Maritime Connectivity:
The Evolving Role of Ports in Global Shipping Networks

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Session III: The Evolution of Global Shipping Industry & Shipping Routes

Enabling Trade. Energizing The World

Why "connectivity"?

How to measure it?

What are the trends?

Challenges for the seaport

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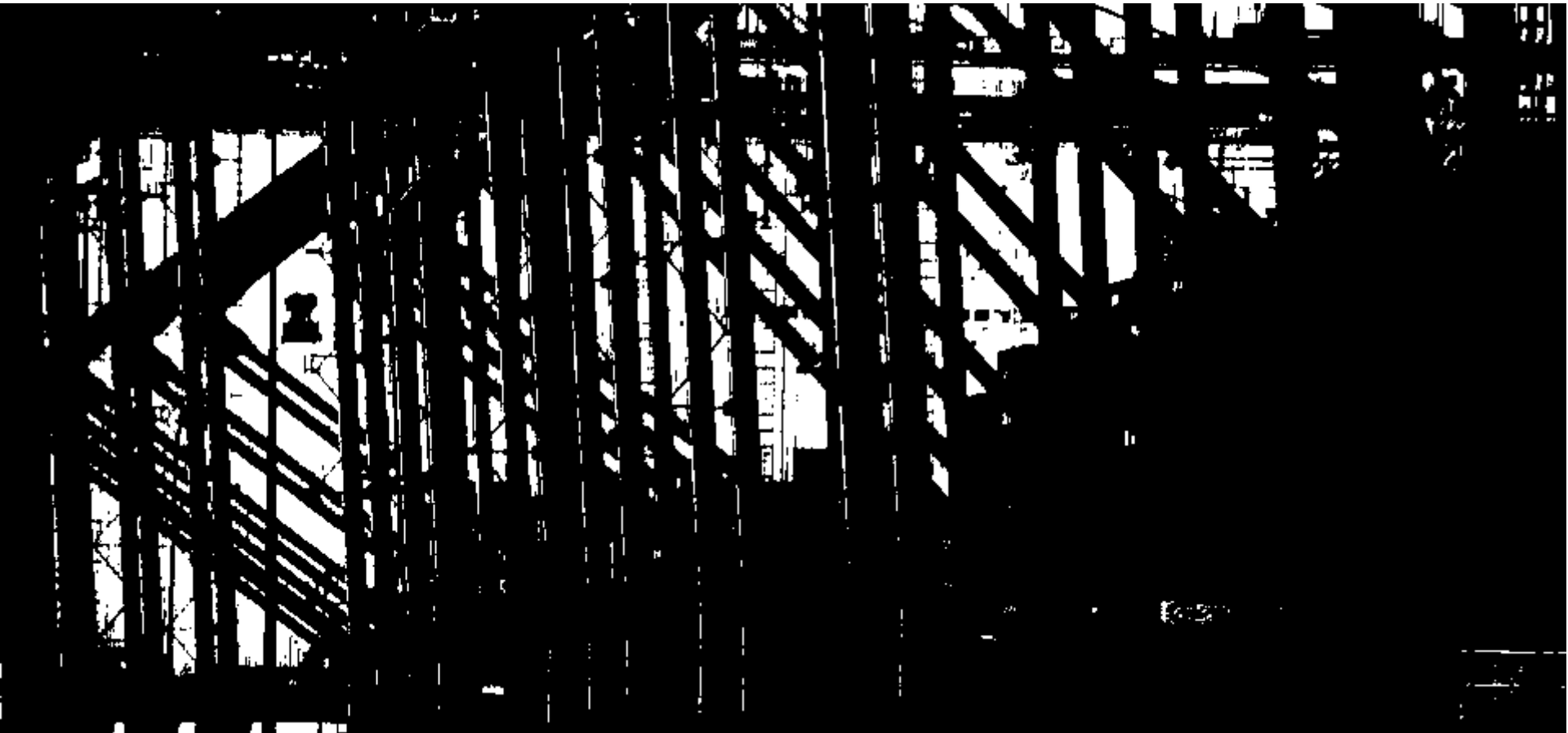
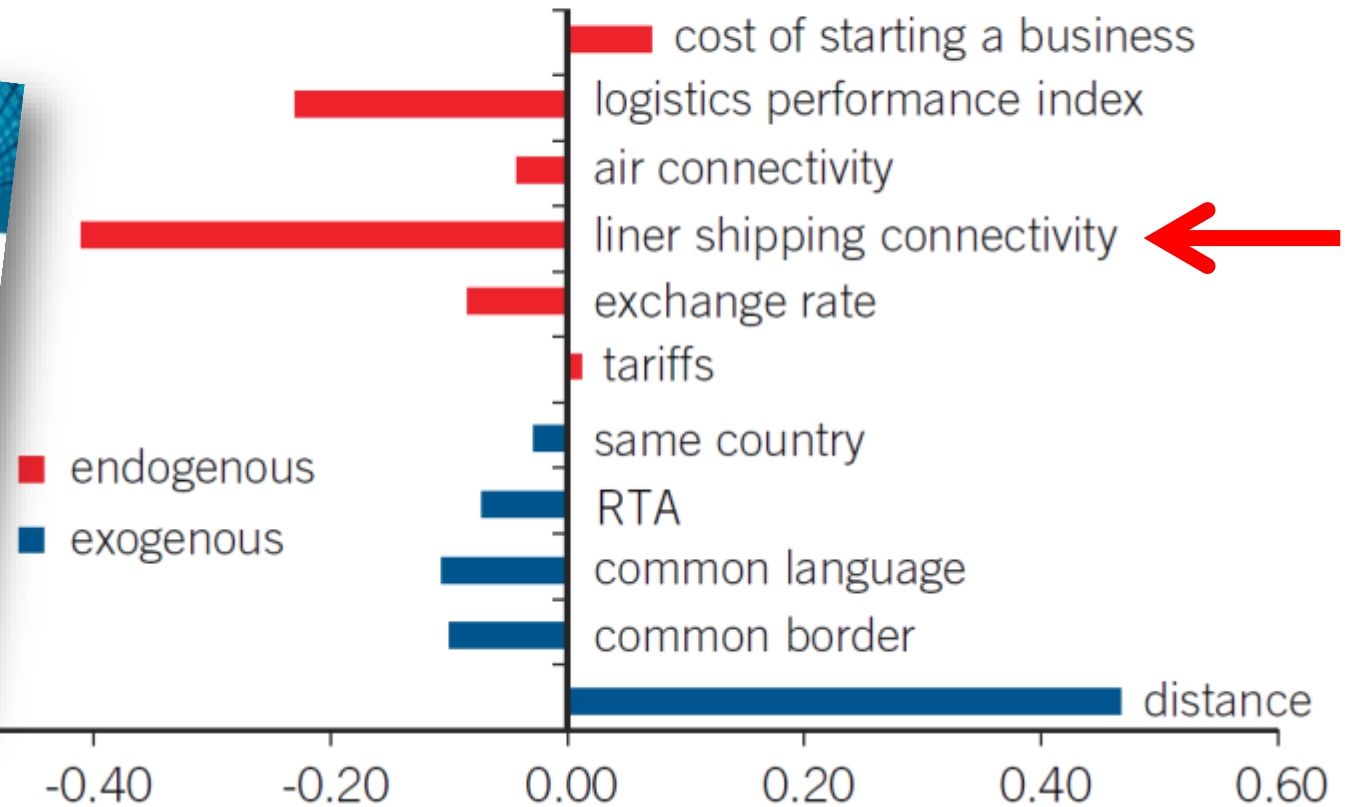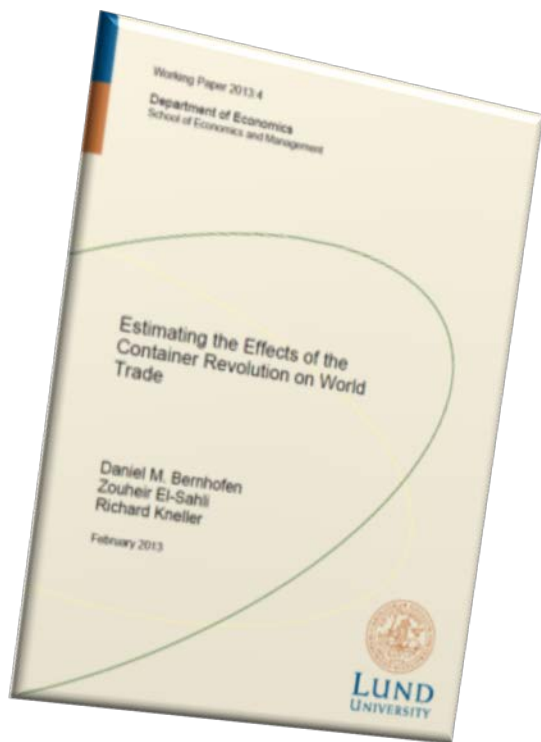# Challenges for the seaport

Figure 1. Relative Impact of Different Sources of Trade Costs

(normalized regression coefficients ["betas"] against the indicator measuring the cost component)

(Arvis et al, 2013)

