

Trade regionalisation and international production networks in Asia

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OEET 2nd Workshop on Emerging Economies

Turin, 28 November 2015

Outline

- Introduction
- Revealed trade preferences and international production
 - the case of electronics in Asia
- Network analysis of international trade and production
- Concluding remarks

Introduction

- Trends in international economic integration: a slowdown of globalization?
- Rising number of bilateral and regional preferential trade agreements
- Research questions
 - Has trade become more regionalized?
 - What is the role of international production networks?

The case of electronics in Asia

REVEALED TRADE PREFERENCES AND INTERNATIONAL PRODUCTION NETWORKS

Monitoring trade regionalisation: statistical tools

- *Descriptive measures of trade regionalisation*
 - Trade shares
 - Trade intensity indices
 - Revealed trade preference indices:
 - the regional introversion index
- *Network analysis of regional trade*
 - Community analysis of international trade flows

Trade shares

- Bilateral trade shares

$$S_{ij} = t_{ij} / t_{iw}$$

where:

t_{ij} : trade (exports plus/or imports) between reporting country i and partner country j ;

t_{iw} : trade between reporting country i and the world;

$$0 \leq S_{ij} \leq 1$$

Trade intensity indices

- Bilateral trade intensity indices (Balassa)

$$I_{ij} = S_{ij} / W_{ij} = (t_{ij} / t_{iw}) / (t_{wi} / t_{ww})$$

where: t_{ij} : trade (exports plus/or imports) between reporting country i and partner country j ;

$t_{iw} = t_{wi}$: trade between reporting country i and the world;

t_{ww} = world trade.

- Homogeneous (size-independent) bilateral trade intensity

$$HI_{ij} = S_{ij} / V_{ij} = (t_{ij} / t_{iw}) / (t_{oj} / t_{ow})$$

where: t_{ij} : trade (exports plus/or imports) between reporting country i and partner country j ;

t_{iw} : trade between reporting country i and the world;

t_{oj} : trade between the rest of the world (excluding country i) and country j ;

t_{ow} : trade between the rest of the world and the world.

- Homogeneous extra-bilateral trade intensity

$$HE_{ij} = (1 - S_{ij}) / (1 - V_{ij})$$

Revealed trade preference indices

- Bilateral revealed trade preference indices

$$RTP_{ij} = (HI_{ij} - HE_{ij}) / (HI_{ij} + HE_{ij})$$

$$-1 \leq RTP_{ij} \leq 1$$

- Geographical neutrality (no preferences)

$$RTP_{ij} = 0$$

- Bilateral symmetry:

$$RTP_{ij} = RTP_{ji}$$

- Intra-regional revealed trade preference indices

$$RTP_{ir} = RTP_{ri} = (HI_{ir} - HE_{ir}) / (HI_{ir} + HE_{ir})$$

- **Regional trade introversion index**

$$RTP_{rr} = (HI_{rr} - HE_{rr}) / (HI_{rr} + HE_{rr})$$

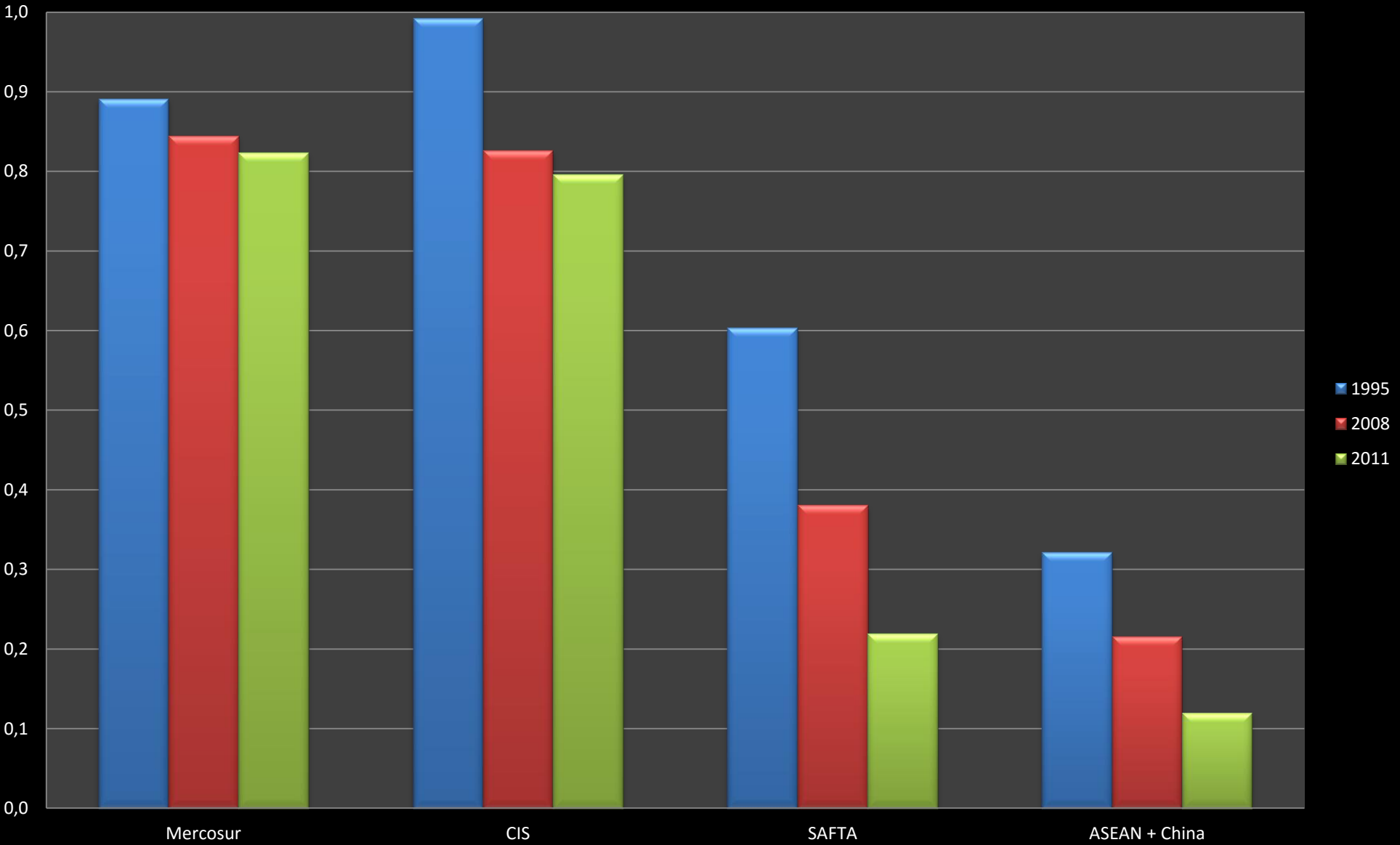
- Regional trade extroversion index

$$RTP_{rw} = - RTP_{rr}$$

- Bi-regional symmetry: for $r = 1, 2$

$$RTP_{11} = RTP_{22}$$

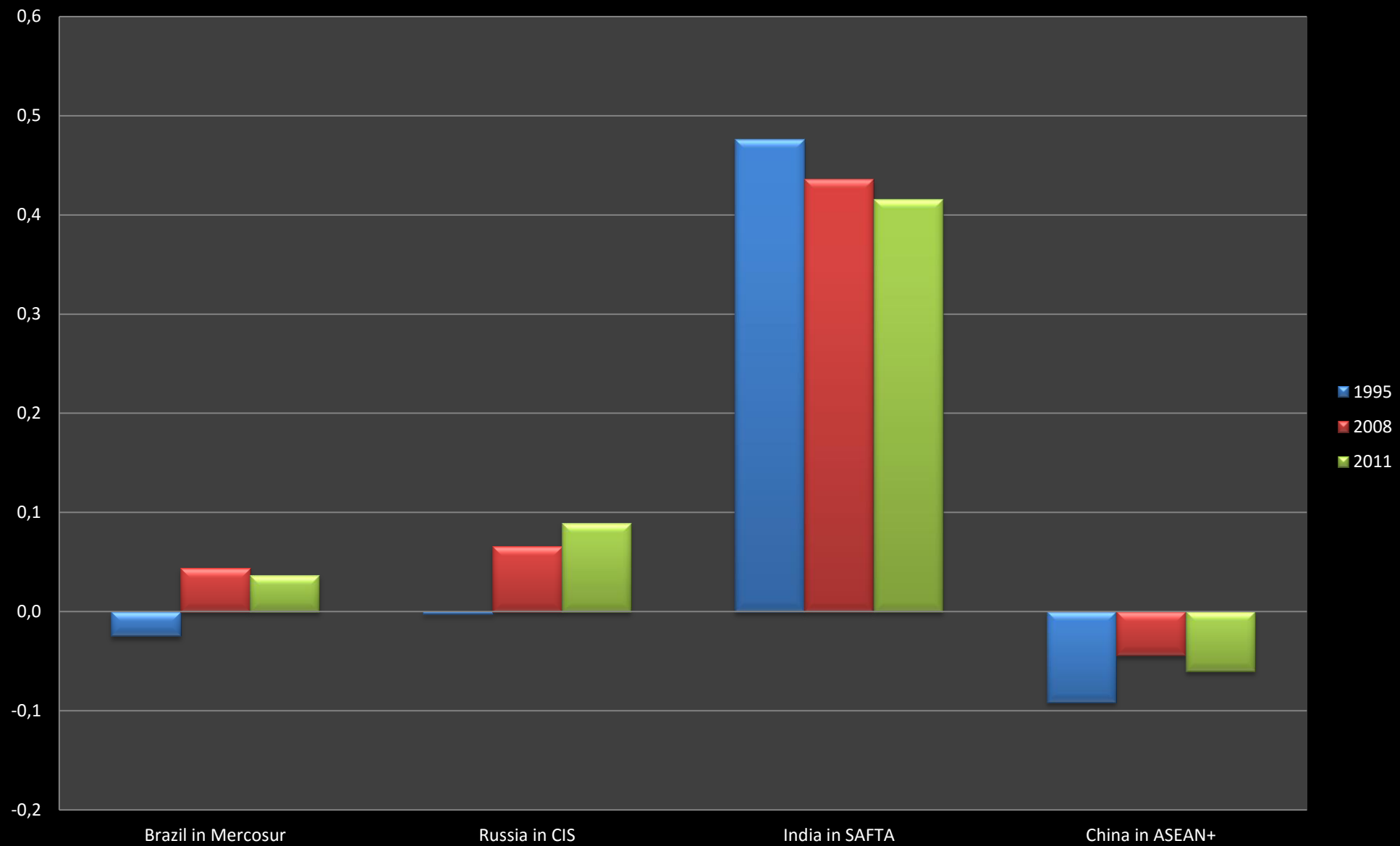
Regional trade introversion indices



Revealed trade leadership indices

- *Local suppliers* ($RTL_{ir} > 0$), whose intra-regional preference is higher for exports than for imports.
 - This can be the result of the leader country attracting foreign direct investment and related imports of intermediate goods, which are used to produce final goods for the entire regional market;
- *Export hubs* ($RTL_{ir} < 0$), whose intra-regional preference is higher for imports than for exports.
 - In some cases, this can be the result of regional production networks, in which final products made of inputs produces in different spokes are exported by the hub country to the rest of the world.

