

(RE)DEFINING CONNECTIVITY TO ASSESS ECONOMIC IMPACTS

Bert Lenaerts (bert.lenaerts@uhasselt.be)

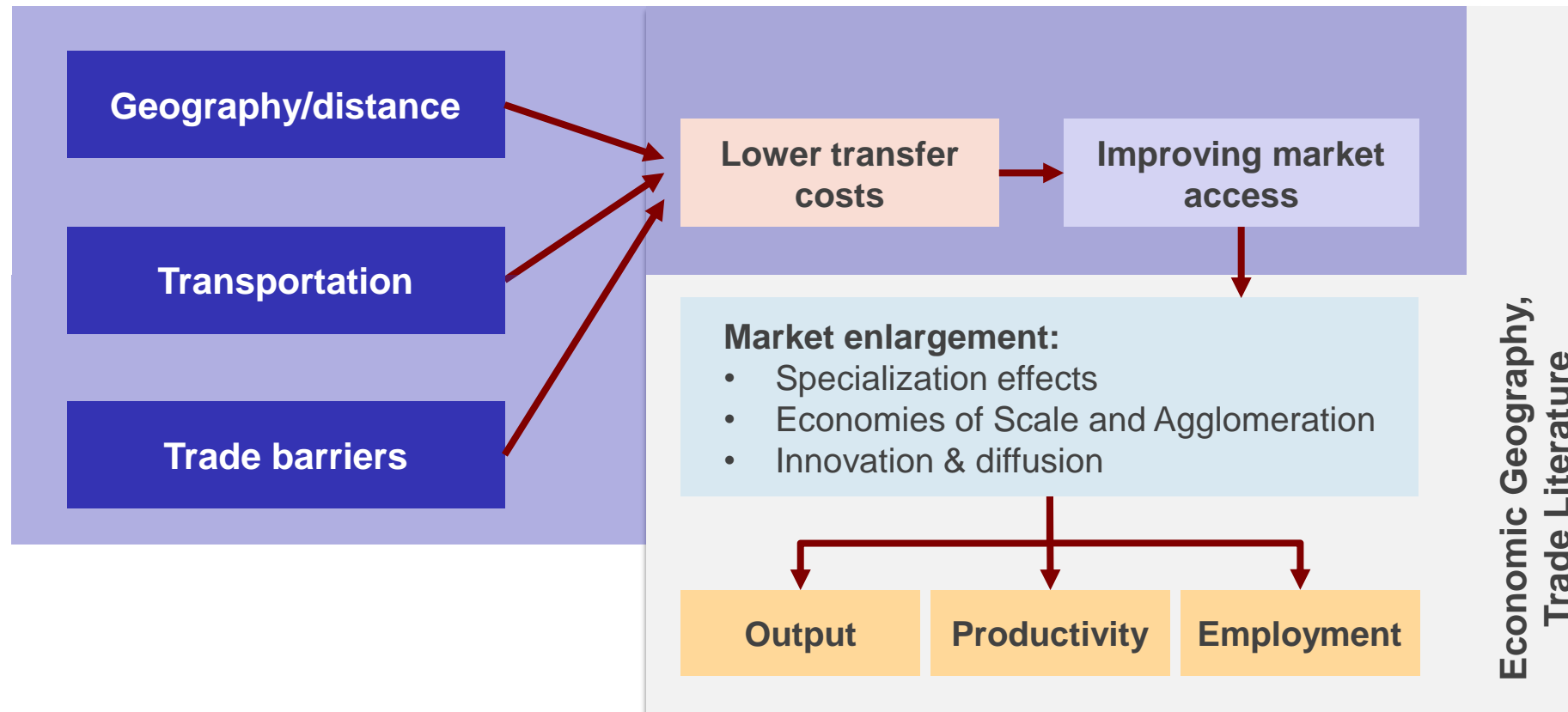
presenting joined work with

Dr. Florian Allroggen (MIT) & Prof. Robert Malina (UHasselt)