Estimating the Effects of the Container Revolution on World Trade

Daniel M. Bernhofen
Zouheir El-Sahli
Richard Kneller

February 2013

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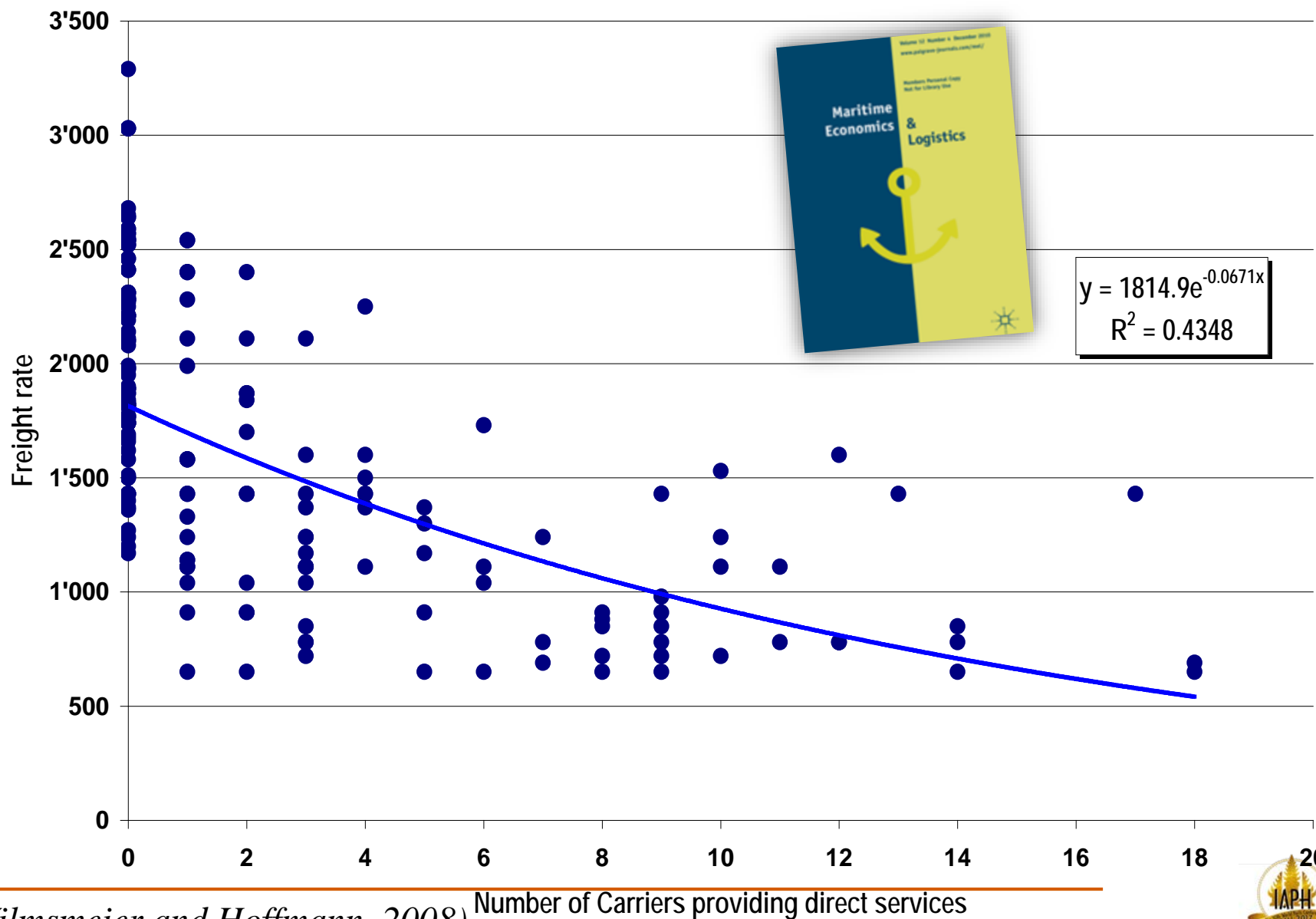
Free exchange

The humble hero

Containers have been more important for globalisation than freer trade

(Bernhofen et al, 2013)

# Better connectivity leads to lower freight rates

$$y = 1814.9e^{-0.0671x}$$
$$R^2 = 0.4348$$

Freight rate

Number of Carriers providing direct services

(Wilmsmeier and Hoffmann, 2008)

More liner services lead to lower maritime transport costs

Variable	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13
Observations	N = 75 928	N = 75 928	N = 75 928	N = 75 928	N = 75 928	N = 35 438	N = 73 818
TONS$_k$	-0.0863 (-57.65)	-0.0863 (-57.67)	-0.0869 (-58.11)	-0.0846 (-56.51)	-0.0874 (-58.85)	-0.0632 (-29.15)	-0.0857 (-57.00)
VALUEPERTON$_k$	0.3422 (128.74)	0.3416 (128.82)	0.3416 (128.94)	0.3408 (128.38)	0.3374 (127.73)	0.4665 (113.19)	0.3447 (129.16)
DISTANCE$_{ij}$	0.3716 (95.80)	0.3698 (97.26)		0.3716	0.3890 (96.81)	0.3380 (55.36)	0.1769 (30.28)
BILATERALVOLUME$_{ij}$	-0.0100 (-4.46)	-0.0109 (-5.53)			-0.0322 (-13.70)	-0.0794 (-23.74)	0.0256 (10.91)
BALANCEROUTE$_{ij}$	0.00020 (1.73)	0.00027 (2.40)			0.00022 (-1.80)	0.00082 (5.06)	0.00228 (14.31)
LINERSERVICES$_{ij}$							-0.1129 (-32.60)
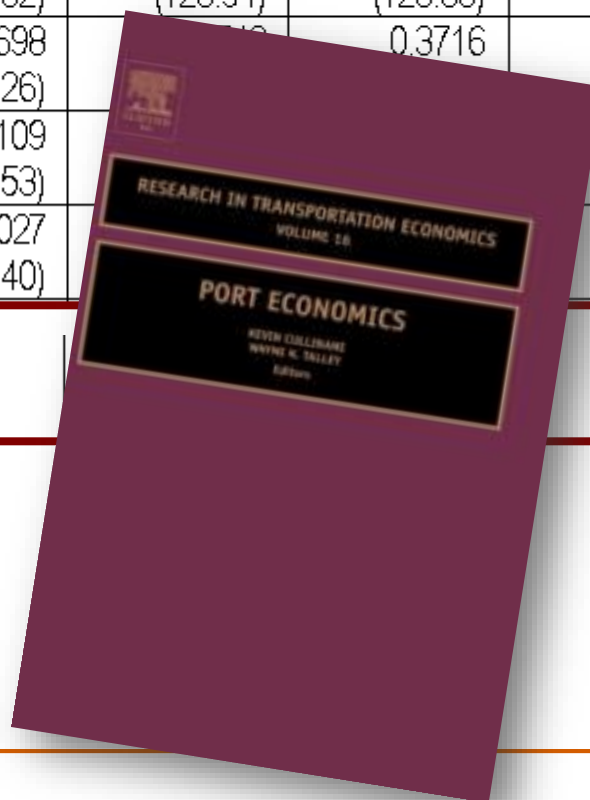
(Wilmsmeier et al 2006)

More trade
-> More shipping supply
-> More competition
-> lower freights
-> More trade

