Study in Progress

Role of Infrastructure in Reducing Trade Costs: India Country Study

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Slide Orientation

- Background of the study
- Intra-South Asia Trade
- Trade Transport Composition
  - Overland
  - Ocean
- Factors (price + non-price) influencing trade flows in South Asia
- Conclusions

Research Objective

- What are barriers affecting trade in South Asia?

Background of the Study

- South Asian countries boast a total population of more than 1.5 billion with about 400 million people living with less than US$ 1 a day.
- South Asian countries are growing at an average 6% per annum since 2001 (average annual growth).
- Intra-South Asia exports have been growing at 7% per annum since 2001
  - US$ 8.20 billion intra-South Asia exports in 2006.
- South Asian countries are looking towards deeper integration of the region
  - An FTA (SAFTA) is in place since July 1, 2006 and will be fully operational by 2016.
  - SAFTA includes some 5,500 tariff lines, taking into account both agricultural (695) and industrial products.
- SAFTA would lead to growth in intra-regional trade from US$ 6 billion in 2006 to US$ 14 billion in 2010 (Government of India, 2006).
- Except Pakistan, India is the largest trading partner of rest South Asian countries.
  - India's exports to South Asia: US$ 5.81 billion (73% of intra-South Asia exports)
- Trade in South Asia is heavily characterized by high incidence of tariffs and transport costs.
  - Estimated international transport costs: 18.49% of *cif* value in 2005
- Studies indicate that South Asian could potentially benefit substantially from higher trade provided trade and transport barriers are removed and transaction costs are minimized.

Intra-South Asia Trade: 2006

Exports (US$ million)							
	Bangladesh	India	Nepal	Pakistan	Sri Lanka	Total	Share (%)
Bangladesh		139.48	4.08	61.01	10.33	214.90	2.69
India	1892.55		974.19	752.82	2190.64	5810.20	72.70
Nepal	3.12	396.16		3.80	0.12	403.20	5.04
Pakistan	250.24	395.84	4.23		180.37	830.68	10.39
Sri Lanka	17.15	664.54	0.47	51.10		733.26	9.17
					Total	7992.24	100.00
Imports (US$ million)							
	Bangladesh	India	Nepal	Pakistan	Sri Lanka	Total	Share (%)
Bangladesh		2144.63	3.43	163.22	11.59	2322.87	29.44
India	121.91		435.77	184.02	614.04	1355.74	17.18
Nepal	4.49	1071.61		4.65	0.52	1081.27	13.70
Pakistan	79.92	677.44	4.18		69.39	830.93	10.53
Sri Lanka	10.41	2153.42	0.13	135.67		2299.63	29.14
					Total	7890.44	100.00

Source: DOTS, IMF (2007)

Modal Share of South Asian Exports

- Trade in South Asia is carried overland

Trade Year: 2005

Mode	Share (%)
Road	63.10
Sea	18.90
Rail	13.30
IWT	1.50
Others (Air)	3.20
Total	100.00

Volume of Overland Trade in South Asia

- About US$ 3.39 billion India's trade with South Asian countries carried overland in 2005 (57% of total trade; maritime 35%, air 7%)
- India's trade with Bhutan and Nepal – overland and air
- India's trade with Maldives and Sri Lanka – Maritime and air
- India's trade with Pakistan – overland and air [maritime when 3rd country counted]
- India's trade with Bangladesh – All surface transport modes (overland, air, and maritime)

India's Trade in 2005

India's Trade with Bangladesh

Total	Overland	
1904.62	1523.70	(80%)
Exports	**Maritime**	
1773.85	285.69	(15%)
Imports	**Air**	
130.77	95.23	(5%)

India's Trade with Bhutan

Total	Overland	
155.50	144.62	(93%)
Exports	**Maritime**	
97.57		
Imports	**Air**	
57.93	10.89	(7%)

India's Trade with Nepal

Total	Overland	
1188.52	1069.67	(90%)
Exports	**Maritime**	
815.44		
Imports	**Air**	
373.08	118.85	(10%)

India's Trade with Pakistan

Total	Overland	
613.25	600.99	(90%)
Exports	**Maritime**	
515.09		
Imports	**Air**	
98.16	12.27	(2%)

India's Trade with Maldives

Total	Overland	
49.12		
Exports	**Maritime**	
48.52	48.14	(98%)
Imports	**Air**	
0.60	0.98	(2%)

India's Trade with Sri Lanka

Total	Overland	
1904.67		
Exports	**Maritime**	
1536.90	1714.20	(90%)
Imports	**Air**	
367.77	190.47	(10%)

Note: Modal shares are estimated.

