With a benefit-cost ratio of 2, in the case of internal funds, border reforms are largely profitable in terms of trade and economic growth opportunities. Nevertheless, costs of reforms are steep for SA, a region with low income and high poverty rates. For every hundred dollars invested in capital goods, the regional household must forego 85 dollars in direct consumption. With limitations to funding policymakers in SA should consider alternative development schemes, such as commercialization of facilities that may open paths for trading opportunities in SA.

3 Policy Recommendations

This Flashnote highlights that in order to reduce export processing time priority should focus on institutional reforms in South Asia. The region lags behind most in the competency of the assembly and processing of documents that quickly bids up time spent at the borders. Figure 7 illustrates that South Asia requires more documents¹⁵ than others, despite the widespread use of Electronic Data Interchange (EDI). The region has a long way to go to streamline administrative procedures and enhance transparency to meet global standards. Given the limited resources are available to build high quality infrastructure and trading facilities in the region, policy efforts can be directed at improving other equally-important areas of trade facilitation that require low investment such as streamlining institutional procedures.

Figure7. Number of Documents Required to Export



Source: Doing Business Survey 2010, World Bank.

South Asia may also learn from the success stories of similar developing regions where major reforms have opened doors for larger trading opportunities. Trade and transport corridor reforms of Central Asia Regional Economic Cooperation (CAREC) and Greater Mekong Sub-region (GMS) are two great

¹⁵ Documents include bank documents, custom declaration and clearance documents port filling documents, import licenses and other official documents exchanged between the concerned parties.

examples. Some of CAREC's program efforts include simplifying customs processes using the single window, establishing joint customs that process both export and import country documents simultaneously, and compiling forms under a single administration. Likewise, the mobilization of land and water corridors in GMS resulted in substantial reductions in trading time, increases in border crossing up to 50%, and increases in trade up to 40%¹⁶. The planning, implementation and evaluation of these projects could serve as a blueprint for South Asia to design various reform agendas.

The South Asian Free Trade Area (SAFTA) has already highlighted some of these issues and has taken into consideration a number of customs-related measures including simplification and harmonization of customs clearance procedure, national customs classification based on Harmonized System (HS) coding system, customs cooperation to resolve dispute at customs entry points, and import licensing and registration procedures.¹⁷ However, implementing such measures remains a challenge for a region hurdled with political conflicts and economic constraints (i.e. narrow export bases). If South Asia were to implement these trade facilitation measures, unilateral trade efforts, in conjunction with regional cooperation, would be strengthened. In particular, India (being the dominant economy on intraregional trade in South Asia) may be able to leverage investments in the neighboring developing countries.

VII. Conclusion

South Asia has large opportunities for trade growth from reforms in trade-related procedures at borders. Improving speed in delivery by reducing time spent on documents and legal formalities reaps the largest benefits in terms of trade gains. As such strengthening institutions at borders should become the first step for facilitating trade reforms in South Asia.

4. Technical Notes

In this Flashnote, we evaluate the effect of trade facilitation on global trade flows using a cross-sectional gravity model with data on 94 countries (Appendix Table1) for the year 2004.

Using log-linearized forms of the equation, the model can be formalized as follow:

$$\ln trade_{xm} = \beta_0 + \beta_1 \ln Logis_x + \beta_2 \ln Logis_m + \beta_3 \ln GDP_x + \beta_4 \ln GDP_m + \beta_5 \ln GDPpc_x + \beta_6 \ln GDPpc_m + \beta_7 \ln \tau_{xm} + \beta_8 \ln Dist_{xm} + \beta_9 Landl_{xm} + \beta_{10} Com_Lang_{xm} + \beta_{11} Com_Bor_{xm} + \varepsilon$$

The subscript x , denotes the exporting country and the m denotes the importing country. $Trade_{xm}$ represents merchandise trade at *cif* prices and is aggregated over all merchandise for the year 2004. $Logis$ represents trade facilitation. Time and cost to trade goods between two partner countries are used as proxies for trade facilitation measures. $GDP_x GDP_m$ represents country size and is the product of real GDPs of the two partner countries. $GDPpc_x GDPpc_m$ represents income and is the product of real GDP per capita of the trading countries. τ_{xm} represents the bilateral preferential tariff rate aggregated for all goods weighted by trade. In addition to tariffs, we include a set of bilateral variables in the model which may affect trade: distance, dummies for landlockedness, common border and language. $Dist$ is the geographical distance from x th country to m th country. $Landl$ represents landlockedness. Common language and common border are denoted by Com_Lang and Com_Bor respectively.

Appendix Table1. Variable Data Source

Variable	Source
Trade ($Trade_{xm}$)	Global Trade Analysis Project (GTAP) version 7, originally from United Nations Commodity Trade Statistics Database (UN

¹⁶ ADB. 2007. Midterm Review of the Greater Mekong Subregion Strategic Framework, 2002-2012.

¹⁷ Weerahewa, Jeevika. 2009. Impact of Trade Facilitation Measures and Regional Trade Agreements on food and Agricultural Trade in South Asia. *Asia-Pacific Research and Training Network on Trade*, Working Paper Series no. 9.