Better services

-> More trade

-> More income to
finance infrastructure

-> Better services

Lower Transport Costs

-> More trade

-> Economies of scale

-> Lower Transport Costs

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Challenges for the seaport

1) Per country – in a "point"
2) Per route – between pairs of countries

1) Per country – in a "point" (159)
2) Per route – between pairs of countries

1) Per country – in a "point" (159)
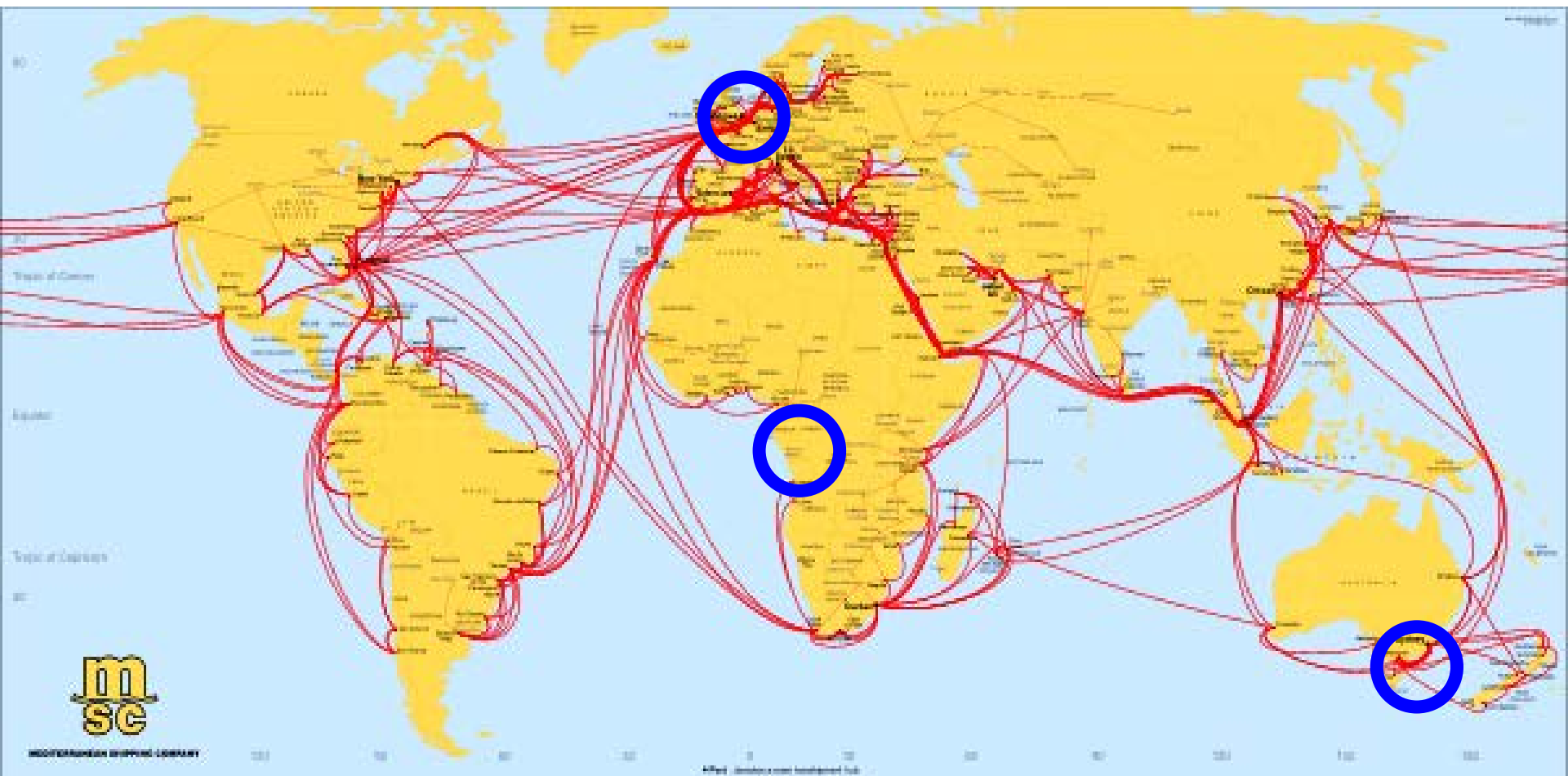2) <u>Per route</u> – between countries (159*158/2=12561)

1) Per country – in a "point" (159)
2) Per route – between pairs of countries

UNCTAD developed the Liner Shipping Connectivity Index
– **LSCI** –
using the following 5 components:

- Companies
- Services
- Largest ship
- Number of ships
- TEU

Source for components: *CI-Online* and *MDS Transmodal*

LSCI on-line

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Liner shipping connectivity index, annual, 2004-2016 ℹ