Overland Trade Associated with High Trade Transaction Costs in South Asia

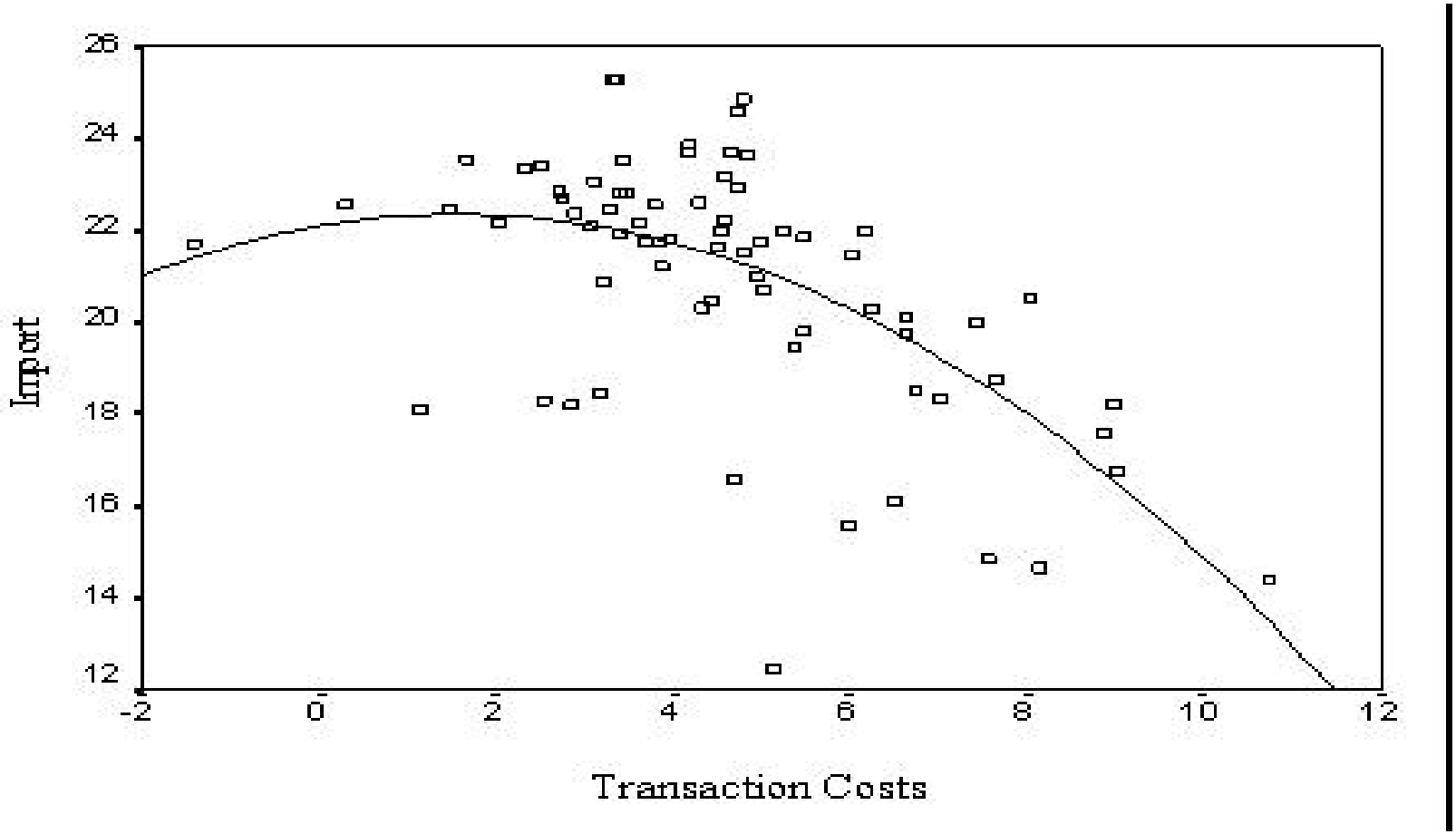
Year	Developed countries	Developing Countries	Developing Asia
	(%)		
1990	2.9	6.7	6.9
2000	2.9	5.9	6.5
2003	2.9	6.1	6.7
2004	3.0	5.9	6.5