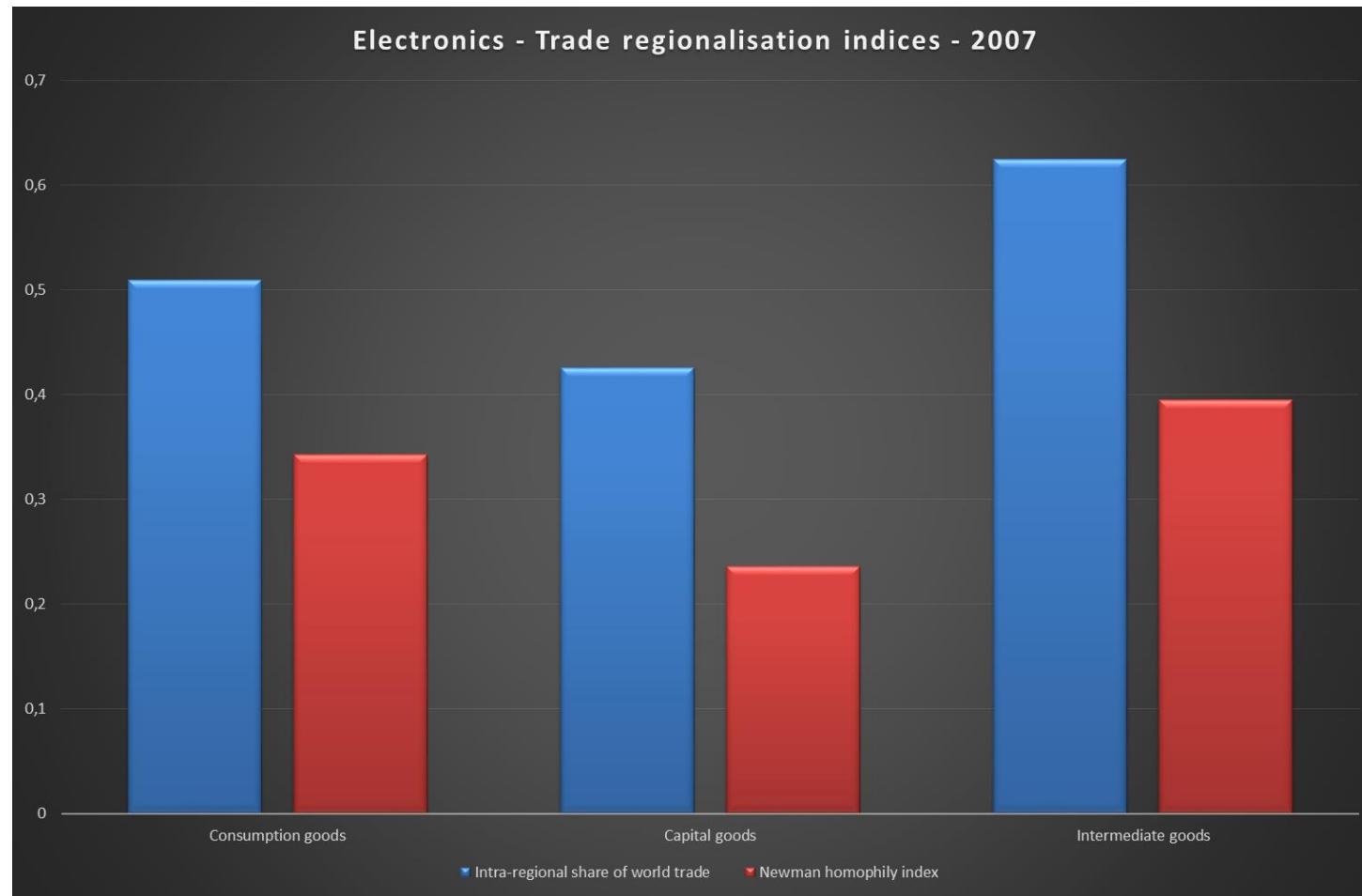
Regional trade leadership indices



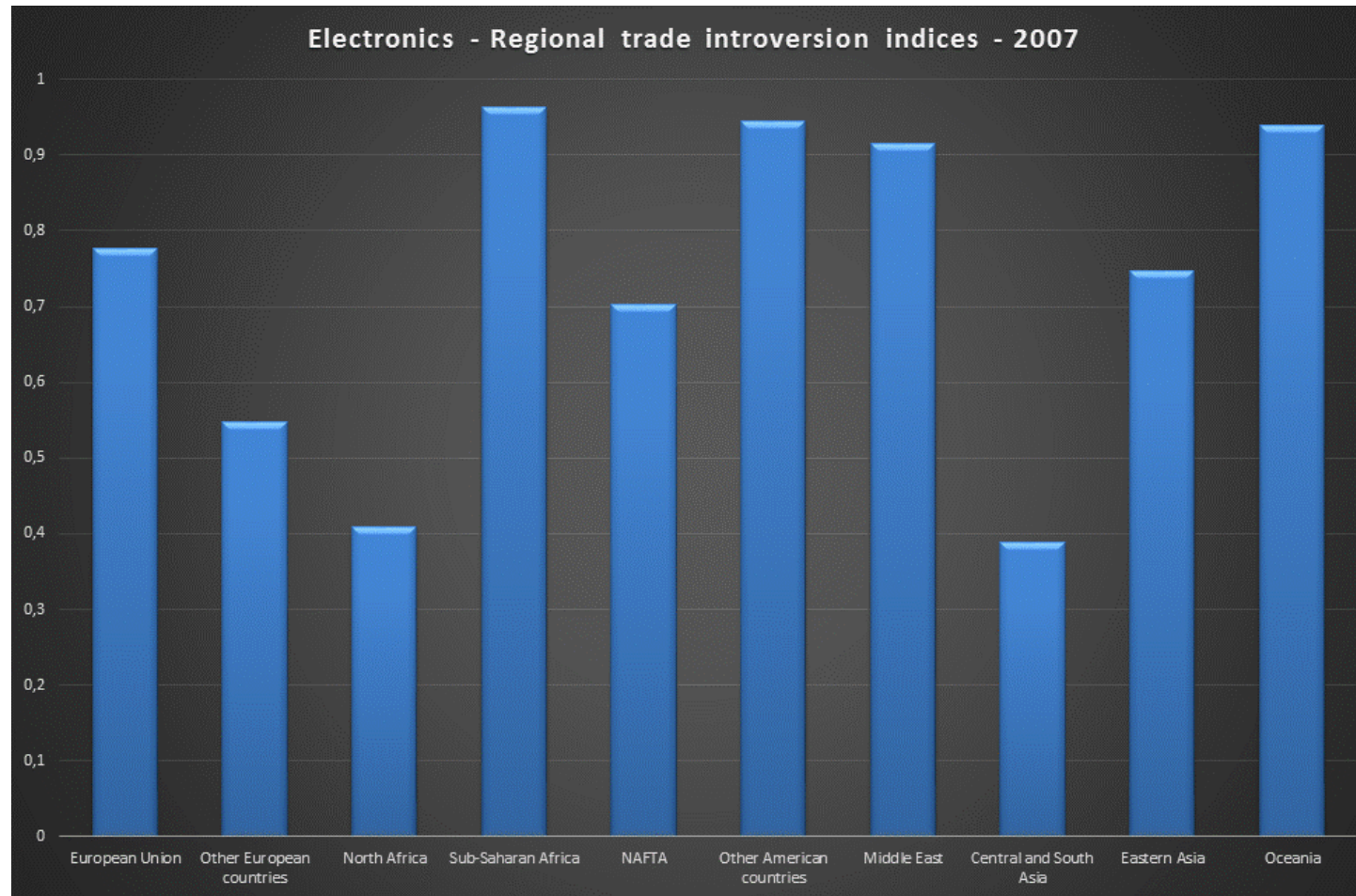
Detecting production networks from trade data