Other: ▦ MEASURE ℹ - Index (Maximum 2004=100) ℹ

YEAR / ECONOMY	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ghana	12.48	12.64	13.80	14.99	18.13	19.33	17.28	18.01	17.89	19.35	21.69	21.85	20.70
Gibraltar	..	..	..	..	..	..	..	..	..	..	..	..	..
Greece	30.22	29.07	31.29	30.70	27.14	41.91	34.25	32.15	45.50	45.35	47.25	46.81	47.41
Greenland	2.32	2.32	2.27	2.27	2.36	2.27	2.27	2.30	2.30	2.30	2.30	2.30	2.30
Grenada	2.30	2.52	3.37	4.09	4.20	4.13	3.71	3.93	4.04	4.59	4.45	4.02	4.00
Guam	10.50	10.52	9.56	8.73	8.56	8.57	8.78	8.76	8.41	7.85	8.38	8.33	8.33
Guatemala	12.28	13.85	18.13	15.40	15.44	14.73	13.33	20.88	20.07	20.28	21.17	20.27	20.30
Guinea	6.13	6.89	8.71	8.47	6.41	8.32	6.28	6.21	7.42	8.06	5.78	9.01	8.92
Guinea-Bissau	2.12	5.19	5.03	5.22	5.34	3.54	3.50	4.07	4.31	4.00	3.98	3.97	3.97
Guyana	4.54	4.37	4.60	4.51	4.36	4.34	3.95	3.96	4.06	4.31	4.13	4.64	4.52
Haiti	4.91	3.43	2.91	2.87	3.44	4.40	7.58	4.75	5.08	5.12	5.07	6.54	6.31
Holy See	..	..	..	..	..	..	..	..	..	..	..	..	..
Honduras	9.11	8.64	8.29	8.76	9.26	10.68	9.09	9.42	10.03	10.73	11.13	10.43	9.96
Hungary	..	..	..	..	..	..	..	..	..	..	..	..	..
Iceland	4.72	4.88	4.75	4.72	4.72	4.73	4.70	4.68	4.68	4.66	4.41	4.43	4.36
India	34.14	36.88	42.90	40.47	42.18	40.97	41.40	41.52	41.29	44.35	45.61	45.85	46.24
Indonesia	25.88	28.84	25.84	26.27	24.85	25.68	25.60	25.91	26.28	27.41	28.06	26.98	27.19
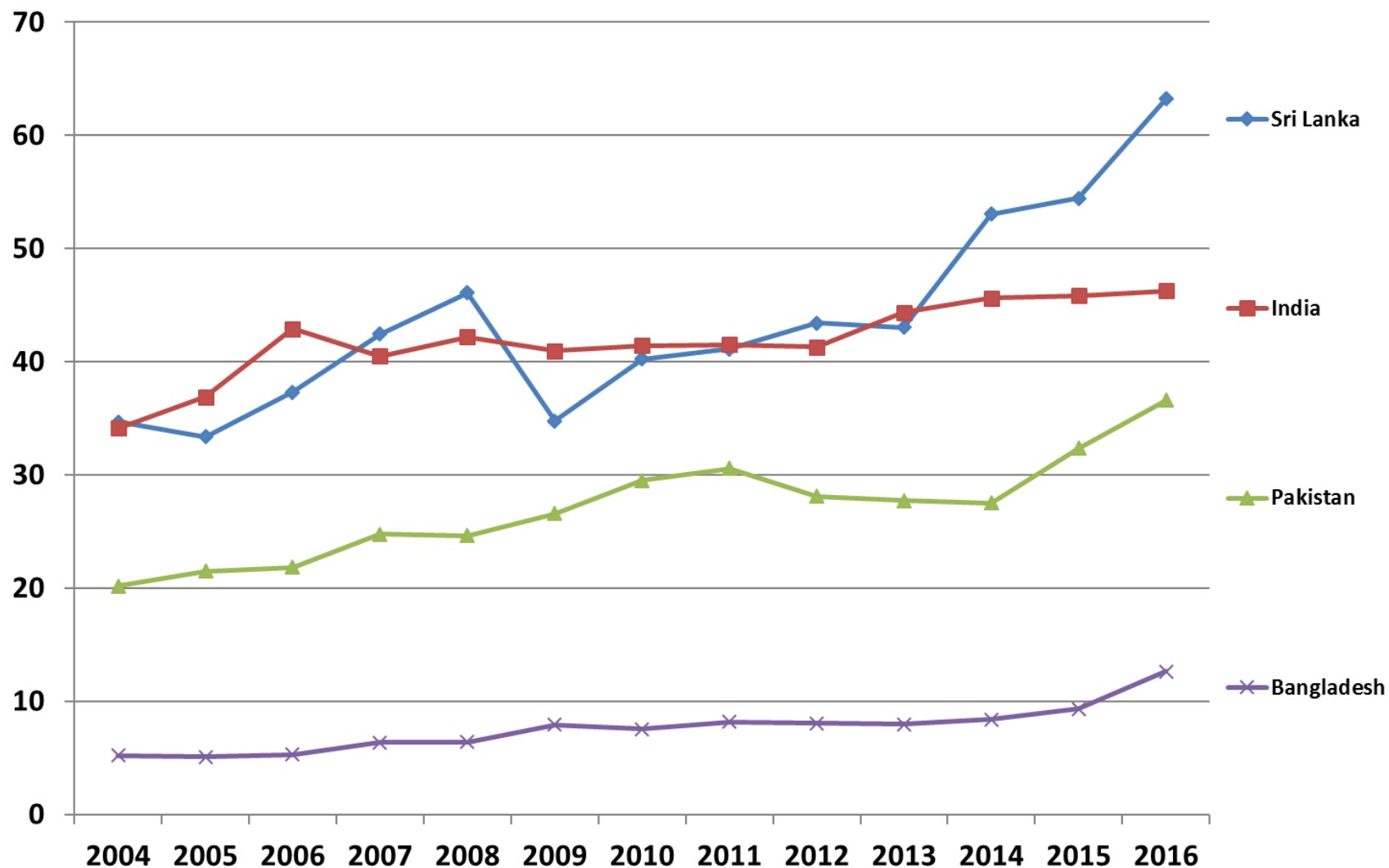
http://stats.unctad.org/LSCI
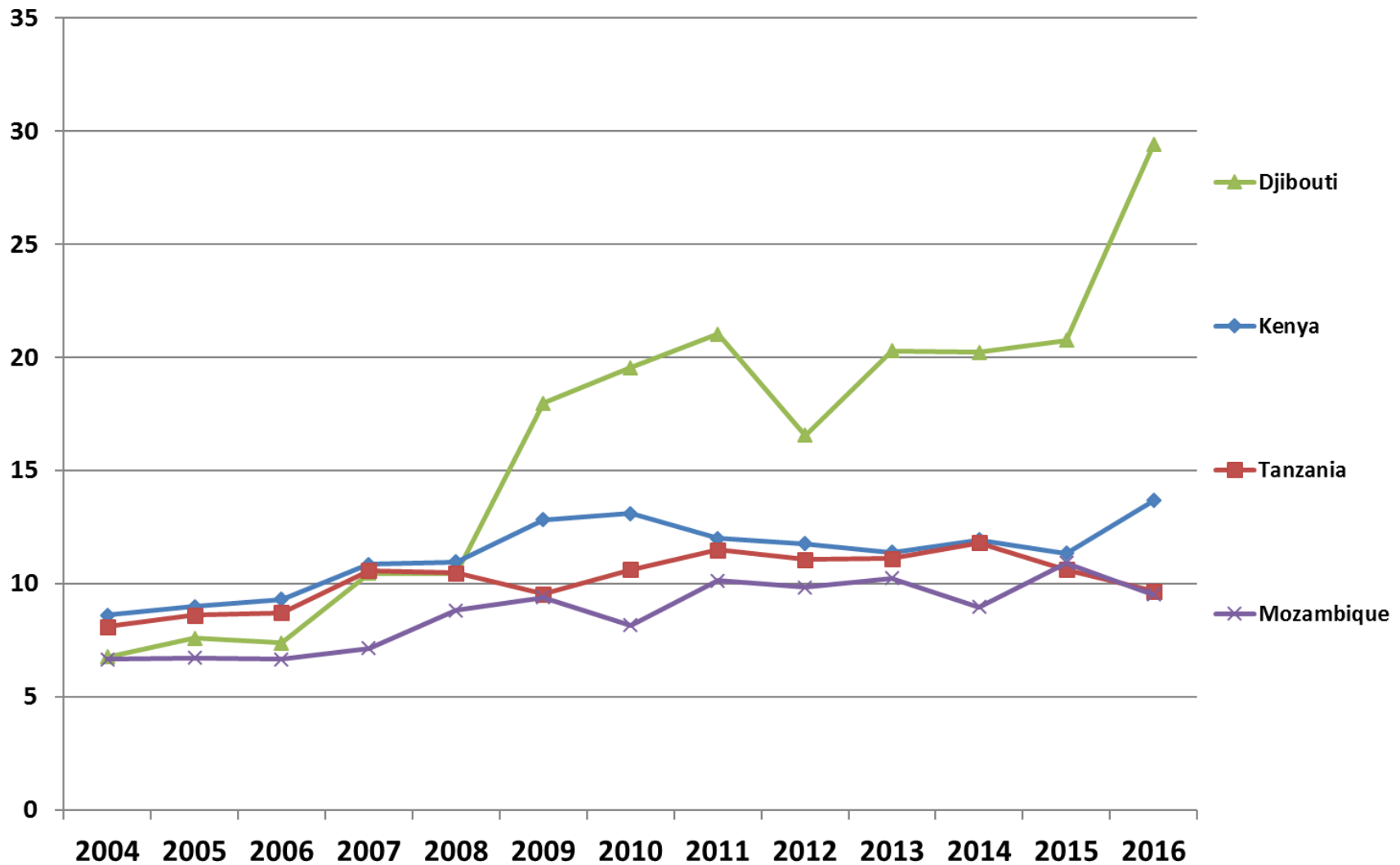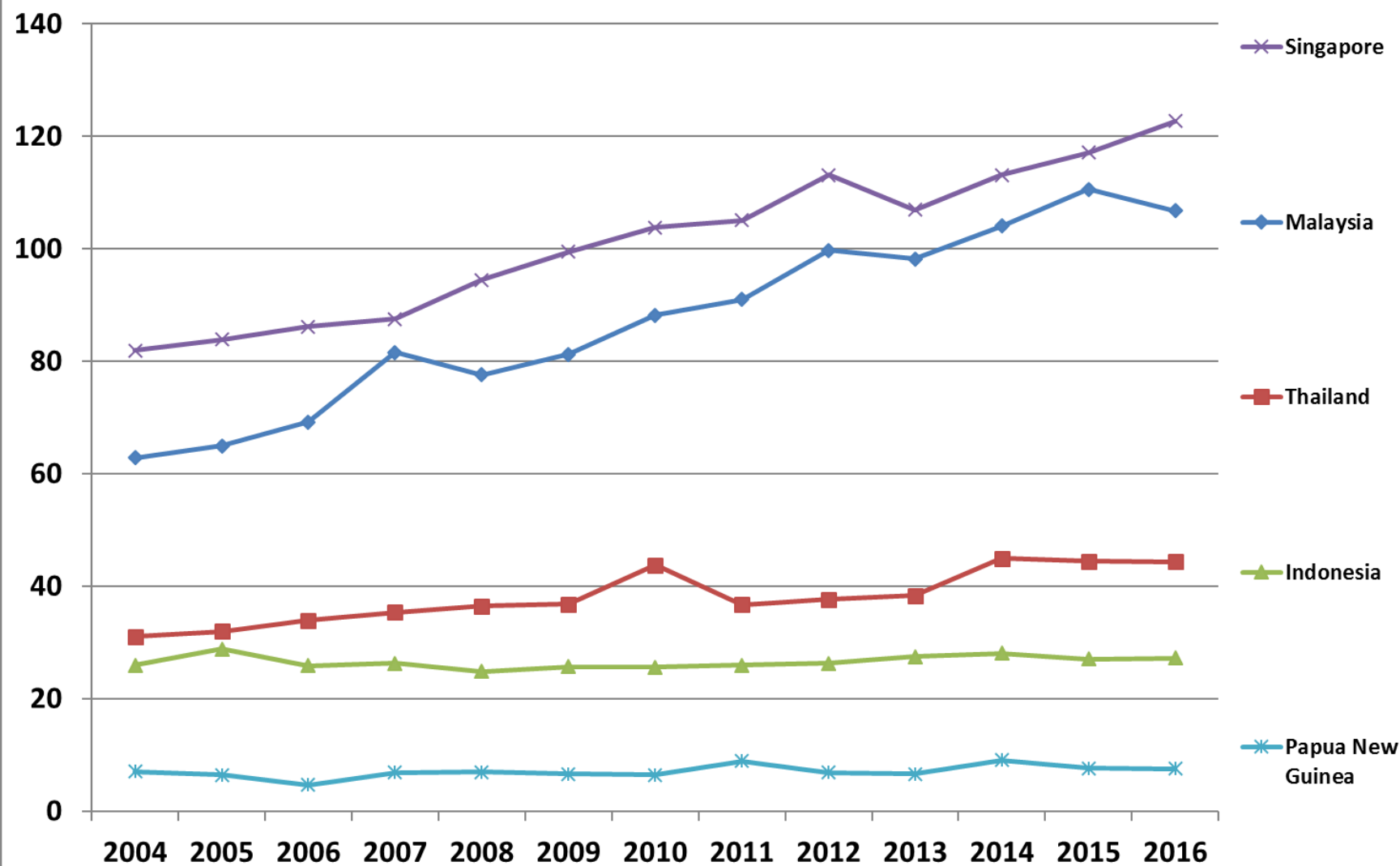
Trends in selected countries