UHASSELT

Trade, transport, and economic development

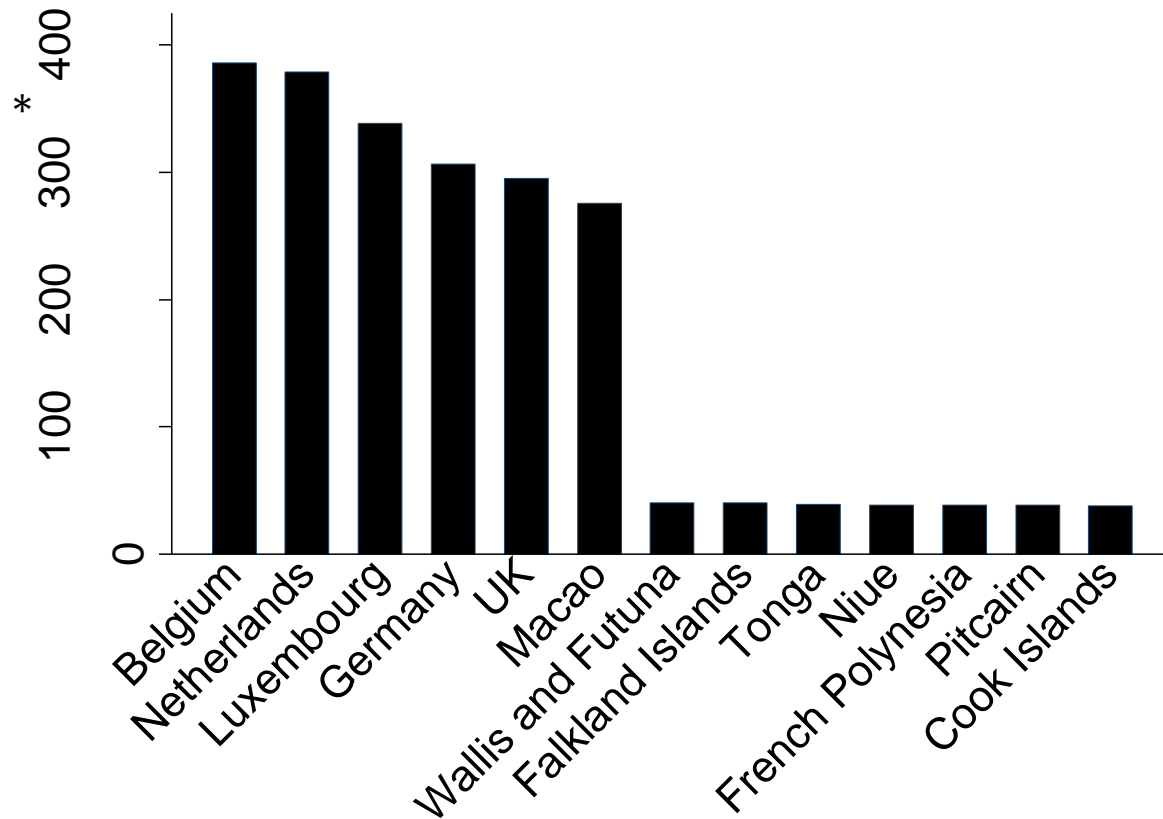


Aims

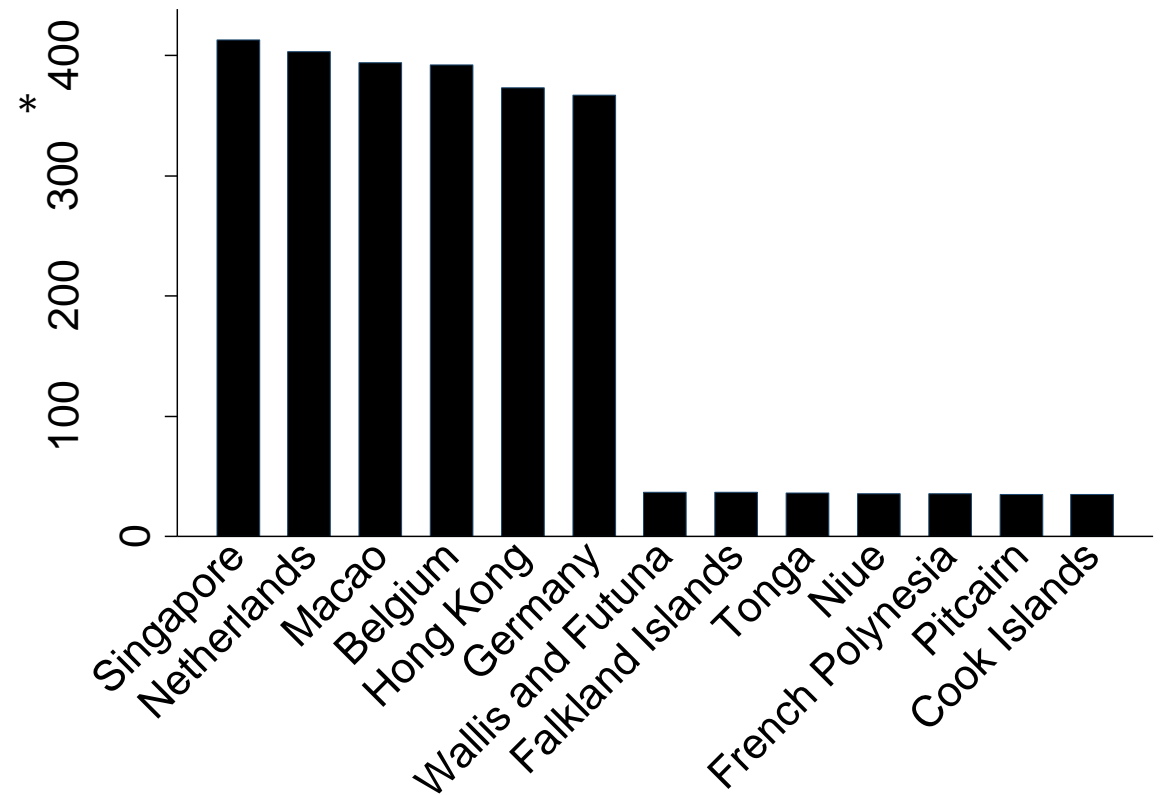
1. Understand how distance (remoteness) relates to:
 - transport networks;
 - trade barriers; and
 - market access
2. Determine strength of correlation between connectivity and usual metrics
3. Formulate outlook on future research

Market potential

No internal trade

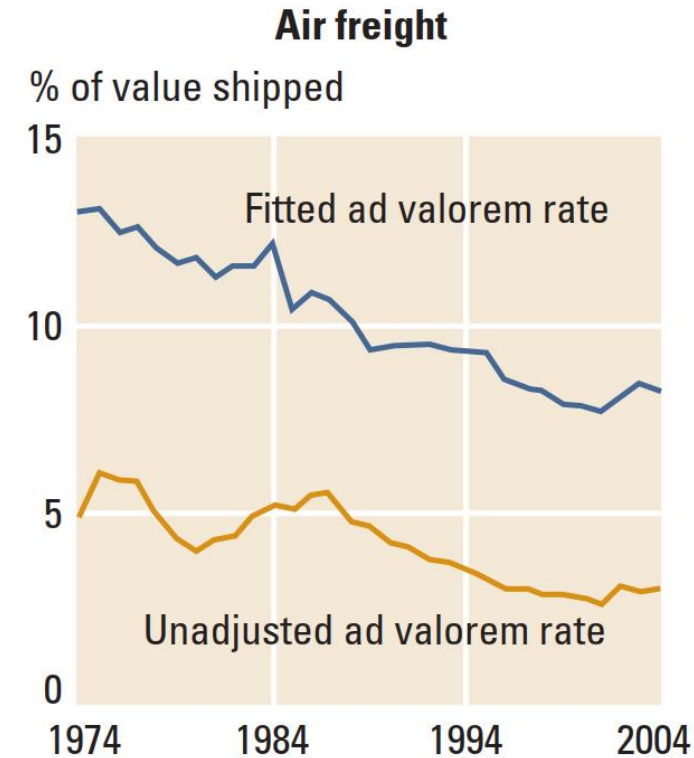
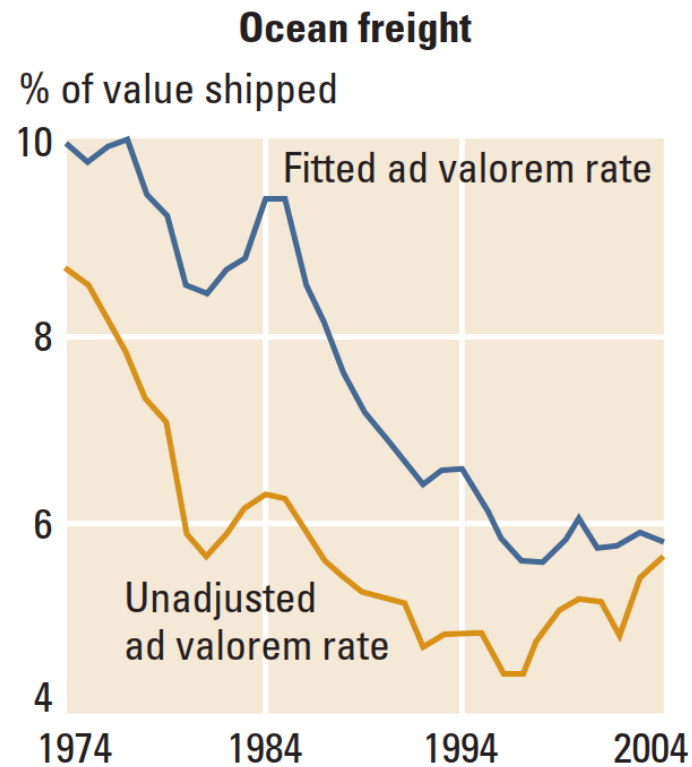


Internal trade



* Sum of all trading partners' GDP weighted by the inverse of bilateral distance

Death of distance hypothesis



Source: World Bank (2008) & Hummels (2007)