Note: *As a percentage of import value (taken at *cif*).
Source: UNCTAD

Particulars	Transaction Costs
	2005
	%
Trade between India and Bangladesh	10.20
Trade between India and Sri Lanka	10.10
Trade between India and Nepal	11.63
Trade between India and Maldives	10.92
Trade between India and Pakistan	12.15
Trade between Bangladesh and Pakistan	14.05
Trade between Bangladesh and Sri Lanka	80.52
Trade between Sri Lanka and Pakistan	10.96
Trade between Sri Lanka and Maldives	10.00
Trade between Bangladesh and Nepal	14.11
Trade between Pakistan and Nepal	18.77
South Asia Average	18.49

Note: *As a percentage of import value (taken at *cif*).
Source: Calculated based on DOTS, IMF

Relative Importance of Trade Transaction Costs in Asia



Source: De, P, (2006) “Trade Infrastructure and Transaction Costs: The Imperatives for Asian Economic Cooperation”, *Journal of Economic Integration*, Vol. 21, No. 4, December 2006, pp. 708 - 735

South Asia Witnessing Regional Production and Trade Network

India's Merchandise Trade and Production Engagement

	Nepal	Bangladesh	Sri Lanka
Trade	Cement, iron and steel, machinery, agricultural items, auto components, electronics, chemicals, coal, minerals, etc.	Cement, coal, cotton yarn, agricultural items, iron and steel, minerals, chemicals, etc.	Chemicals, plastics, processed foods, textile and clothing, minerals, iron and steel, aluminium, machinery, etc.
Production	Processed foods, pharmaceuticals, electronics, etc.	Cement, coal, textile, chemicals, auto components, jute, processed foods, etc.	Rubber, auto components, textile, processed foods, electronics, pharmaceuticals, etc.

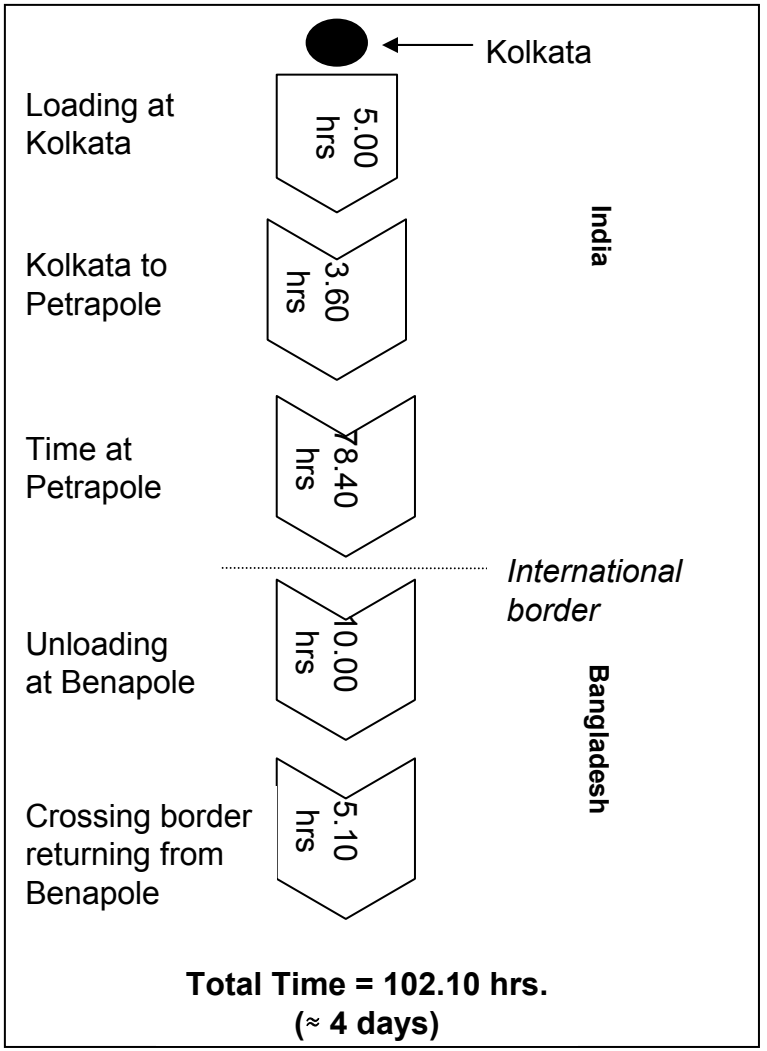
Variety of goods trade and interlinked with production network => Require Well developed logistics – inbound and outbound

Borders are Congested

Case of India (Petrapole) and Bangladesh (Benapole): December 2006

Unplanned and informal market

Long queue of trucks



Escalating Trade Transaction Costs

Border Delay (Time) at Petrapole

Particulars	**Subramanian (1999)**	**Das and Pohit (2005)**	**De and Ghosh (2007)**
	Year: 1998	**Year: 2002**	**Year: 2006**
Border crossing delays (hrs.)*	60	87	94
Types of documents required at border (No)	29	NA	17
Copies of documents required at border (No)	118	NA	67

Notes: While data for 1998 and 2002 collected from Subramanian (1999), and Das and Pohit (2005), respectively, the same for the year 2005, is taken from De and Ghosh (2007).