LSCI - Liner Shipping Connectivity Index

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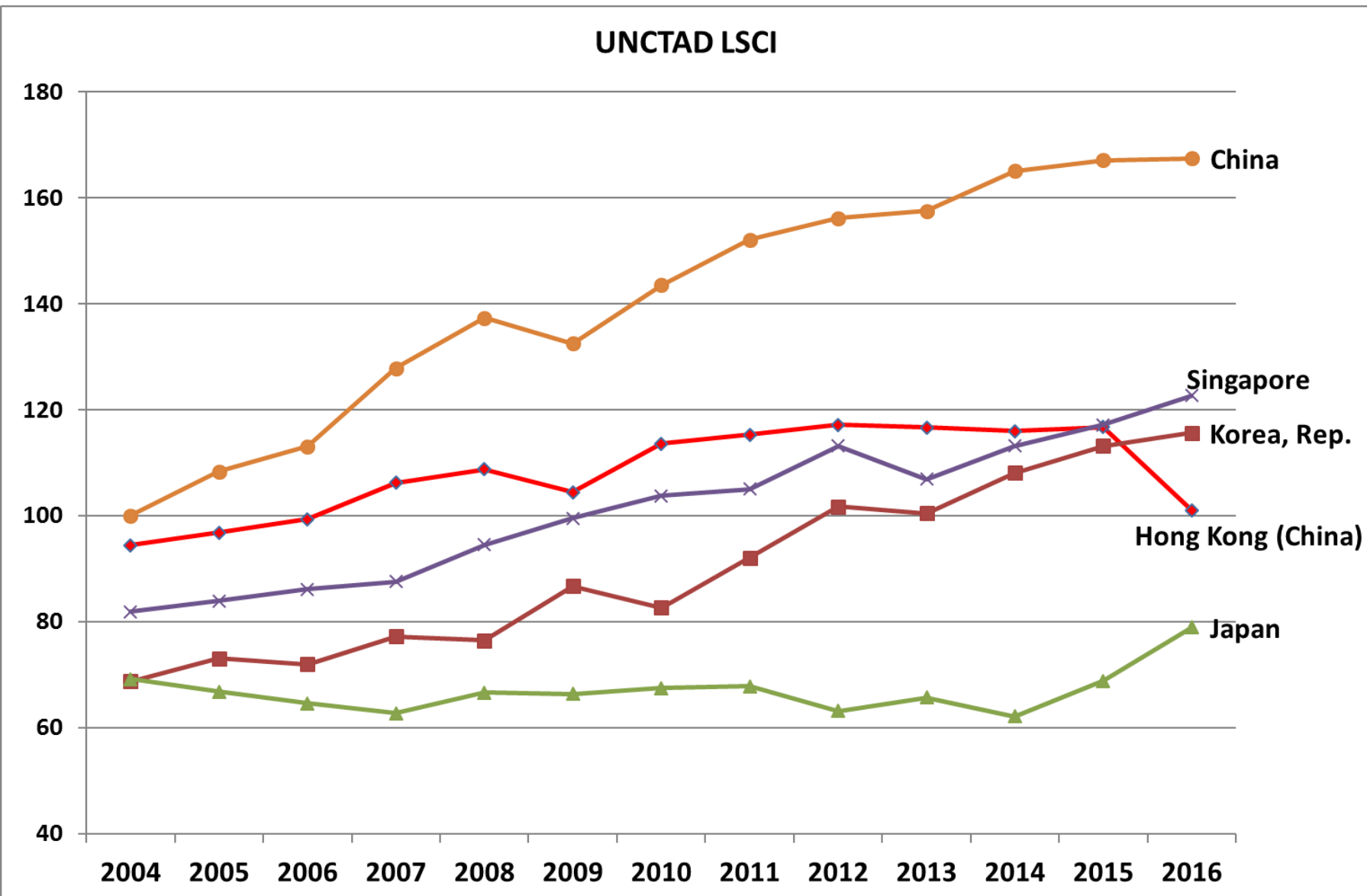# Trends in selected countries

LSCI - Liner Shipping Connectivity Index

Trends in selected countries
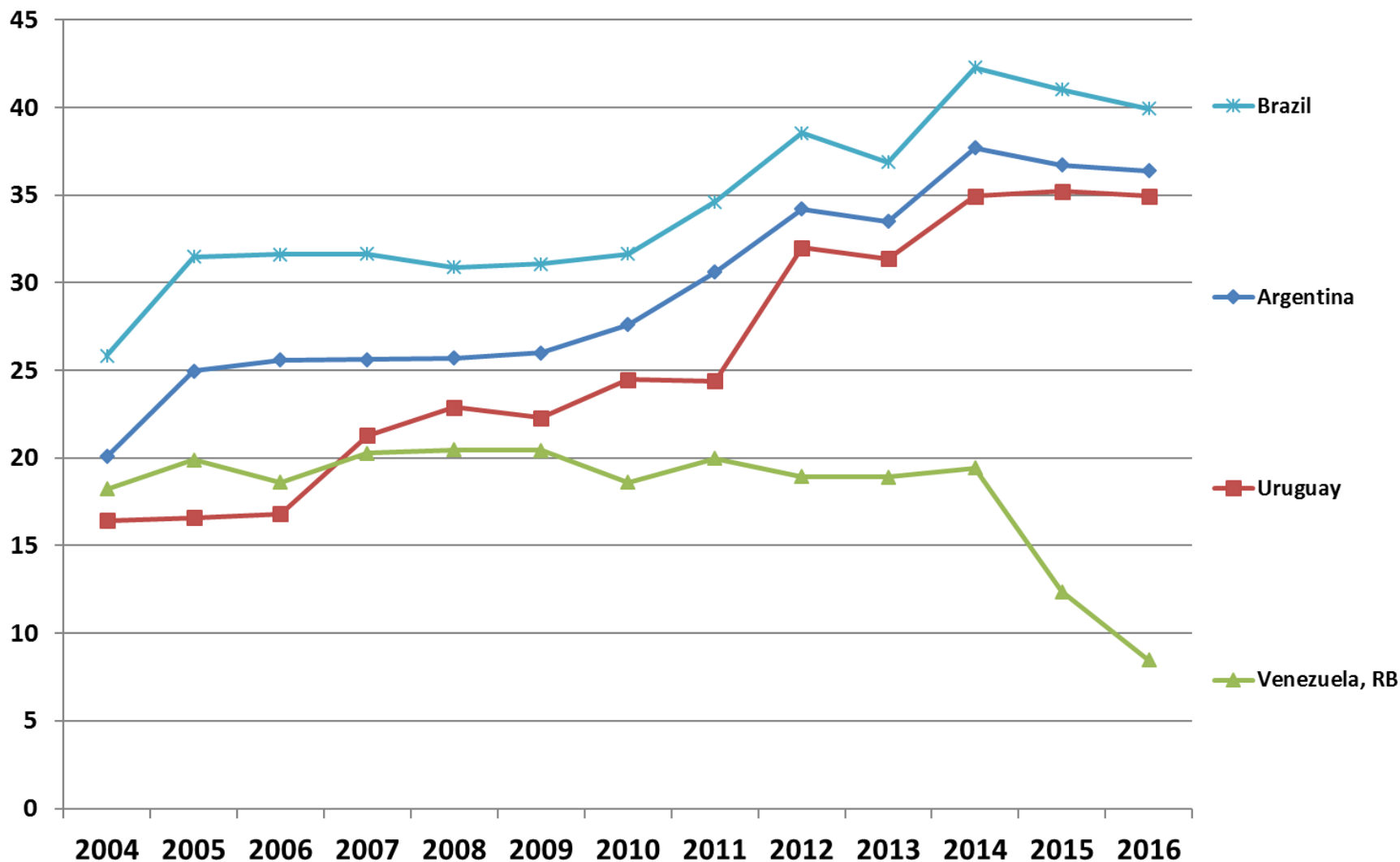

UNCTAD LSCI — Line chart showing the Liner Shipping Connectivity Index for selected countries from 2004 to 2016: China, Singapore, Korea, Rep., Hong Kong (China), and Japan.

Trends in selected countries

LSCI - Liner Shipping Connectivity Index

The Top Five today (May 2017) – fleet deployment

	Total number of services	Total number of ships scheduled on the services	Total number of operators	Max ship capacity (TEU)	Deployed annual capacity (TEU)
China	463	1,996	907	18,506	85,347,681
Singapore	246	1,217	526	18,506	51,717,456
Republic of Korea	245	1,017	465	18,506	40,924,768
Hong Kong	201	940	426	18,506	39,589,202
Malaysia	196	906	365	18,506	36,663,697

The Top Five today (May 2017) – direct liner services

Country	Number of countries connected with direct service	Average of services per direct connection	Average nunber of operators on direct connections
Belgium	103	6.5	11.9
United Kingdom	101	6.6	12.8
United States	101	8.6	19.2
China	96	18.7	44.4
Spain	96	7.4	12.0

MDS Transmodal™
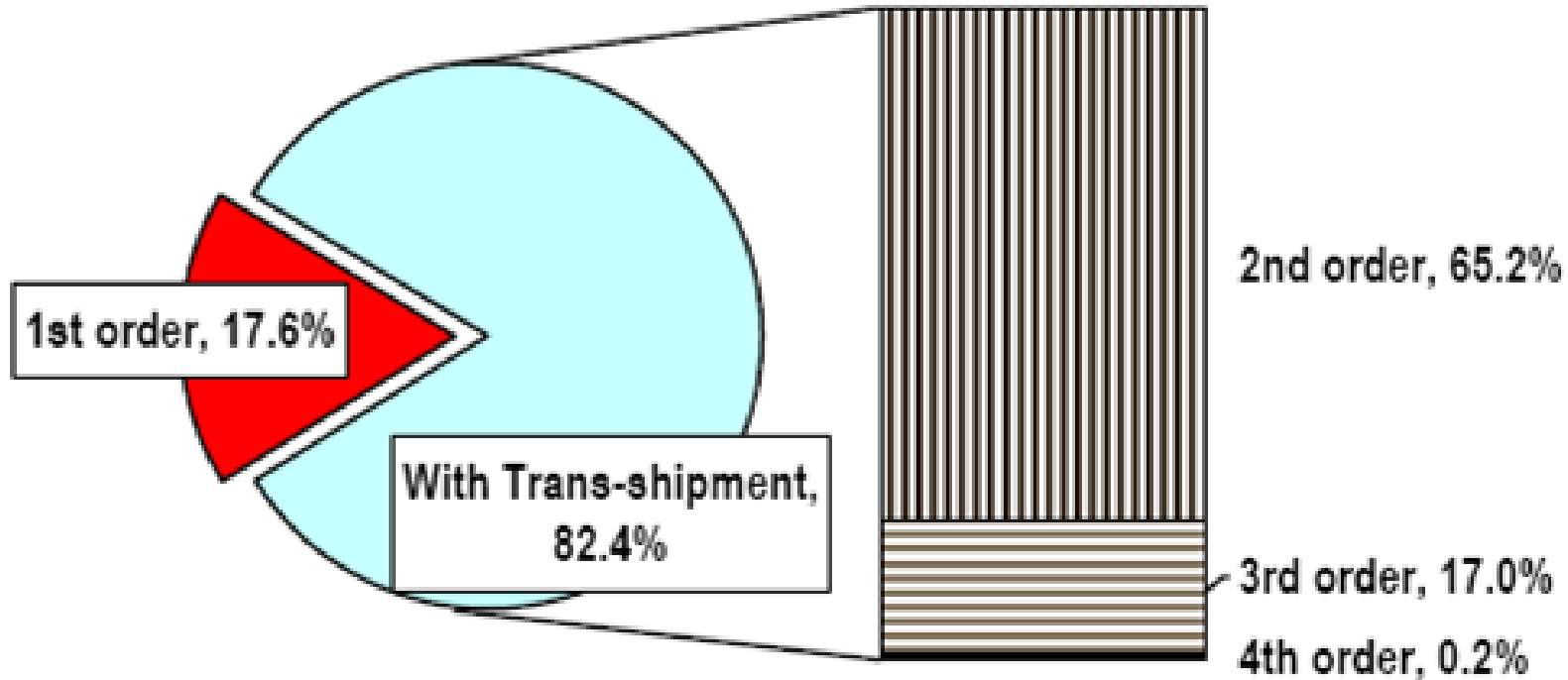
1) Per country – in a "point" ✔