REVEALED TRADE PREFERENCES IN ELECTRONICS: THE CASE OF ASIA

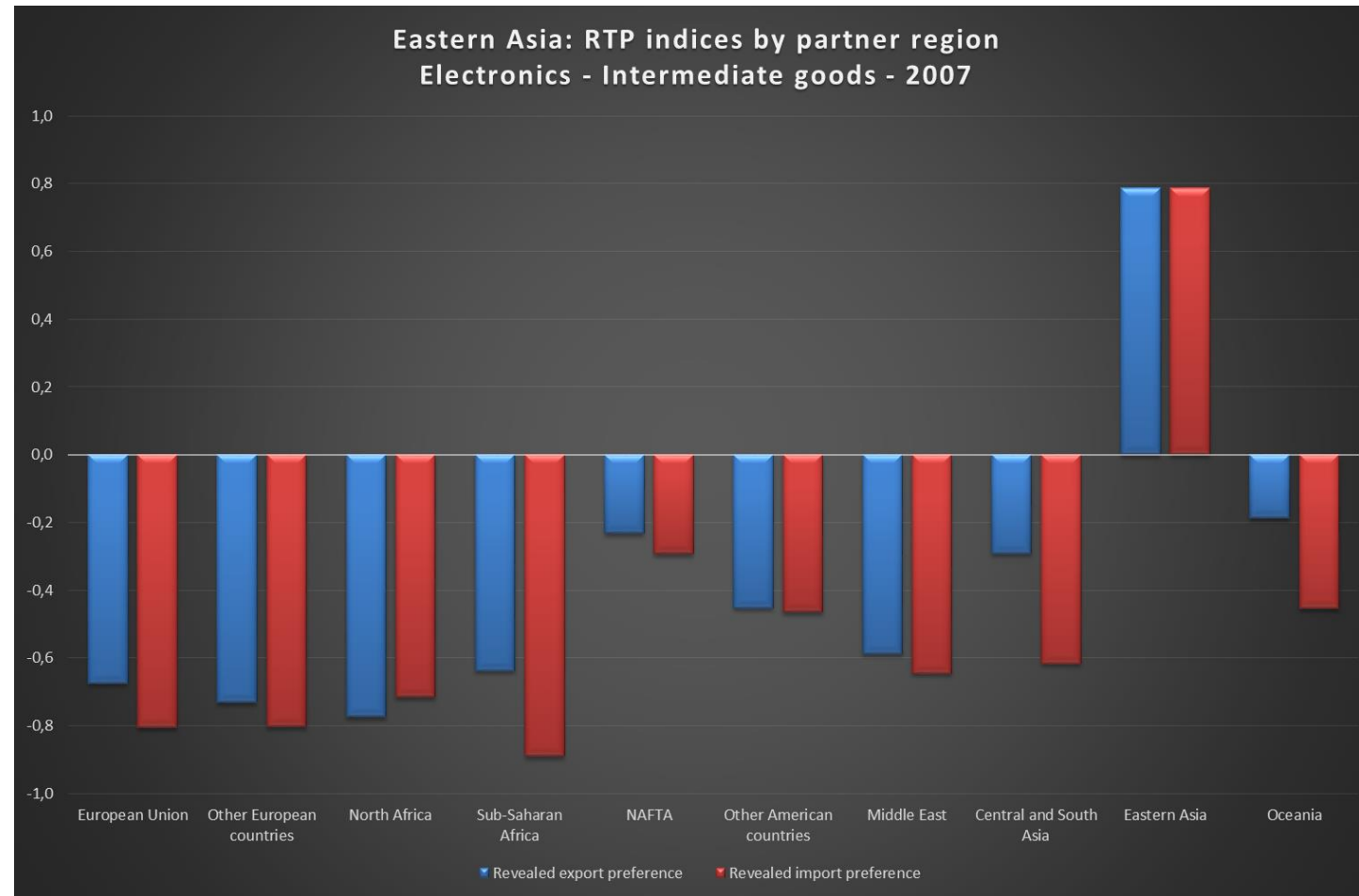
The world trade matrix of electronic goods shows a significant degree of trade regionalisation



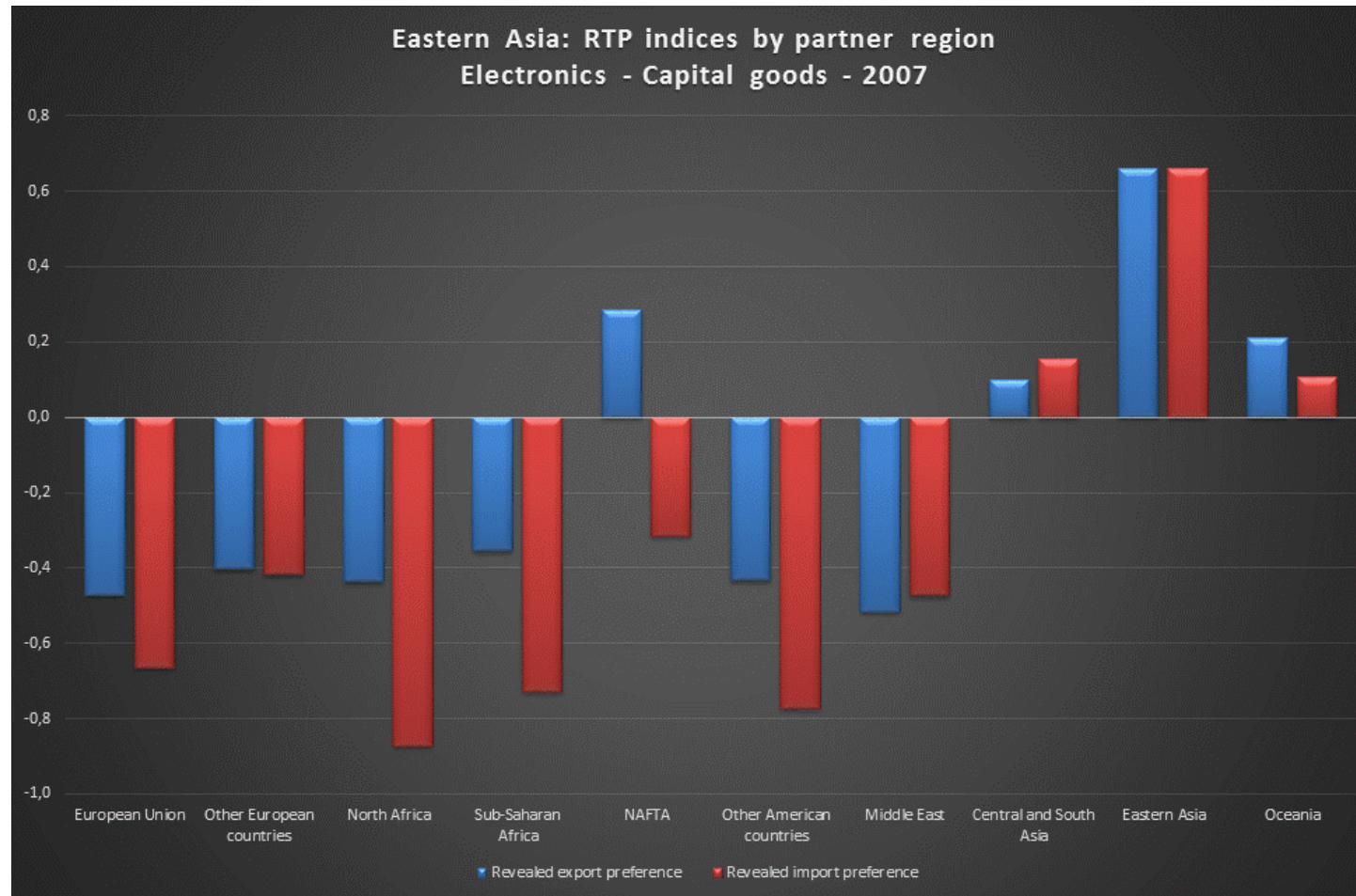
Regional trade introversion is particularly high in some developing regions



