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## Session 11

Impacts of Non Tariff Measures on Agricultural Trade: A  
Gravity Modeling Approach

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# Impacts of Non Tariff Measures on Agricultural Trade: A Gravity Modeling Approach

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# Barriers to Trade

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Any restriction imposed on the free flow of trade

## Types of Barriers

- Geographical barriers – distance,
- Cultural barriers - different customs, traditions, laws, languages
- 2 main categories
  - Tariff measures
  - Non Tariff measures



# Non Tariff Measures (NTMs)

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Any restriction other than traditional custom duties that distort trade

NTMs include:

- Measures to control the volumes of imports
- Measures to control the price of imported goods
- Monitoring measures
- Production and export measures
- Technical barriers

## Primary intention of imposing NTMs

- To protect health, safety, or sanitation among humans, plants and animals
- To protect the environment
- To improve national welfare by correcting market failures

Over bearing use of NTMs → Barrier



# Effects of NTMs on Agricultural Trade; Findings of Previous Studies

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- Otsuki et al. (2001):

10% tighter EU aflatoxin contamination levels reduces African exports by 4.3% (cereals) and 11% (nuts and dried fruits)

- Herath (2001):

Loss of foreign exchange earning due to non-compliance in Sri Lankan beverage and spice sector is US\$2.9 million in 99/2000

## Findings of previous studies cont...

- 
- Calvin, L. & Krissof, B. (1998):

Removal of Japanese TBs on apples would increase Fuji apple imports by 88,200 mt in 1996/97

- Moenius (1999):

Found that shared standard has large trade promoting effect between the nations



# Agricultural Trade in South Asia

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- World Trade in agricultural products, 2005 – US\$ 852 billions
- Share of South Asia – 1.75%
- **Major exporting commodities**  
Tea, Paddy, Animal products (meat, milk), Spices, Fruits and Vegetables
- **Major exporting markets**  
United States, European Union, Japan





## Overall Objective

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- To compare the impacts of NTMs with other sources of barriers on agricultural exports of South Asian countries and their major trading partners

## Specific Objectives

- To estimate the impacts of NTMs for the trade patterns of South countries
- To estimate the impacts of NTMs for the trade patterns of North countries

4 different trade patterns were obtained to do the estimations

- South-South trade
- South-North trade
- North-South trade
- North-North trade



# Empirical Model

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## Gravity Model

- Based on Newton's theory of Gravity
- Predicts bilateral trade flows based on the economic sizes (often using GDP measurements) and distance between two countries

$$F_{ij} = G \frac{M_i M_j}{D_{ij}}$$



# Conventional Variables

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Dependant variable –

Value of bilateral exports of agricultural products

Independent variables –

Agricultural GDP of the two countries,  
distance between two countries



# Other Variables

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- Official common language, colonial ties, common border, landlocked countries
- Region dummy variables
- Trade restrictiveness measures

Overall trade restrictiveness index (OTRI)

Tariff trade restrictiveness index (TTRI)



# Trade Restrictiveness Measures

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- OTRI (Agricultural)

OTRI is based on imports

Captures the impact of each country's trade policies in its aggregate agricultural imports

Captures the effects of both tariffs and non tariff measures



## Trade Restrictiveness Measures cont...

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- TTRI (Agricultural)

Captures the impact of each country's tariff trade policies in its aggregate agricultural imports

- $OTRI - TTRI =$  Measures the impact of  
NTM



# Data Sources

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Variables (2005)	Source
Bilateral trade values (HS code 1- 24)	Trade Map – International Trade centre
GDP & Agricultural GDP	World Economic outlook - IMF
Distance	CEPII
Trade restrictiveness indices	World Trade Indicators – World Bank





## Data Sources cont.....

Common border	CEPII
Colony Ties	
Official Language	
Landlocked countries	

- 40 Countries
  - 8 South Asian countries
  - Top 10 export destinations of SAARC members
- Functional Form – log-log
- Ordinary Least Squares and Robust Estimations