2) Per route – between countries (12561)

Out of 162 x 161 pairs of countries:
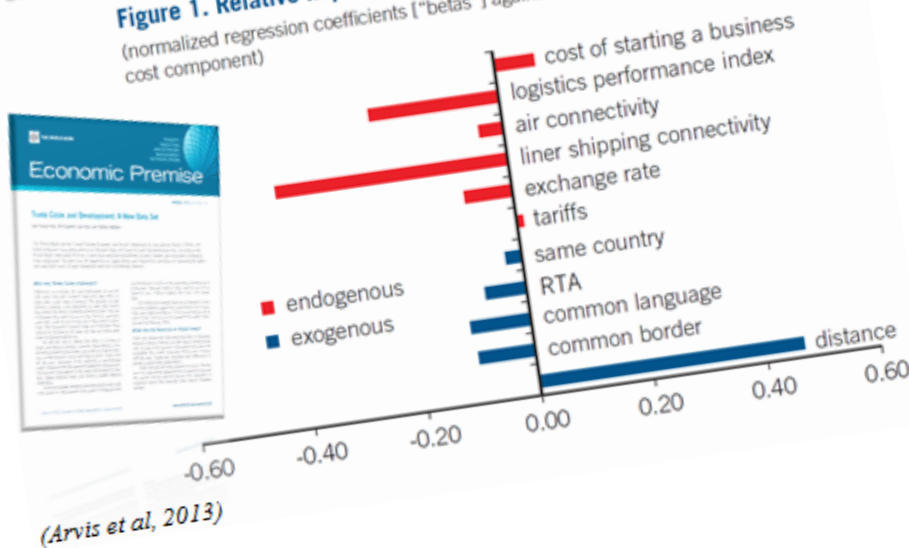
How many are connected by direct services?

1st order, 17.6%

With Trans-shipment, 82.4%

2nd order, 65.2%

3rd order, 17.0%

4th order, 0.2%

- Use national-level data:

  e.g. geometric average of country-level LSCI

Higher Liner Shipping Connectivity leads to lower trade costs

Figure 1. Relative Impact of Different Sources of Trade Costs (normalized regression coefficients ["betas"] against the indicator measuring the cost component)

- endogenous
- exogenous

cost of starting a business
logistics performance index
air connectivity
liner shipping connectivity
exchange rate
tariffs
same country
RTA
common language
common border
distance

-0.60 -0.40 -0.20 0.00 0.20 0.40 0.60

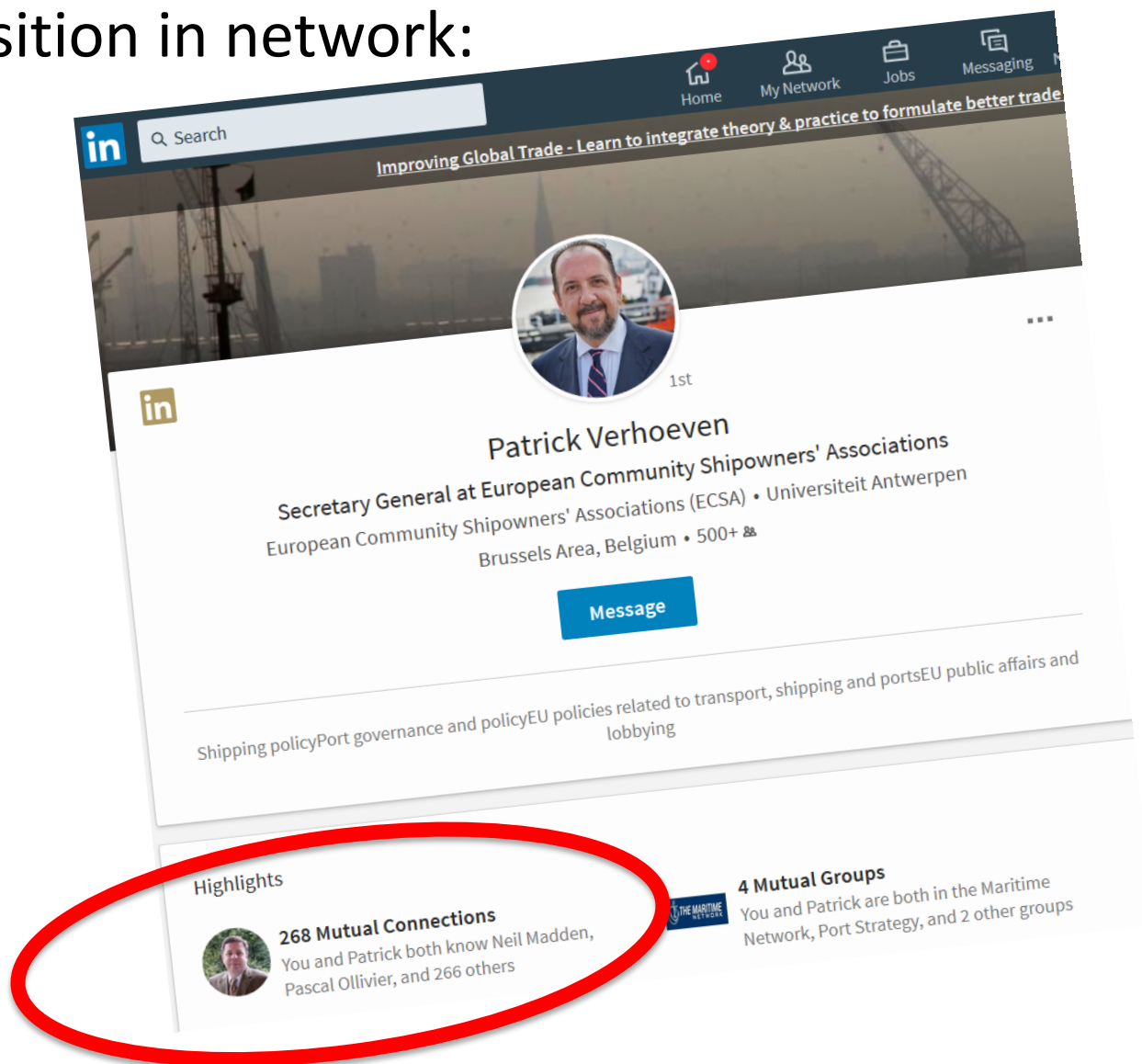(Arvis et al, 2013)

Economic Premise

- Direct connectivity:
  - Number of companies (competition)
  - Number of services (transport options)
  - Largest ship (infrastructure)

- ## Position in network:

  e.g. Number of options to get from A to B
  with one (or two) transshipment(s)
  -> number of common connections

- ## Position in network:

- Combine with distance:

  e.g. what's the shortest distance to get from A to B with transshipments (if there is no direct service)

- Combinations of the above…
  - e.g. Largest ship on connections with transshipment (Max-Min)
  - Level of competition on routes with transshipment
  - (…)

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Liner shipping bilateral connectivity index, annual, 2006-2016