Impact of transport: setting the scene

- Need to proxy for transport cost
- Two main approaches
 1. Accessibility:
 - generalised transport cost (including distance) X destination
 - empirical NEG: mostly trade-based
 2. Volumes measures
 - traffic data
 - aviation-specific

Accessibility

- Empirical NEG: Trade-based accessibility

- $EXP_{ij} = \alpha DIST_{ij} + \beta EC_DIST_{ij} + \gamma CNY_i + \delta PTN_j$

- Market Access = $\sum DIST^\alpha EC_DIST^\beta PTN^\delta$

EXP_{ij} = exports

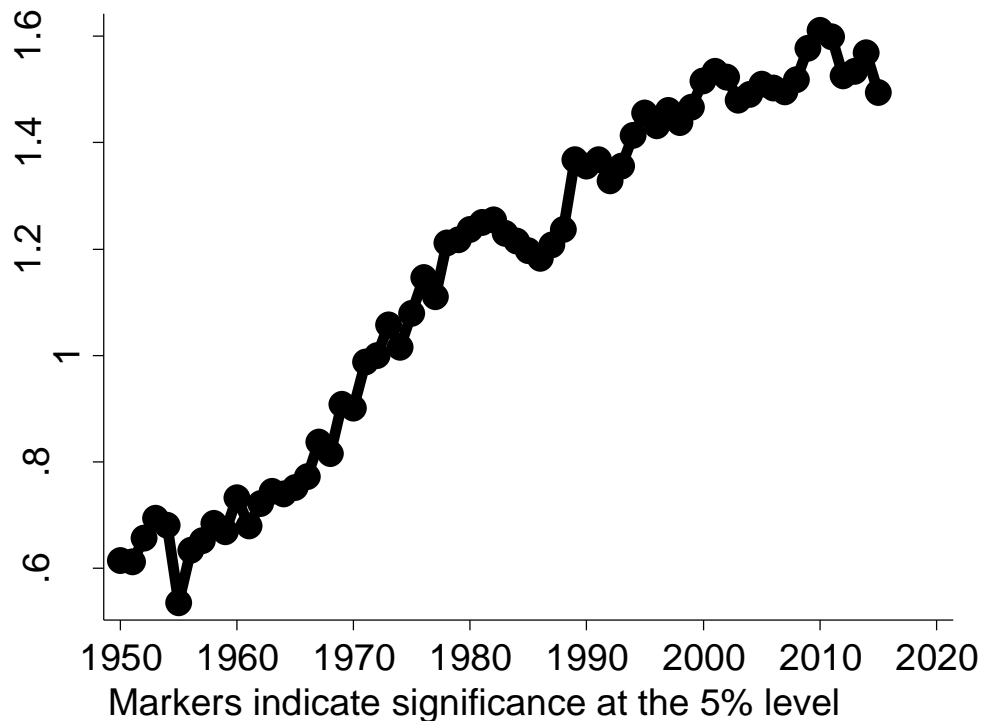
$DIST_{ij}$ = bilateral distance

EC_DIST_{ij} = economic distance

CNY_i = exporting country

PTN_j = importing country

Distance effect (coefficient)

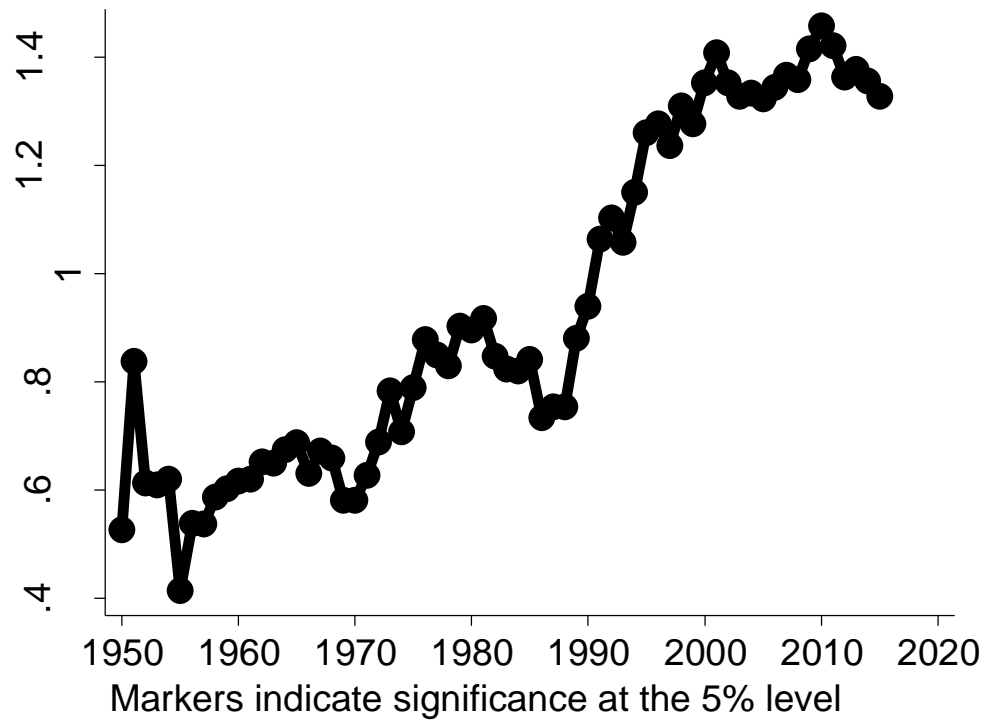


Data source: IMF DOTS & CEPII

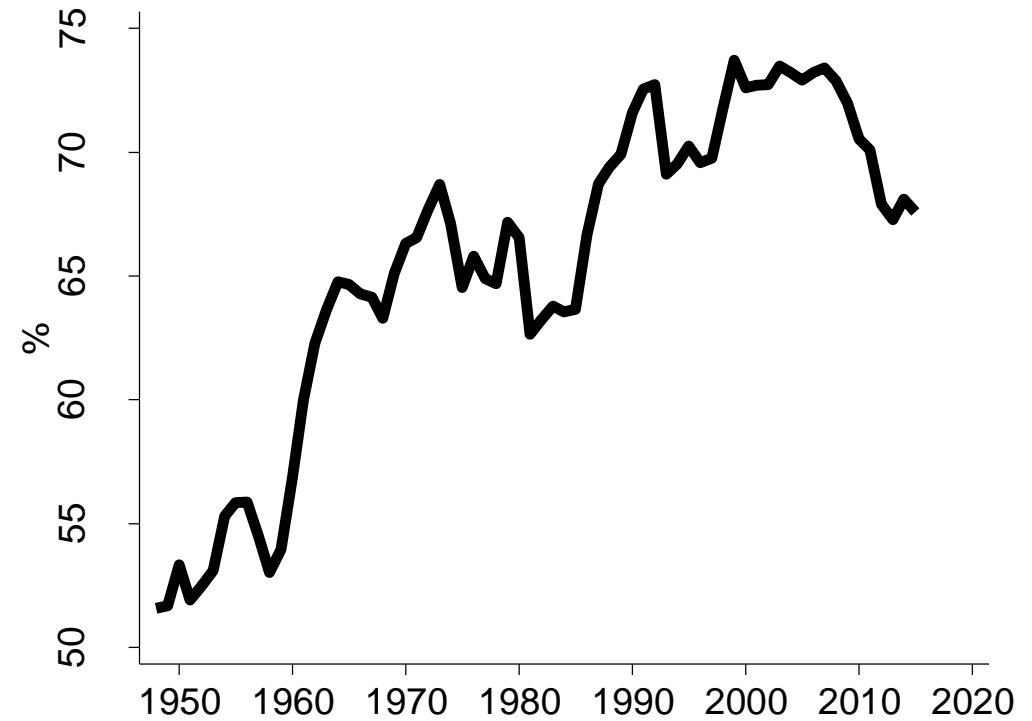
- Persistent and increasing over time
- Challenges death of distance hypothesis
- Hypotheses:
 - No transport effect
 - Proxied transaction costs
 - Home bias
- Regional differences?
 - Add interactions