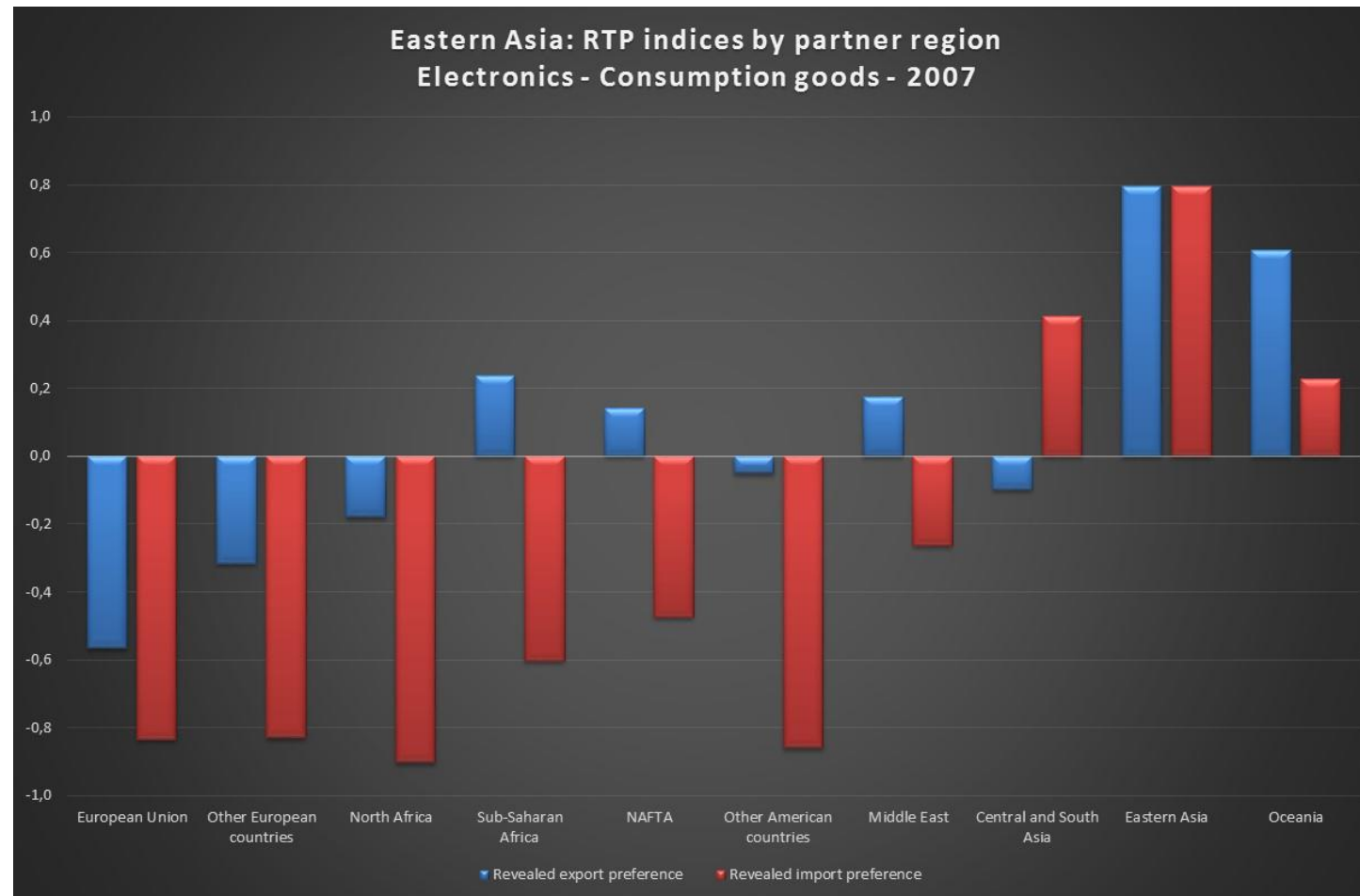
Eastern Asia: revealed trade preferences in intermediate goods are only intra-regional



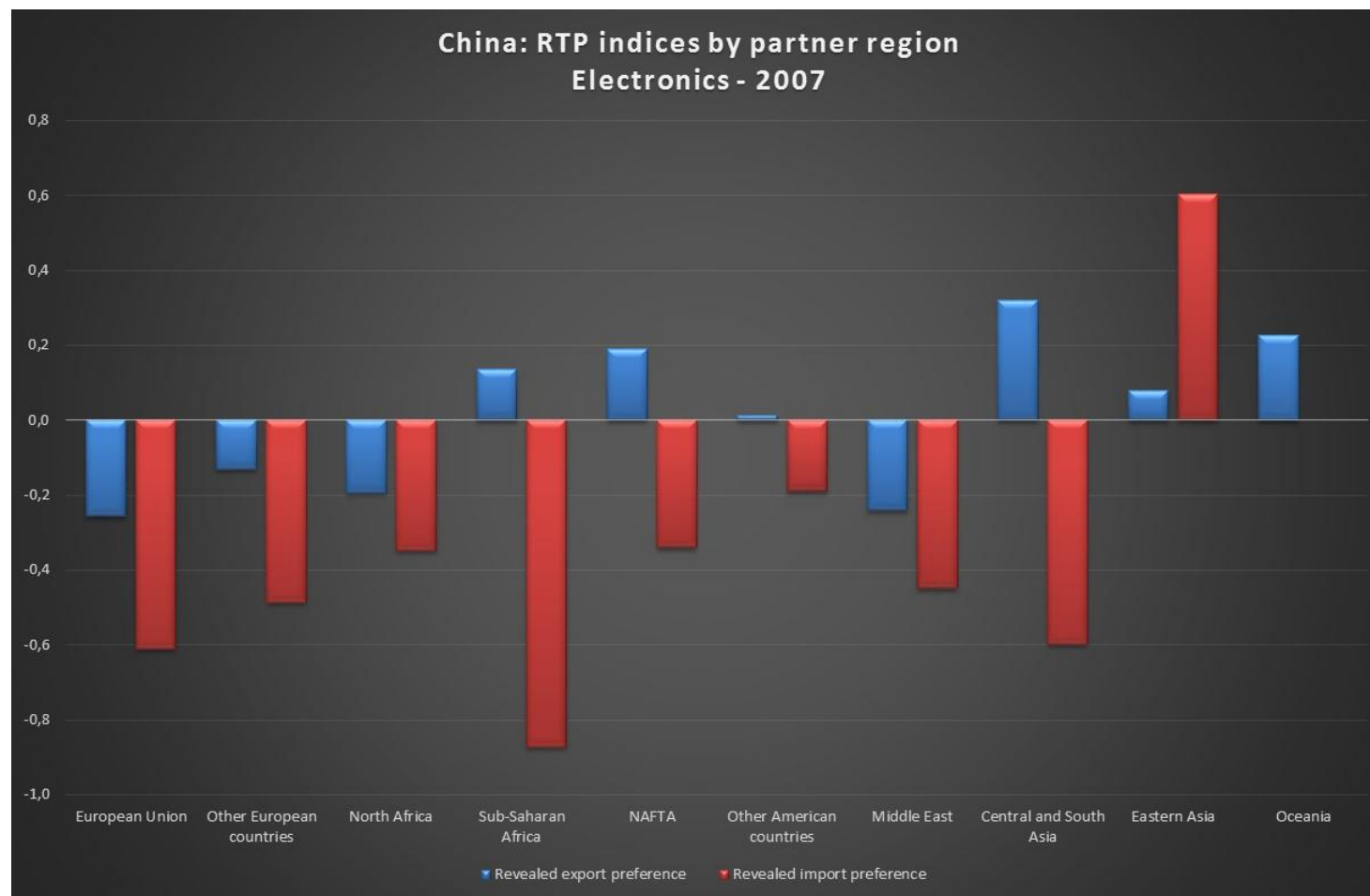
In capital goods, the pattern of extra-regional trade preferences is limited to neighbouring regions and NAFTA