Other: MEASURE - Index   YEAR ▼ 2016 ◀▶

PARTNER / ECONOMY	Albania	Algeria	American Samoa	Angola	Antigua and Barbuda	Argentina	Aruba	Australia	Bahamas	Bahrain	Bangladesh	Barbados	Belgium	Belize	Benin	Bermuda	Brazil	Brunei Darussalam	Bulgaria	Cabo Verde	Cambodia	Cameroon	Canada
Albania	_	0.175	0.102	0.113	0.105	0.179	0.106	0.185	0.180	0.102	0.100	0.107	0.206	0.103	0.183	0.081	0.183	0.095	0.160	0.099	0.099	0.183	0.187
Algeria	0.175	_	0.176	0.223	0.189	0.234	0.193	0.235	0.229	0.183	0.125	0.193	0.342	0.191	0.233	0.148	0.246	0.111	0.175	0.185	0.121	0.228	0.256
American Samoa	0.102	0.176	_	0.193	0.181	0.200	0.187	0.233	0.199	0.186	0.173	0.184	0.234	0.183	0.194	0.149	0.205	0.161	0.107	0.104	0.177	0.192	0.217
Angola	0.113	0.223	0.193	_	0.195	0.346	0.200	0.301	0.323	0.290	0.224	0.200	0.425	0.212	0.356	0.151	0.359	0.188	0.124	0.205	0.205	0.341	0.354
Antigua and Barbuda	0.105	0.189	0.181	0.195	_	0.205	0.211	0.212	0.209	0.186	0.114	0.296	0.250	0.192	0.195	0.152	0.220	0.104	0.109	0.162	0.113	0.194	0.218
Argentina	0.179	0.234	0.200	0.346	0.205	_	0.217	0.332	0.355	0.296	0.251	0.219	0.481	0.218	0.304	0.154	0.489	0.189	0.122	0.188	0.209	0.284	0.384
Aruba	0.106	0.193	0.187	0.200	0.211	0.217	_	0.229	0.223	0.195	0.123	0.217	0.321	0.205	0.199	0.153	0.234	0.107	0.113	0.175	0.121	0.197	0.288
Australia	0.185	0.235	0.233	0.301	0.212	0.332	0.229	_	0.312	0.276	0.265	0.227	0.426	0.227	0.307	0.156	0.346	0.195	0.181	0.191	0.218	0.285	0.370
Bahamas	0.180	0.229	0.199	0.323	0.209	0.355	0.223	0.312	_	0.295	0.215	0.221	0.440	0.228	0.279	0.155	0.370	0.176	0.118	0.189	0.196	0.269	0.359
Bahrain	0.102	0.183	0.186	0.290	0.186	0.296	0.195	0.276	0.295	_	0.221	0.194	0.356	0.198	0.257	0.152	0.302	0.180	0.173	0.111	0.199	0.234	0.320
Bangladesh	0.100	0.125	0.173	0.224	0.114	0.251	0.123	0.265	0.215	0.221	_	0.127	0.290	0.126	0.238	0.082	0.256	0.180	0.112	0.102	0.201	0.216	0.250
Barbados	0.107	0.193	0.184	0.200	0.296	0.219	0.217	0.227	0.221	0.194	0.127	_	0.268	0.196	0.200	0.153	0.237	0.111	0.111	0.165	0.123	0.199	0.233
Belgium	0.206	0.342	0.234	0.425	0.250	0.481	0.321	0.426	0.440	0.356	0.290	0.268	_	0.265	0.384	0.163	0.513	0.207	0.220	0.226	0.243	0.395	0.484
Belize	0.103	0.191	0.183	0.212	0.192	0.218	0.205	0.227	0.228	0.198	0.126	0.196	0.265	_	0.198	0.152	0.229	0.103	0.110	0.170	0.116	0.199	0.234
Benin	0.183	0.233	0.194	0.356	0.195	0.304	0.199	0.307	0.279	0.257	0.238	0.200	0.384	0.198	_	0.150	0.315	0.190	0.176	0.192	0.211	0.375	0.313
Bermuda	0.081	0.148	0.149	0.151	0.152	0.154	0.153	0.156	0.155	0.152	0.082	0.153	0.163	0.152	0.150	_	0.156	0.080	0.081	0.081	0.082	0.150	0.157

Why "connectivity"?

How to measure it?

What are the trends?

Challenges for the seaport

Containership deliveries, TEU
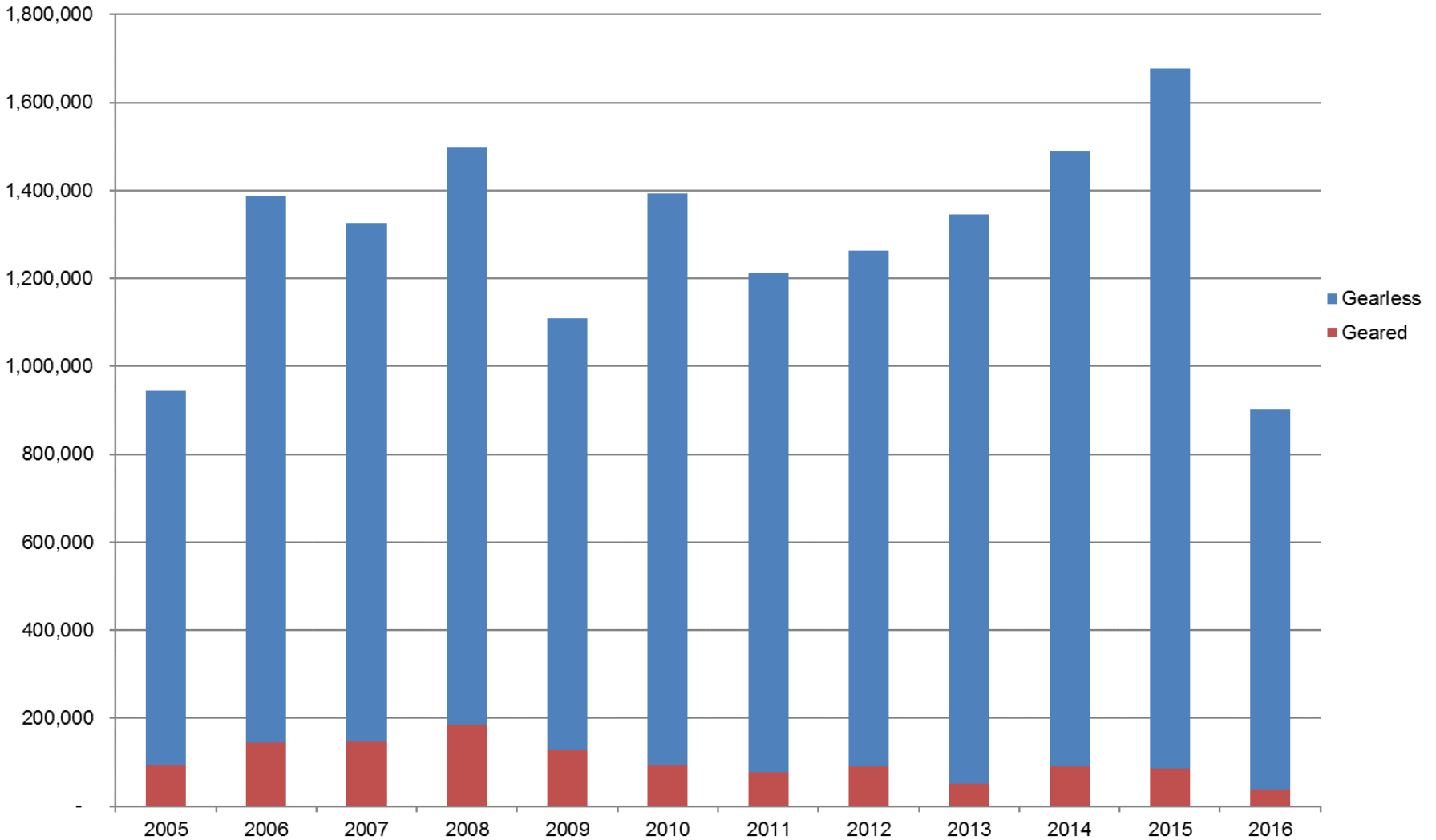
Average fleet deployment, 160 countries

Legend: Number of companies (left axis); Average vessel size (right axis)

Number of companies: 22.1 (2004) → 14.6 (2016)
Average vessel size: 2,259 (2004) → 5,184 (2016)