# Results

## Trade of Developing Countries

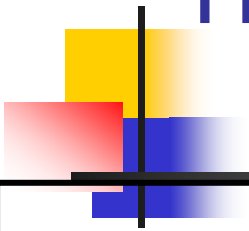
	South-South		South-North	
Variables	Coefficient	Std. Errors	Coefficient	Std. Errors
Constant	2.003	8.770	11.730***	4.179
GDP exp (log)	1.054***	0.283	1.356***	0.171
GDP imp (log)	1.789***	0.387	0.422***	0.159
Distance (log)	-2.927***	0.968	-2.783***	0.442
NTM	-0.111*	0.064	-0.009	0.026
TTRI	-0.065**	0.028	-0.027	0.040
D <sub>ntm*SA</sub>	0.004	0.086	0.029	0.040

\*\*\* Significant at 1%, \*\*Significant at 5%, \* Significant at 10%

Variable	South-South		South-North	
	Coefficient	Std. Errors	Coefficient	Std. Errors
Common lang.	2.298**	1.501	2.557***	0.790
Common bord.	3.351**	1.649	-0.436	1.963
C.colonization	3.042**	1.377	3.325***	0.913
C. Colony			2.860***	0.897
Landlocked	2.501	1.560	-12.984***	1.013
# of observations	180		360	
F value	F(12,167)=18.99		F(12,346)=21.52	

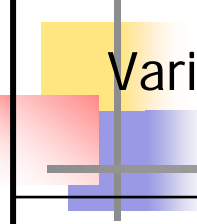
\*\*\* Significant at 1%, \*\*Significant at 5%, \* Significant at 10%

# Trade of Developed Countries



Variables	North-South		North-North	
	Coefficient	Std. Errors	Coefficient	Std. Errors
Constant	9.825***	5.122	14.063*	1.280
GDP exp (log)	0.376**	0.176	0.195***	0.050
GDP imp (log)	2.612***	0.303	0.140***	0.052
Distance (log)	-2.997***	0.511	-1.360***	0.114
NTM	-0.085***	0.029	-0.012	0.009
TTRI	-0.118***	0.020	-0.009	0.018

\*\*\* Significant at 1%, \*\*Significant at 5%, \* Significant at 10%



Variables	North-South		North-North	
	Coefficient	Std. Errors	Coefficient	Std. Errors
Common lang.	3.029**	1.306	1.065***	0.274
Common bord.	-4.645	2.875	0.715**	0.284
Com_colony	-0.731	2.038	0.933***	0.322
C.Colonisation	-0.483	1.764	-0.964	0.617
Trade in Asia	-2.494***	0.718	-0.590*	0.318
# of observations	210		380	
F value	F(11,198)=14.01		F(10,369)=36.65	

\*\*\* Significant at 1%, \*\*Significant at 5%, \* Significant at 10%



## Summary Results of Trade Restrictiveness Indices

Trade Patterns	Co-efficient of TTRI	Co-efficient of NTM
South-South	-0.065 <sup>**</sup>	-0.111 <sup>*</sup>
South-North	-0.027	-0.009
North-South	-0.118 <sup>***</sup>	-0.085 <sup>***</sup>
North-North	-0.009	-0.012



# Conclusions

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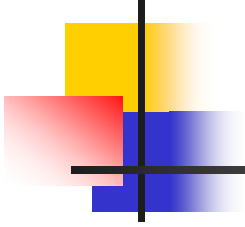
- Country size, geographical and cultural variables are the determinants of bilateral agricultural trade flows.
- Trade restrictiveness indices
  - NTMs are affecting both south and north countries when they export their agricultural products
  - South-South trade flows restrict more by NTMs than tariffs
  - North-South trade flows restrict more by tariffs than NTMs





1% increase of TTRI and NTMs, reduce  
agricultural exports by

Trade Patterns	TTRI	NTM
South-South	6.29%	10.5%
North-South	11.1%	8.15%



Thank You