Europe

Distance effect (coefficient)

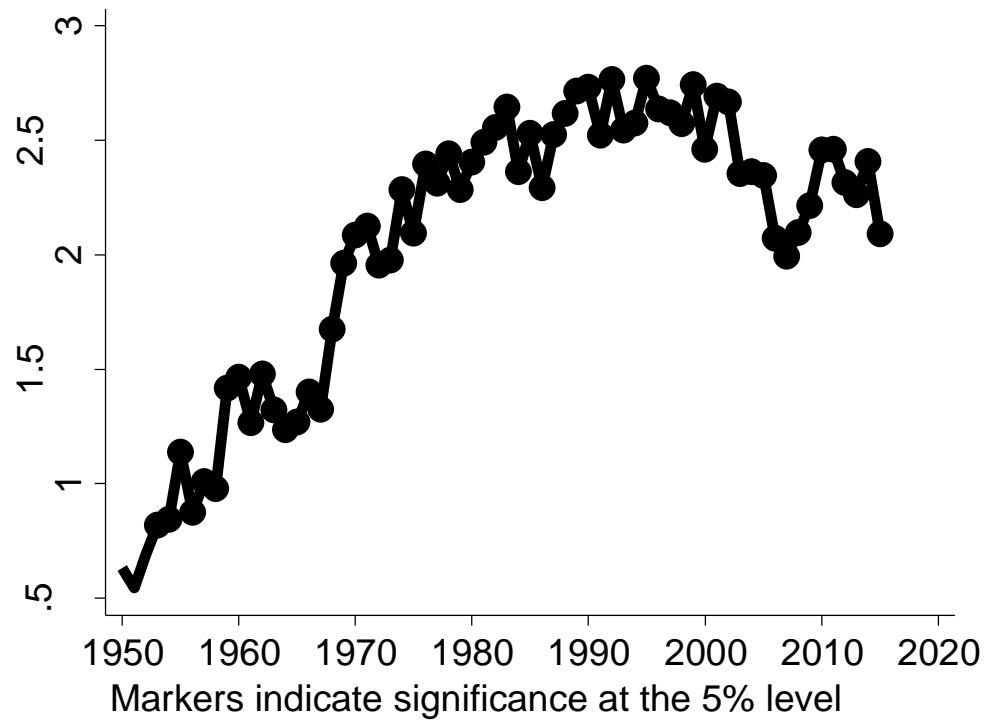


Share of regional trade

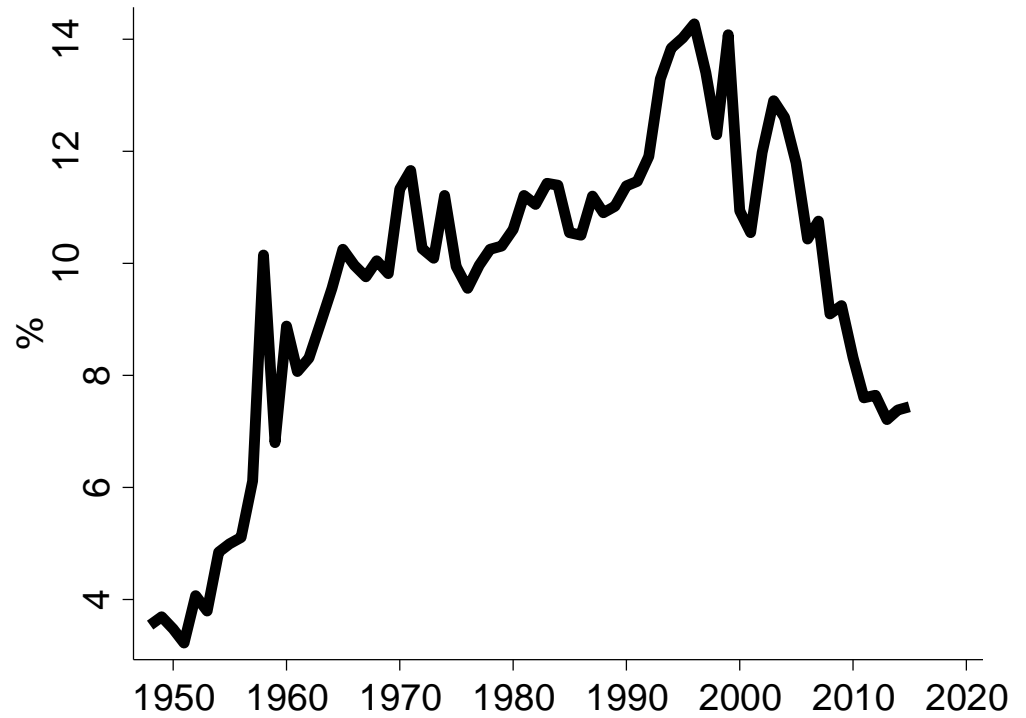


Oceania

Distance effect (coefficient)