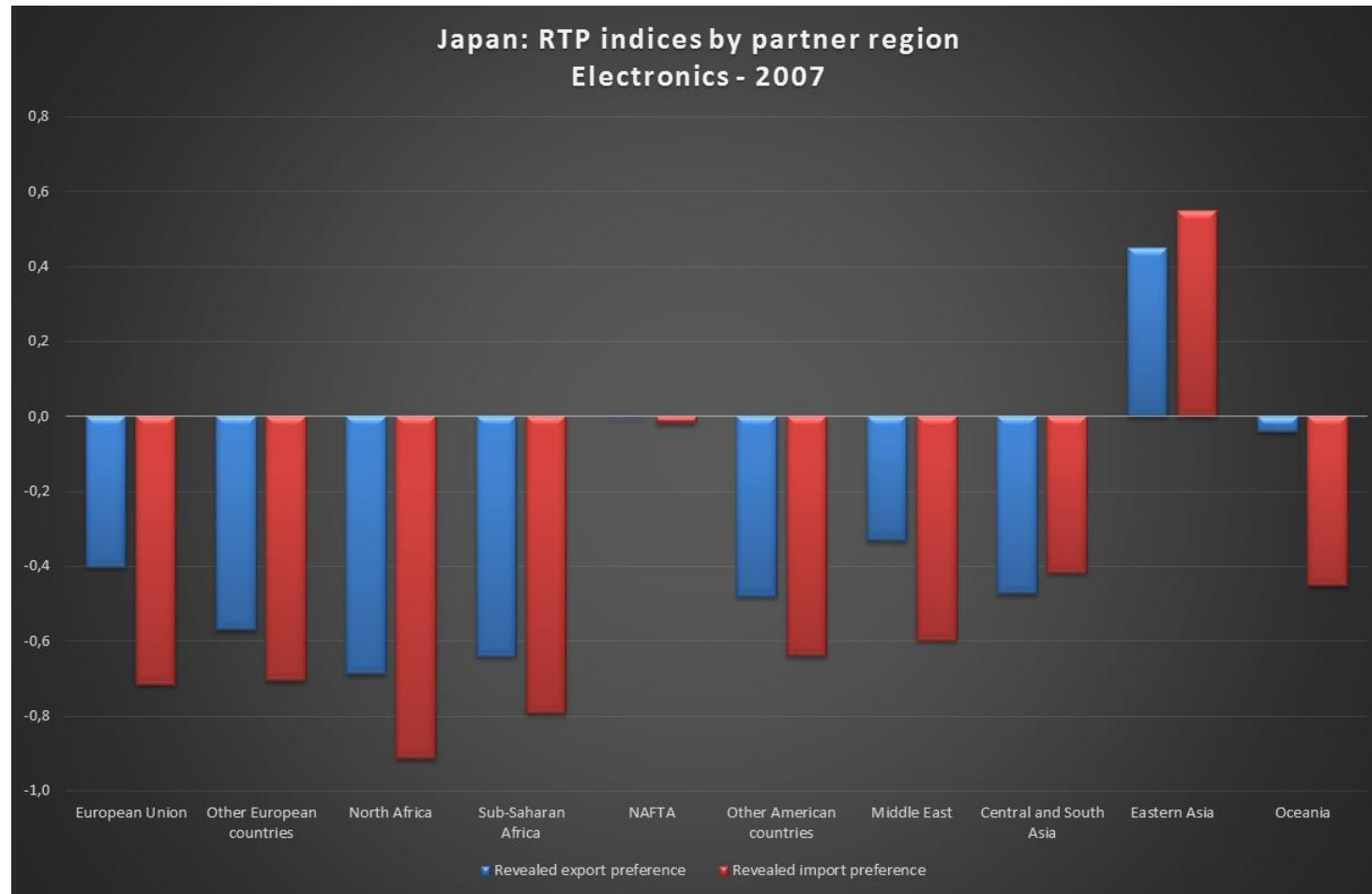
In consumption electronics, intra-regional trade is supplemented by imports from neighbouring regions whereas exports tend to be more diversified