Comtrade)	
Trade facilitation ($Logis_x, Logis_m$)	Doing Business Survey 2010, World Bank (WB).
Real GDP (GDP_x, GDP_m) and Real GDP per capita ($GDPpc_x, GDPpc_m$)	World Development Indicators (WDI), World Bank (WB)
Bilateral tariff(τ_{xm})	Market Access Maps (MacMap), United Nations Conference on Trade and Development (UNCTAD); originally from the database CEPII of the French Research Center in International Economics
Geographical Distance ($Dist_{xm}$)	Central Intelligence Agency (CIA), The World Factbook
Dummy variables: landlocked ($Landl_{xm}$); language (Com_Lang_{xm}), and border (Com_Bor_{xm})	Central Intelligence Agency (CIA), the World Factbook

The models were initially estimated using Ordinary Least Square (OLS) using corrections for heteroskedasticity. OLS could however suffer biases from measurement errors or reverse causality.¹⁸ We minimize measurement error by constructing a new index on trading time from disaggregated components using the principal component analysis (PCA) method. This involves estimating a new set of orthogonal variables that characterize diminishing correlation with the dependent variable. In the second method, the Principal Component Regression (PCR) estimates consistent estimates by taking the first score; this reduces noise across individual components and maximizes correlation with the dependent variable.

One caveat that has received attention in the literature is the presence of bidirectional causality in conventional gravity models.¹⁹ The model suggests that not only slow procedures reduce trade, but the possibility of low trade may be a reason for inadequate infrastructure. In the third method, we account for this by re-estimating our model with two-stage least squares (2SLS) regression using appropriate instrumental variables (IVs).²⁰

Because we found no significant deviations across different specifications, we used the estimated elasticity derived from OLS for the simulation exercises. Three simulation experiments were done assuming that South Asian countries improve their trade facilitation up to (i) average level in South Asia (Policy 1); (ii) average level in East Asia (Policy 2); and (iii) halfway up to the best performer in East Asia (Policy 3), while keeping all other factors affecting value of trade at all constant levels. These three simulations were also replicated using cost measures of trade facilitation.

Appendix Table2. Estimated Trade Gains (%) from Improving Time Efficiency using Average Level in East Asia and the Pacific (Policy 2)

Country	Institutional Procedures		Handling & Transport		Terminal Efficiency	
	Exp	Imp	Exp	Imp	Exp	Imp
Bangladesh	14	10	-	-	4	-
Bhutan	22	7	-	9	6	1
India	10	1	-	3	5	-
Maldives	17	3	-	-	-	4

¹⁸ Perrson, Maria (2007). "Trade Facilitation and the EU-ACP Economic Partnership Agreements: Who Has the Most to Gain?" GTAP Conference 2007, Purdue University.

¹⁹ Hertel, T. and T. Mirza. 2010. Analyzing the Effects of Trade Facilitation on International Trade using a Simultaneous Approach. *Mimeo*, Purdue University.

²⁰ Instrumental variables used for trade facilitation include 'Corruption Perceptions Index' as a measure of governance (data from Transparency International); costs of borrowing by the private and public sectors (data from Global Market Information Database (GMID)); and national deficit, standardized by GDP levels (data from GMID).

Nepal	20	7	6	3	4	-
Sri Lanka	16	6	-	-	-	-
<i>Average</i>	<i>17</i>	<i>6</i>	<i>1</i>	<i>3</i>	<i>3</i>	<i>1</i>

Note: Following the World Bank definition of regional categories, East Asia and the Pacific comprises PRC, Fiji, Hong Kong, Indonesia, Kiribati, Malaysia, Marshall Islands, Micronesia, Mongolia, Palau, Philippines, Samoa, Singapore, Taiwan, Thailand, Tonga, and Vanuatu
Dash (-) indicates that the country already enjoys best practices in the region

Source: Staff estimates.

Appendix Table3. Estimated Trade Gains (%) from Improving Time Efficiency Half-way up to Best Practices in East Asia and the Pacific (Policy 3)

Country	Institutional Procedures		Handling & Transport		Terminal Efficiency	
	Exp	Imp	Exp	Imp	Exp	Imp
Bangladesh	18	9	-	-	3	1
Bhutan	17	7	2	5	4	1
India	13	6	-	2	4	-
Maldives	22	5	-	-	-	3
Nepal	16	7	4	2	3	1
Sri Lanka	21	9	-	-	-	-
<i>Average</i>	<i>18</i>	<i>7</i>	<i>1</i>	<i>2</i>	<i>2</i>	<i>1</i>

Note: Dash (-) indicates that the country already enjoys best practices in the region
Source: Staff estimates.

Appendix Table4. Estimated Trade Gains (%) from Reduced Direct Costs up to the Average Level in East Asia and the Pacific, (Policy 2)

Country	Institutional Procedures		Handling & Transport	
	Exp	Imp	Exp	Imp
Bangladesh	3	7	9	11
Bhutan	22	9	4	23
India	19	6	-	6
Maldives	17	-	21	34
Nepal	13	9	36	15
Sri Lanka	-	14	4	-
<i>Average</i>	<i>12</i>	<i>8</i>	<i>12</i>	<i>15</i>

Note: Dash (-) indicates that the country already enjoys best practices in the region
Source: Staff estimates.

Appendix Table5. Estimated Trade Gains (%) from Reduced Direct Costs Half-way up to Best Practices in East Asia and the Pacific, (Policy 3)

Country	Institutional Procedures		Handling & Transport	
	Exp	Imp	Exp	Imp
Bangladesh	8	7	22	12
Bhutan	15	5	16	16
India	16	8	12	9
Maldives	15	2	20	20
Nepal	9	7	26	13
Sri Lanka	5	14	22	3
<i>Average</i>	<i>11</i>	<i>7</i>	<i>20</i>	<i>12</i>

Note: Dash (-) indicates that the country already enjoys best practices in the region
Source: Staff estimates.