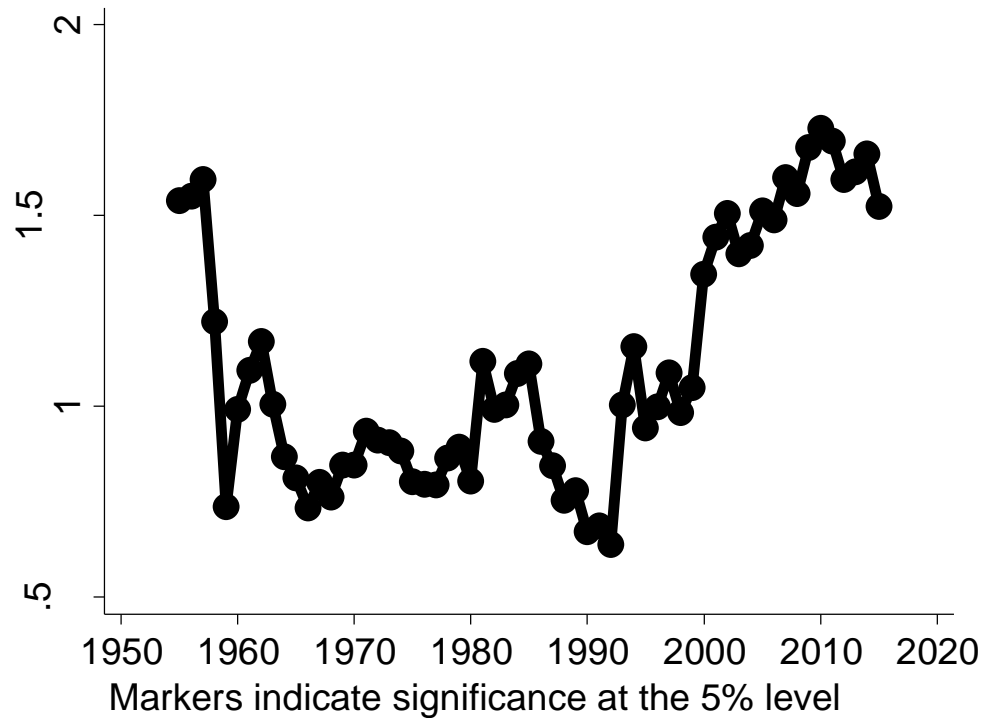


Share of regional trade

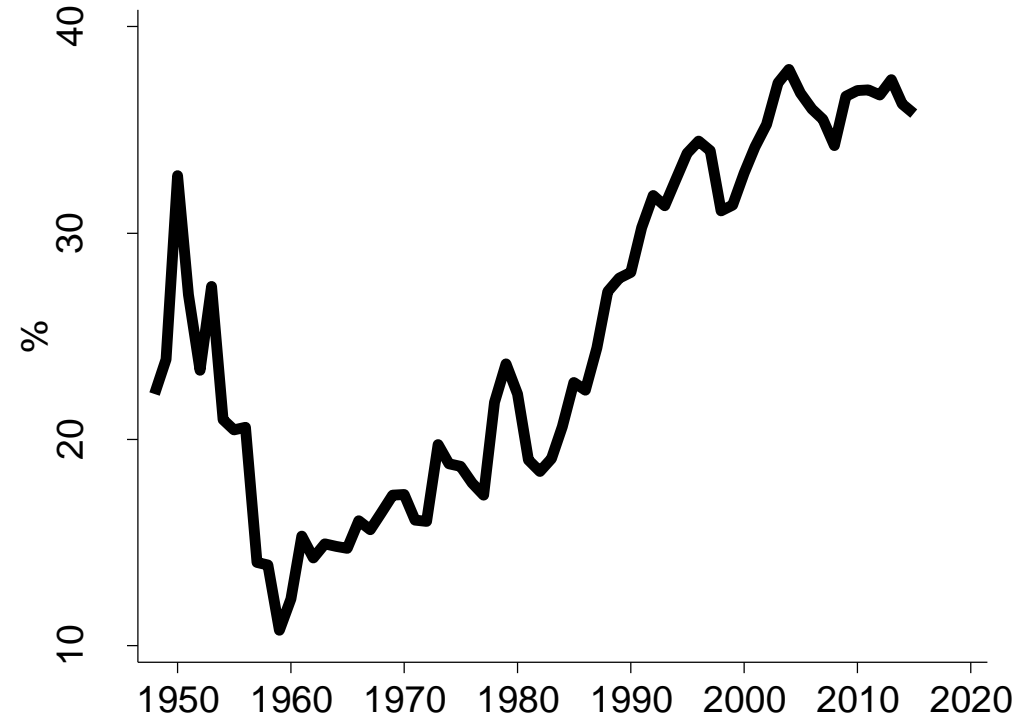


East & Central Asia

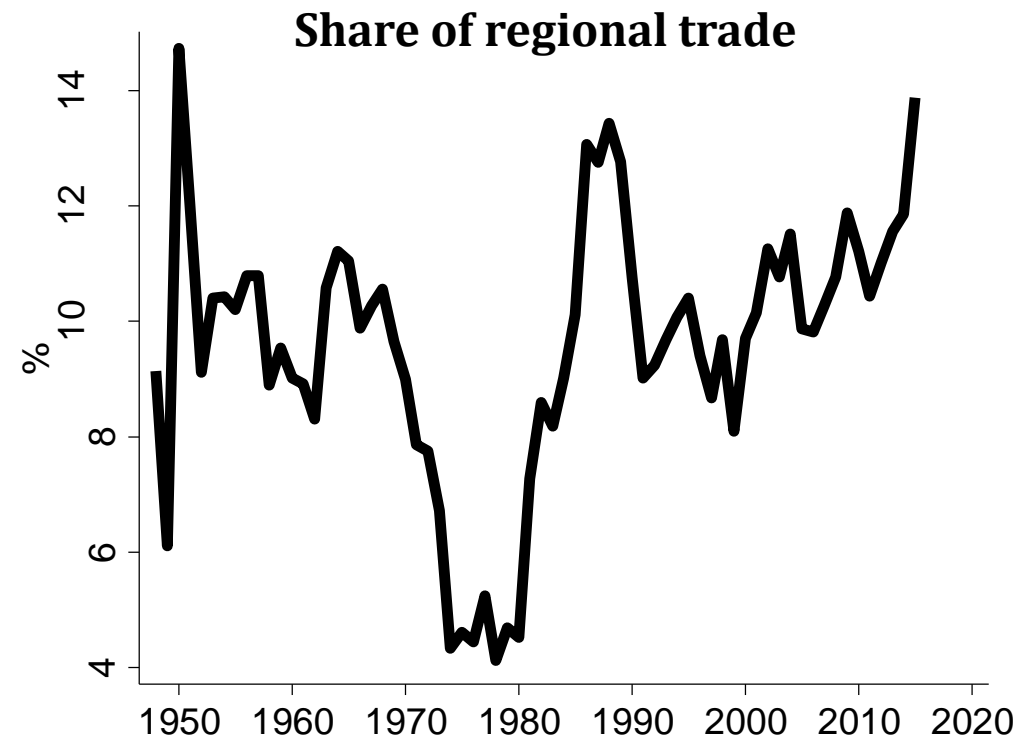
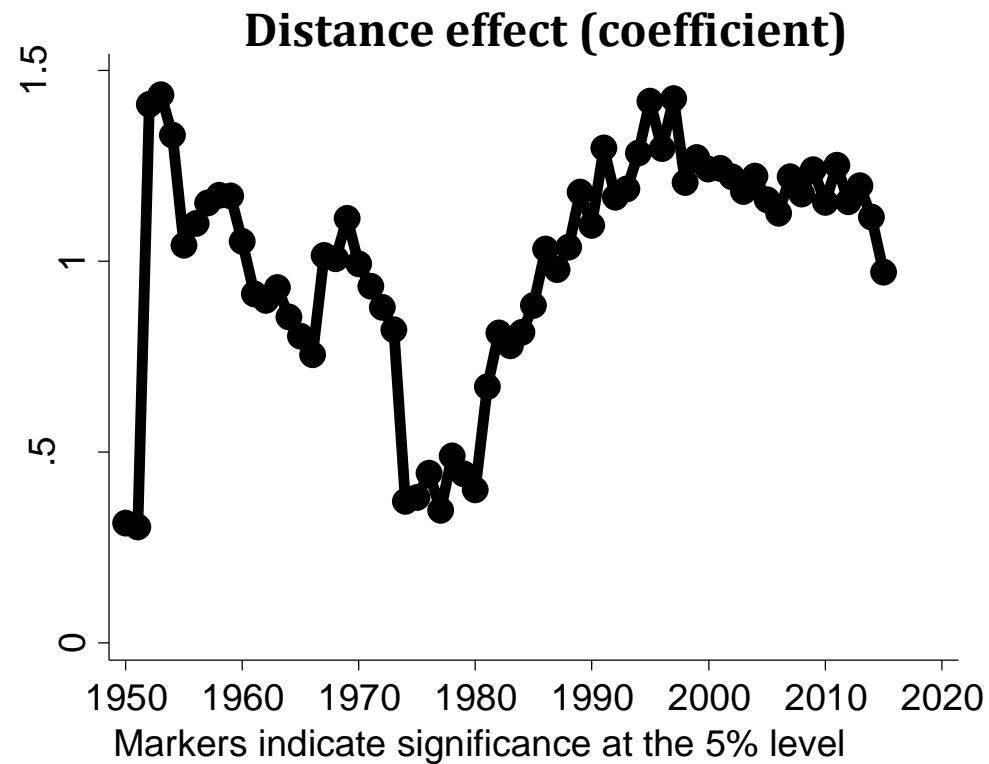
Distance effect (coefficient)