UNCTAD Trade Logistics

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Jan.Hoffmann@UNCTAD.org
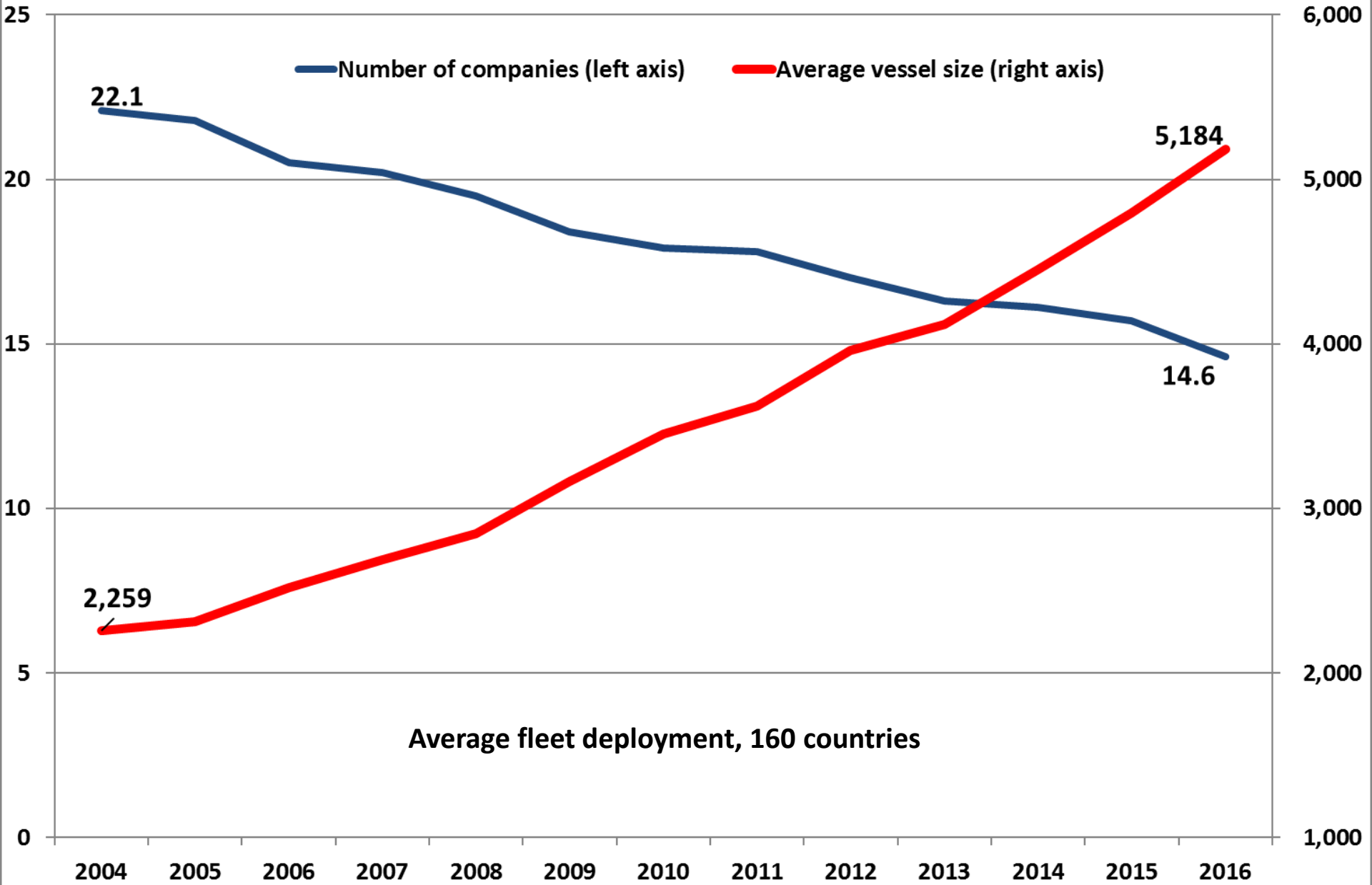
Three irrelevant reasons why carriers should not invest in more mega-container vessels

Today's container shipping

- Ever larger ships
- Extremely low freight rates
- Idle fleet

Why is this a problem?

Why is this a problem?

1) Total logistics costs may actually go up

Why is this a problem?

2) It's a game:

Unless old ships are scrapped, the oversupply will remain, or rather, increase, as carriers build new and larger ships

3) Potential oligopolies in small markets

Global fleet deployment (country averages)
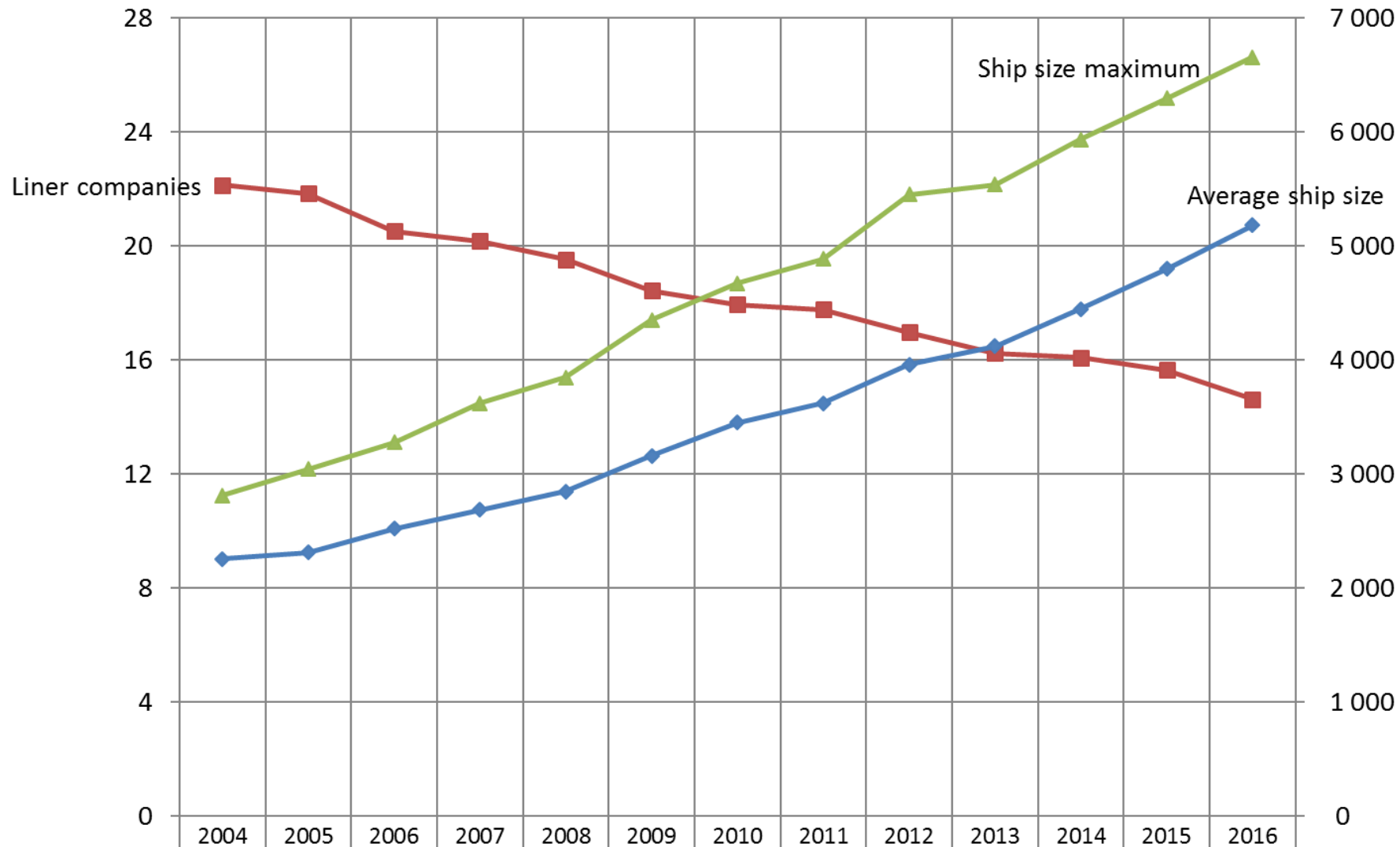
Source: UNCTAD Review of Maritime Transport 2016 based on data from CI-Online

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Liner companies	22.1	21.8	20.5	20.2	19.5	18.4	17.9	17.8	17.0	16.3	16.1	15.7	14.6
Average ship size	2 259	2 312	2 520	2 689	2 848	3 161	3 452	3 622	3 962	4 121	4 449	4 798	5 184
Ship size maximum	2 812	3 045	3 279	3 620	3 847	4 353	4 673	4 889	5 452	5 540	5 937	6 298	6 656

Ever more important role of seaports…

… in an ever more challenging environment.

- Parts of networks: ever less captive markets.
- Stronger and fewer "clients" (shipping lines)
- More demanding "clients" (shippers)
- Need to partner with hinterland and governments

What can national policy makers do to improve maritime connectivity?

1. Trade and Transit Facilitation

The good news:
An increasing awareness that transit trade is good for the transit countries!

- It is good for my own ports' business.

- It is good for my own importers and exporters, because it helps improve shipping connectivity.

1. Trade and Transit Facilitation
2. Promote competition

- Ports should promote the liberalization of cabotage and transport markets

1. Facilitate trade and transit: More cargo for your port

2. Promote competition

3. E-Commerce: Connectivity beyond transport

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Higher Liner Shipping Connectivity leads to lower trade costs

Figure 1. Relative Impact of Different Sources of Trade Costs
(normalized regression coefficients ["betas"] against the indicator measuring the cost component)

- cost of starting a business
- logistics performance index
- air connectivity
- liner shipping connectivity
- exchange rate

Trends in selected countries

LSCI - Liner Shipping Connectivity Index

Number of companies (left axis)
Average vessel size (right axis)

22.1

14.6

2,259

5,184

Recommendations for policy makers

1. Facilitate trade and transit: More cargo for your port
2. Promote competition
3. E-Commerce: Connectivity beyond transport

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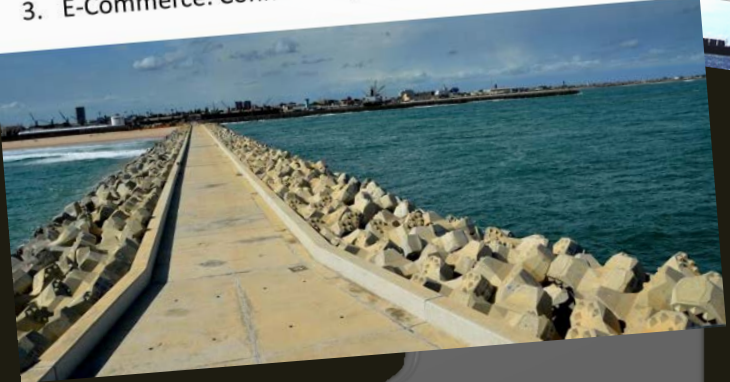
Thank You

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