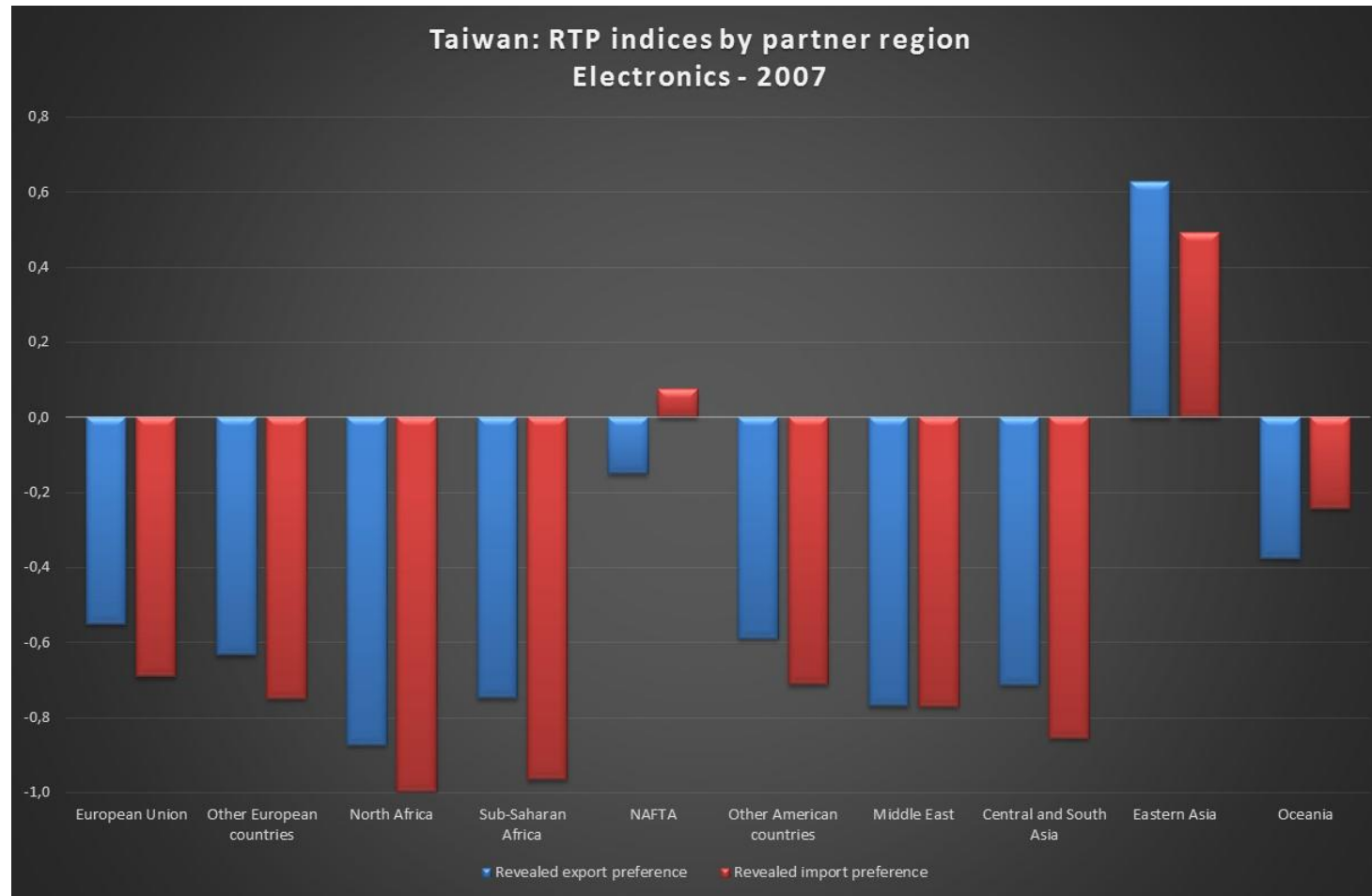
China: an export hub



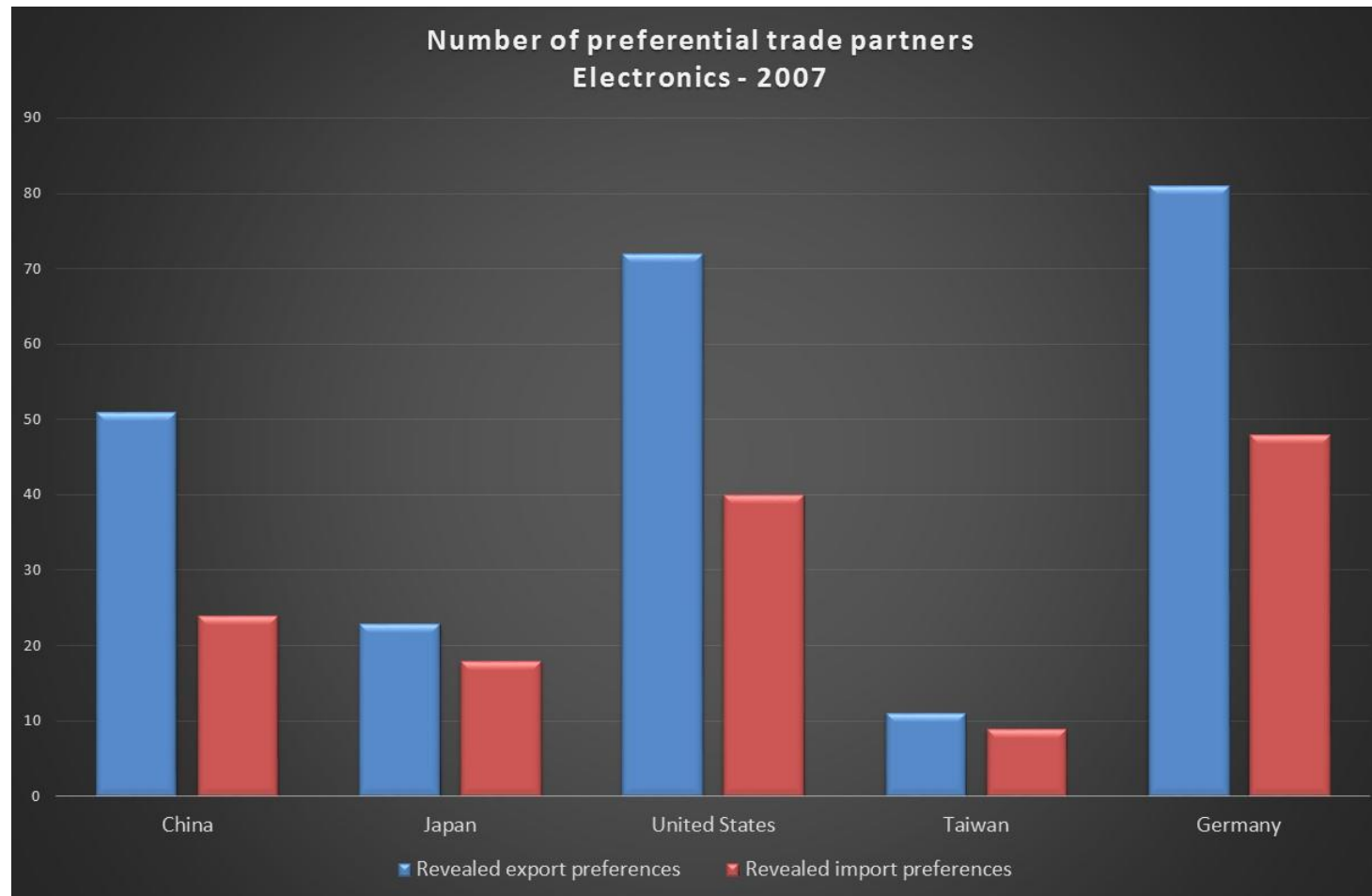
Japan: a strong intra-regional preference



Taiwan: a dominant local supplier, linked to NAFTA



Extensive margins of trade preferences



Regional and global networks

NETWORK ANALYSIS OF INTERNATIONAL TRADE AND PRODUCTION

Detecting international production from trade data: the role of network analysis

- Most often, internationalization of production does not give rise to **global value chains**, but rather to **international production networks (IPNs)** («spiders vs. snakes», Baldwin&Venables, 2013).
- It is therefore useful to look at the countries involved not only following a sequence of steps, but a network of links
- Countries' roles in international production are revealed by the application of measures of centrality to directed and weighted trade networks of intermediates and finished products.