Share of regional trade

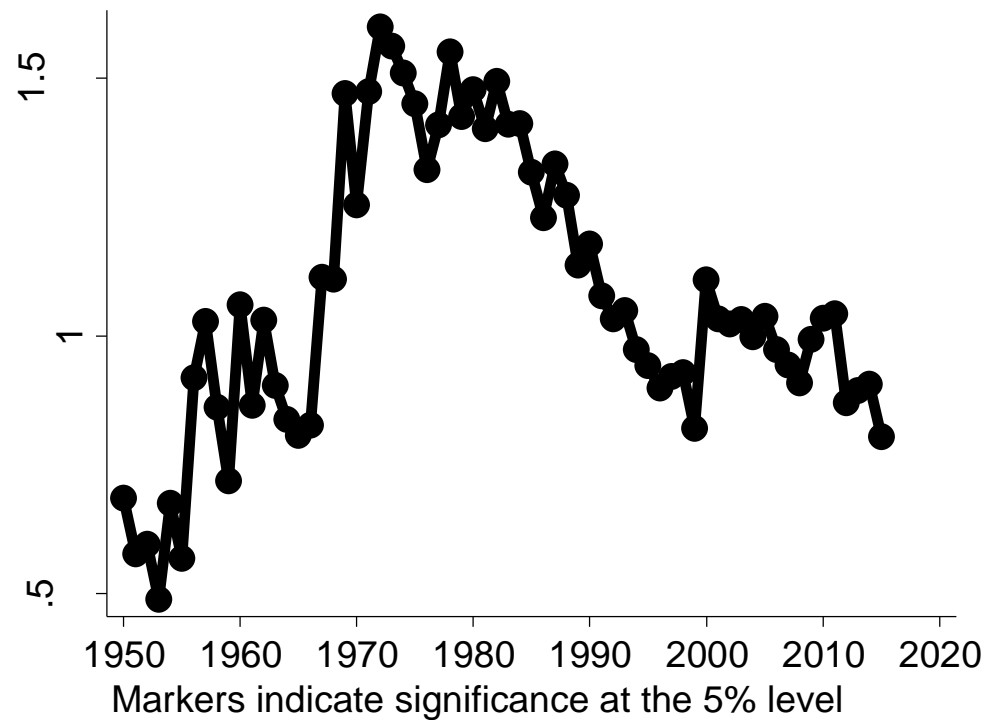


Middle East

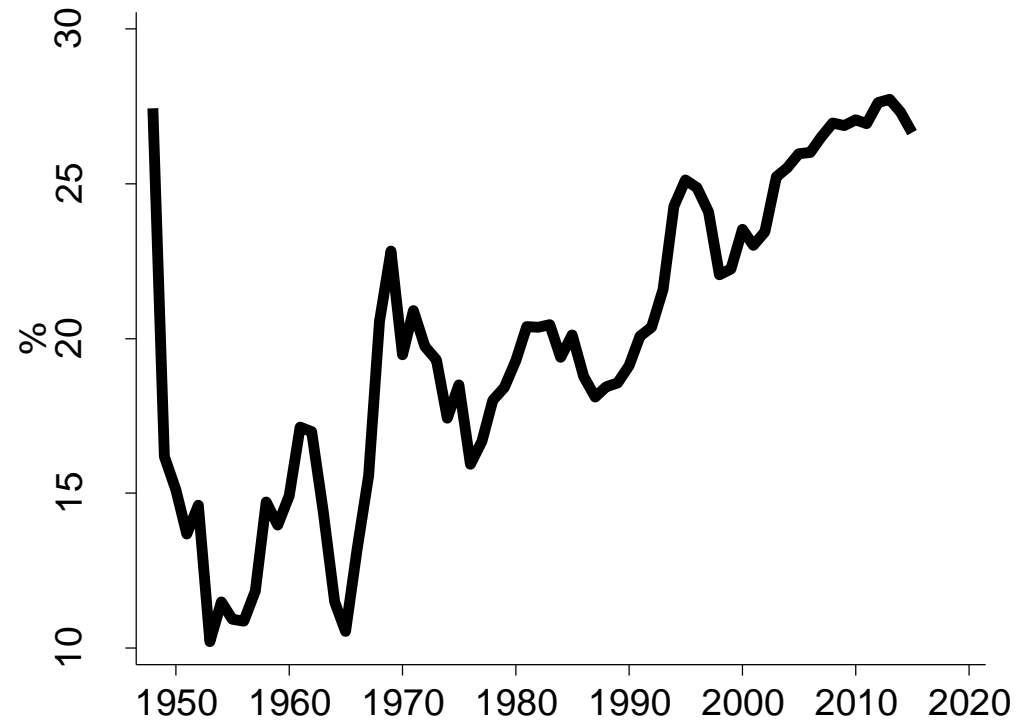


South & South-East Asia

Distance effect (coefficient)