Source: De, P, and B. Ghosh (2007) "On Assessing Transaction Costs of Trade at Border: An Analysis of Indian Exports to Bangladesh", *Economic and Political Weekly*, Forthcoming

High Trade Transaction Costs: Stylized Features in South Asia

- High trade transaction costs across borders
  - Regulations, poor institutions and poor infrastructure penalize South Asian trade.
  - Road ends at border
  - Lack of integrated regional transport network – Missing links, absence of harmonisation of tracks, etc.
  - Technological asymmetry at ports [India – Bangladesh vis-à-vis India – Sri Lanka [high vs. low transaction costs]
- High barriers of all sorts at borders
- Disincentives to regional transport and production networks
  - Low overland traffic
  - High costs of movement of factors of production

Estimable Model (Imposed from Earlier Paper)

- Looking at the demand side of import, the final estimable equation takes following shape.
  - $\ln X_{ij} = \alpha 0 + \alpha i + \alpha j + \beta 1 \ln Y_i + \beta 2 \ln TII_i + \beta 3 \ln TII_j + \beta 4 \ln Port_i + \beta 5 \ln Port_j + \beta 6 \ln T_{jInl} + \beta 7 T_{ijInt} + \beta 8 T_{iInl} + \beta 9 \ln TR_{ij} + \beta 10 \ln ER_j + \beta 11\, D1 + \beta 12\, D2 + \beta 13\, D3 + \beta 14\, D4 + \varepsilon ij$
- On the impact of 'non-price' barriers to trade, we have
  - $\ln X_{ij} = \alpha 0 + \alpha i + \alpha j + \beta 1 \ln Y_i + \beta 2 \ln TII_i + \beta 3 \ln TII_j + \beta 4 \ln Port_i + \beta 5 \ln Port_j + \beta 6\, D1 + \beta 7\, D2 + + \beta 8\, D3 + \beta 9\, D4 + \varepsilon ij$
- On 'price' barriers to trade, we consider
  - $\ln X_{ij} = \alpha 0 + \alpha i + \alpha j + \beta 1 \ln Y_i + \beta 2 \ln T_{jInl} + \beta 3 T_{ijInt} + \beta 4 T_{iInl} + \beta 5 \ln TR_{ij} + \beta 6 \ln ER_j + \beta 7\, D1 + \beta 8\, D2 + \beta 9\, D3 + \beta 10\, D4 + \varepsilon ij$
- For explicit tariff and freight rates, what Hummels (1999) interpreted as the CES elasticity for a particular good, we revise the above equation as follows.
  - $\ln X_{ij} = \alpha 0 + \alpha i + \alpha j + \beta 1 \ln Y_i + \beta 2 \ln (T_{ij} + TR_{ij}) + \beta 3 \ln ER_j + \beta 4\, D1 + \beta 5\, D2 + \beta 6\, D3 + \beta 7\, D4 + \varepsilon ij$
- To understand the variability of inland and international transport costs, we use
  - $\ln X_{ij} = \alpha 0 + \alpha i + \alpha j + \beta 1 \ln Y_i + \beta 2 \ln (T_{ijInt} + T_{iInl}) + \beta 3 \ln (TR_{ij}) + \beta 4 \ln ER_j + \beta 5\, D1 + \beta 6\, D2 + + \beta 7\, D3 + \beta 8\, D4 + \varepsilon ij$
  - $\ln X_{ij} = \alpha 0 + \alpha i + \alpha j + \beta 1 \ln Y_i + \beta 2 \ln (T_{ijInt}) + \beta 3 \ln (TR_{ij}) + \beta 4 \ln ER_j + \beta 5\, D1 + \beta 6\, D2 + + \beta 7\, D3 + \beta 8\, D4 + \varepsilon ij$
- We use four dummies – Landlocked, Language, Adjacency and EDI.
- We use OLS (Log linear) model for 2005