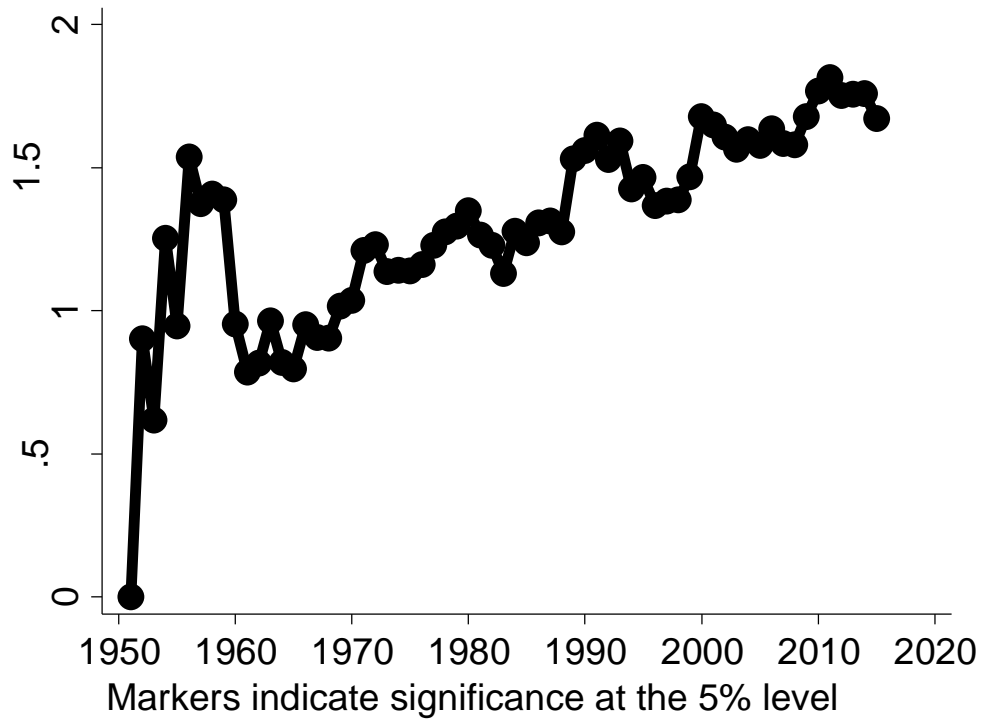


Share of regional trade

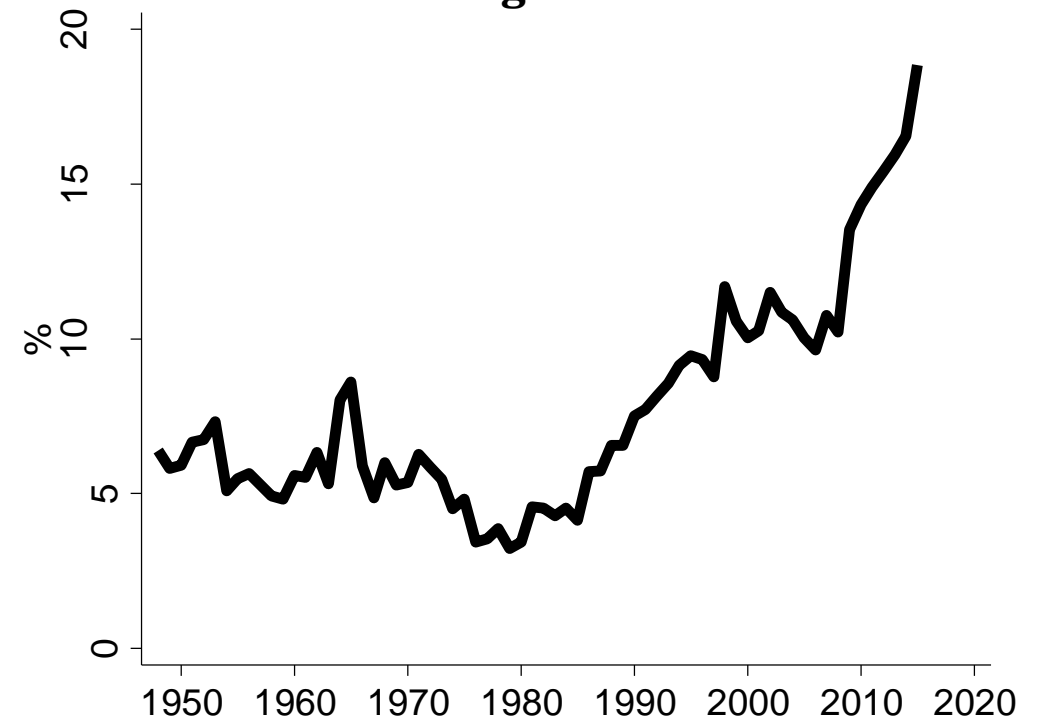


Africa

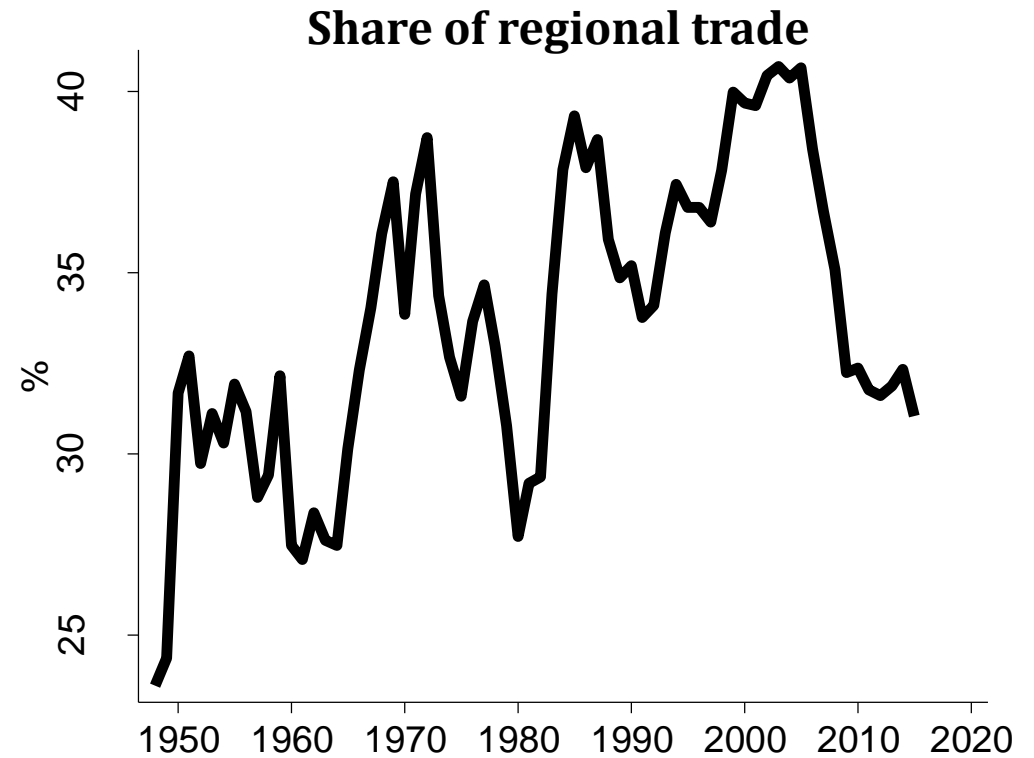
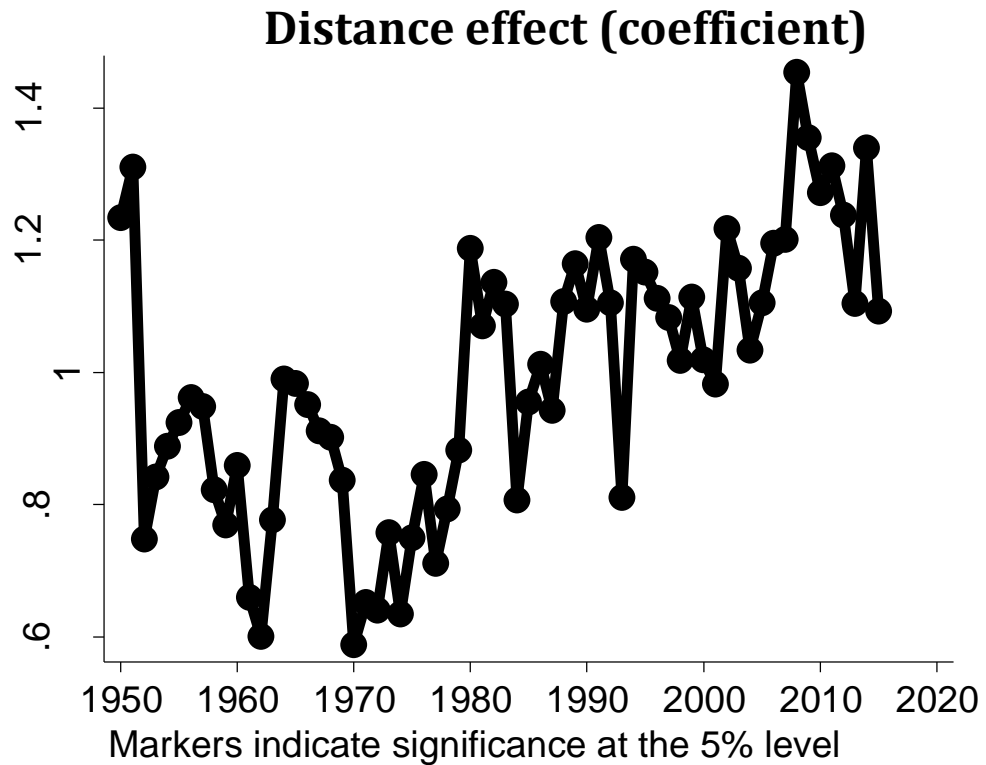
Distance effect (coefficient)



Share of regional trade



North America



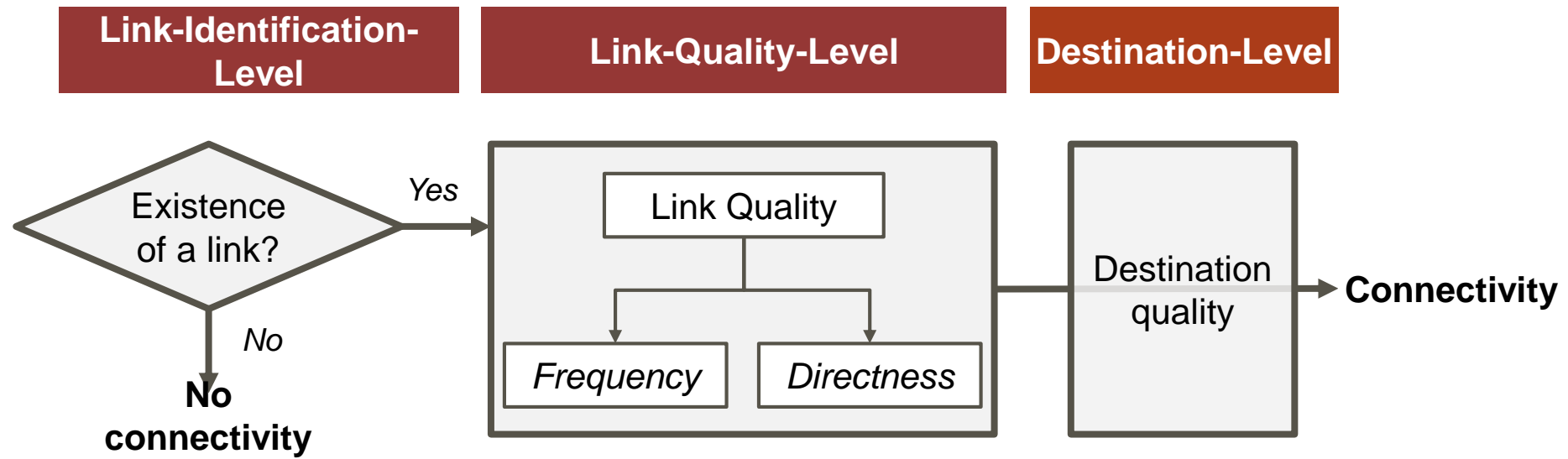
Accessibility

- Regional integration dominates distance effect
 - Emergence regional supply and value chains
 - Economics of variety
- Biased accessibility values
 - Regional integration lowers accessibility?
- Furthermore...
 - Distance \neq good proxy
 - Distance \neq policy variable
 - Distance: no regional differentiation
 - No substitution possible

Transport connectivity

- Connectivity
 - Freeness of movement between nodes in an *aspatial* network
- Air transport: Global Connectivity Index (GCI)
- New air transport connectivity metric:
 - Combines *flight-level* & *destination-level* dimensions
 - Indicator of service quality
 - Data calibrated weighing parameters
 - Connectivity at airport level
- Data:
 - Starting from 1990
 - All airports & airlines worldwide

Developed at MIT Laboratory for Aviation and the Environment (LAE)



Volume measures

- Aspatial measures
- Proxy for transport services?
- Not for small (possible remote) airports

Data sources: World Bank & MIT LAE

Correlation between GCI and volume measures

Deciles	Airport level	Country level	
	Movements	Departures	Passengers
1	0.18	0.04	0.00
2	0.15	-0.16	-0.09
3	0.11	-0.02	0.12
4	0.16	0.12	0.06
5	0.09	-0.08	0.17
6	0.12	0.16	-0.11
7	0.11	0.21	0.25
8	0.14	0.31	0.11
9	0.23	0.15	0.20
10	0.83	0.97	0.96
Overall	0.88	0.97	0.95

Trade connectivity

- Suggestions
 - Allow for regional differentiation in trade proxies
 - 1st stage: view distance as geography-fixed effect
 - 2nd stage: redefine as trade connectivity: $\sum EC_DIST^\beta PTN^\delta$

• Market Access = Transport connectivity + Trade connectivity + Market Potential

Centre for Environmental Sciences

UHasselt

Bert Lenaerts

bert.lenaerts@uhasselt.be

Florian Allroggen

fallrogg@mit.edu

Robert Malina

robert.malina@uhasselt.be



UHASSELT