Data

- Considers South Asia's trade at bilateral level
- Uses data for the year 2005 at 4-digit HS for imports of four South Asian countries, namely, Bangladesh, India, Nepal, Pakistan and Sri Lanka.
- Data at bilateral level for all the variables for their individual partners.
- By taking tariffs and transport costs, it covers a major portion of trade costs.
  - Tariff taken at weighted average
  - Freight taken at weighted average (borrowed from earlier paper)
- Bilateral trade, transport costs, and tariffs are taken at 4-digit HS for the year 2005.
- Total 4795 observations on 16 identical commodity groups
- About 7.22% of total observations shows illogical values (missing or negative or extremely high), which mostly falling in the category of fuels, mining and forest products (30%)
- The major sources of secondary data are *Direction of Trade Statistics Yearbook* (DOTS) of International Monetary Fund (IMF), *United Nations Commodity Trade Statistics* (COMTRADE) of United Nations Statistical Division (UNSD), *World Integrated Trade Solution* (WITS) of World Bank (WB), and *Historical Freight Database* of Maersk Sealand.

Model 1: High Influence of Transport Costs on Trade Flows

- OLS (log linear) + Country Fixed Effect
- Tariff shows positive relationship with trade
  - Unusual, but indicates tariff is not a barrier.
- Prime barrier – Ad-valorem Transport Costs
  - 10% ad-valorem price (transport) increase lowers trade in South Asia by 3.4%.
- Coefficient of exchange rate positive
- Scopes of further enhancement of trade (significant market size)
- Language Dummy highly significant.
- Model explains about 49% of the variations in direction of trade flows.

	Coefficient	t-value
Ln (Market size)	0.213**	3.96
Ln (Tariff)	0.637***	15.72
Ln (Transport Costs, combined)	-0.340***	-7.08
Ln (Exchange Rate)	0.891*	2.27
Landlocked Dummy	-1.098	-1.09
EDI Dummy	0.133	1.46
Adjacency Dummy	0.235	1.19
Language Dummy	2.070***	8.46
No of observations	4795	
Adjusted R^2	0.4862	

LHS = Ln (Import)

Model 2: High Influence of Inland Transport Costs on Trade Flows

- OLS (log linear) + Country Fixed Effect
- Tariff again showing positive relationship with trade
- Prime barrier – Ad-valorem Inland Transport Costs
  - 10% ad-valorem price (inland transport) increase lowers trade in South Asia by 2.5%.
- Coefficient of exchange rate positive and significant
- Scopes of further enhancement of trade (significant market size)
- Language Dummy highly significant.
- Model explains about 49% of the variations in direction of trade flows.

	Coefficient	t-value
Ln (Market size)	0.216**	4.02
Ln (Tariff)	0.380***	12.07
Ln (Inland Transport Costs)	-0.246**	-3.34
Ln (International Transport Costs)	0.005	0.07
Ln (Exchange Rate)	0.788*	1.89
Landlocked Dummy	-1.072	-1.38
EDI Dummy	-0.486*	-2.13
Adjacency Dummy	0.263	1.28
Language Dummy	2.001***	7.79
No of observations	4795	
Adjusted R^2	0.4860	

LHS = Ln (Import)

Model 3: High Influence of Infrastructure on Trade Flows

- OLS (log linear) + Country Fixed Effect
- Model explains about 34% of the variations in direction of trade flows.
- Tariff again showing positive relationship with trade
- Prime barriers – Performance of port and exporting country's infrastructure
- Coefficient of exchange rate negative and significant
- Scopes of further enhancement of trade (significant market size)
- Coefficient of language and adjacency dummies significant and positive.

	Coefficient	t-value
Ln (Market size)	0.154*	1.590
Ln (Tariff)	0.659***	14.660
Ln (Importing Country Infrastructure)	0.126	1.003
Ln (Exporting Country Infrastructure)	-10.809***	-6.150
Ln (Importing Country Port Performance)	-0.899**	-3.880
Ln (Exporting Country Port Performance	-3.700***	-5.170
Ln (Exchange Rate)	-1.833**	-4.200
Landlocked Dummy	Insignificant / Dropped	
EDI Dummy	0.670	1.470
Adjacency Dummy	0.453*	1.800
Language Dummy	0.695*	2.320
No of observations	3631	
Adjusted R^2	0.336	

LHS = Ln (Import)

Policy Options

- A stronger domestic transport sector:
  - Strengthen domestic transport sector by enhancing domestic reforms
- A **Common Transport Policy** for South Asia:
  - Integrate surface connectivity and regional transport network
  - Transit MUST [avoid multiple handling at borders]
  - Remove the barriers at borders – visible and invisible
- Expand and link up South Asian overland linkages
  - Asian Highway
  - Trans-Asian Railway
  - Other regional transport corridors [e.g. SAARC Multimodal Transport Corridor, BIMSTEC Highway]