Methodology to identify international production networks in trade data

- A multilayer network analysis: a tripartite network whose vertices are partitioned into three sets:
 - Exporters of intermediate inputs (U)
 - Importers of intermediates which are at the same time exporters of finished products (B)
 - Importers of finished products (D).
- Three measures for determining the position along IPNs:
 - **Upstreamness** (v_u) : *how much of **u** country exports of intermediate goods goes mostly toward those countries that relatively more than others assume a role of intermediaries between exporters of intermediate inputs and markets of finished products.*
 - **Downstreamness** (δ_d) : *how much of **d** country imports of finished products comes mostly from those countries that relatively more than others assume a role of intermediaries between exporters of intermediate inputs and markets of finished products.*
 - **Betweenness** (β_b) : *it characterises **b** country with the level of preference granted by upstream and downstream countries to it as their intermediary agent; a measure revealed by the combination of upstreamness and downstreamness of those countries to which is related to.*

Countries' position in the IPN of Electronics

Upstreamness		Betweenness		Downstreamness	
Taiwan, Province of (China)	1.000	China	1.000	United States of America	1.000
Japan	0.745	Mexico	0.341	Hong Kong (SARC)	0.449
Korea, Rep. of Korea	0.531	Hong Kong (SARC)	0.332	Germany	0.196
China	0.518	Japan	0.230	Japan	0.178
United States of America	0.431	United States of America	0.211	Netherlands	0.148
Philippines	0.406	Korea, Rep. of Korea	0.199	United Kingdom	0.126
Malaysia	0.365	Singapore	0.181	France	0.112
Singapore	0.276	Taiwan, Province of (China)	0.163	Canada	0.106
Germany	0.161	Malaysia	0.149	Singapore	0.102
Thailand	0.107	Germany	0.119	Korea, Rep. of Korea	0.087
Hong Kong (SARC)	0.106	Canada	0.081	Mexico	0.083
Mexico	0.103	Thailand	0.078	India	0.082
France	0.058	Philippines	0.057	Russian Federation	0.072
Canada	0.040	Netherlands	0.050	Australia	0.067
United Kingdom	0.035	United Kingdom	0.049	China	0.057
Italy	0.034	France	0.038	Italy	0.057
Indonesia	0.032	Hungary	0.036	Spain	0.053
Ireland	0.026	Spain	0.031	Thailand	0.046
Netherlands	0.025	Indonesia	0.026	Taiwan, Province of (China)	0.045

Correlation between the Betweenness index and GVC participation index à la Koopman et al. is positive, but not very high (0.30) => similar but not identical information

Countries' position in the IPN of Textiles

Upstreamness		Betweenness		Downstreamness	
Taiwan, Province of (China)	1.000	China	1.000	United States of America	1.000
Japan	0.940	Hong Kong (SARC)	0.171	Japan	0.579
United States of America	0.854	Viet Nam	0.143	Hong Kong (SARC)	0.403
Korea, Rep. of Korea	0.790	Mexico	0.140	Germany	0.277
China	0.733	India	0.133	United Kingdom	0.229
Australia	0.456	Indonesia	0.111	France	0.188
Hong Kong (SARC)	0.391	Italy	0.100	Canada	0.137
India	0.365	Bangladesh	0.096	Italy	0.135
Italy	0.256	Turkey	0.086	Russian Federation	0.120
Pakistan	0.198	Cambodia	0.076	Spain	0.118
Germany	0.194	Pakistan	0.072	Korea, Rep. of Korea	0.114
Thailand	0.120	United States of America	0.058	Australia	0.094
France	0.113	Thailand	0.056	Belgium-Luxembourg	0.072
Indonesia	0.099	Germany	0.051	Netherlands	0.071
Uzbekistan	0.095	Canada	0.048	Panama	0.059
Belgium-Luxembourg	0.090	Philippines	0.046	United Arab Emirates	0.057
Turkey	0.078	Korea, Rep. of Korea	0.041	Denmark	0.046
United Kingdom	0.075	Honduras	0.040	Singapore	0.044
Malaysia	0.063	Sri Lanka	0.039	Saudi Arabia	0.040

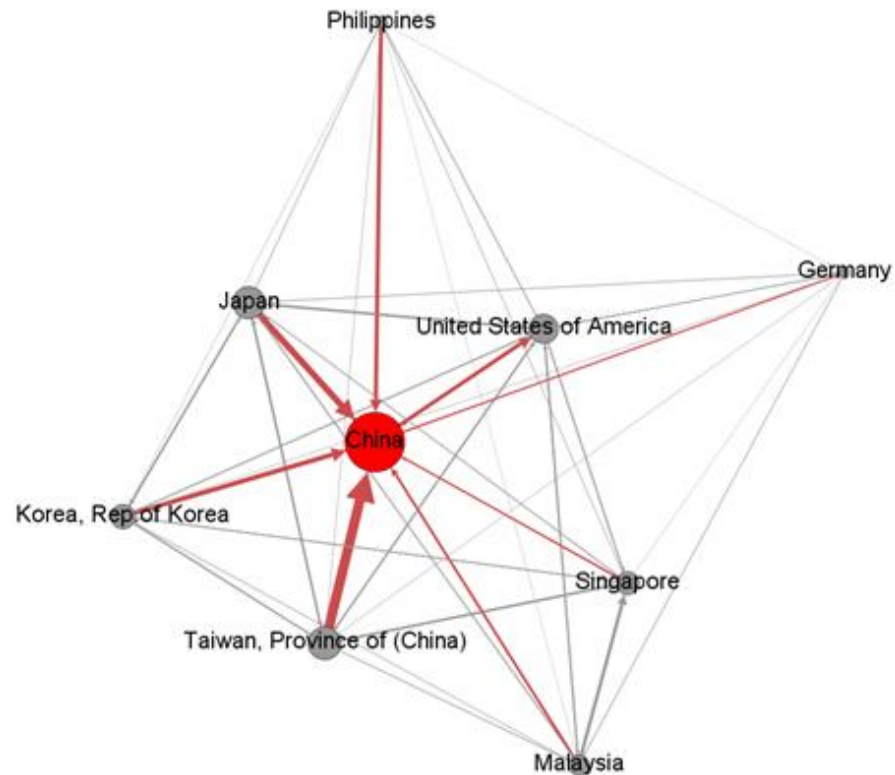
Countries' position in the IPN of Motor Vehicles

Upstreamness		Betweenness		Downstreamness	
United States of America	1.000	United States of America	1.000	Canada	1.000
Canada	0.754	Canada	0.696	United States of America	0.927
Japan	0.729	Mexico	0.490	Mexico	0.161
Mexico	0.663	China	0.185	Australia	0.118
Germany	0.470	Japan	0.178	France	0.105
China	0.329	Germany	0.161	Russian Federation	0.093
Korea, Rep. of Korea	0.252	United Kingdom	0.133	Germany	0.084
France	0.157	France	0.104	United Kingdom	0.082
Italy	0.146	Spain	0.099	Spain	0.074
Taiwan, Province of (China)	0.108	Italy	0.076	Belgium-Luxembourg	0.070
Spain	0.089	Belgium-Luxembourg	0.073	Italy	0.066
United Kingdom	0.069	Austria	0.054	Netherlands	0.056
Czech Republic	0.057	Netherlands	0.050	Venezuela	0.050
Belgium-Luxembourg	0.050	Thailand	0.048	South Africa	0.045
Brazil	0.049	Sweden	0.042	Chile	0.045
Poland	0.045	Korea, Rep. of Korea	0.041	Poland	0.038
Sweden	0.044	Turkey	0.039	Saudi Arabia	0.038
Austria	0.040	Brazil	0.038	Colombia	0.037
India	0.034	Poland	0.038	China	0.035

Methodology to analyze IPNs

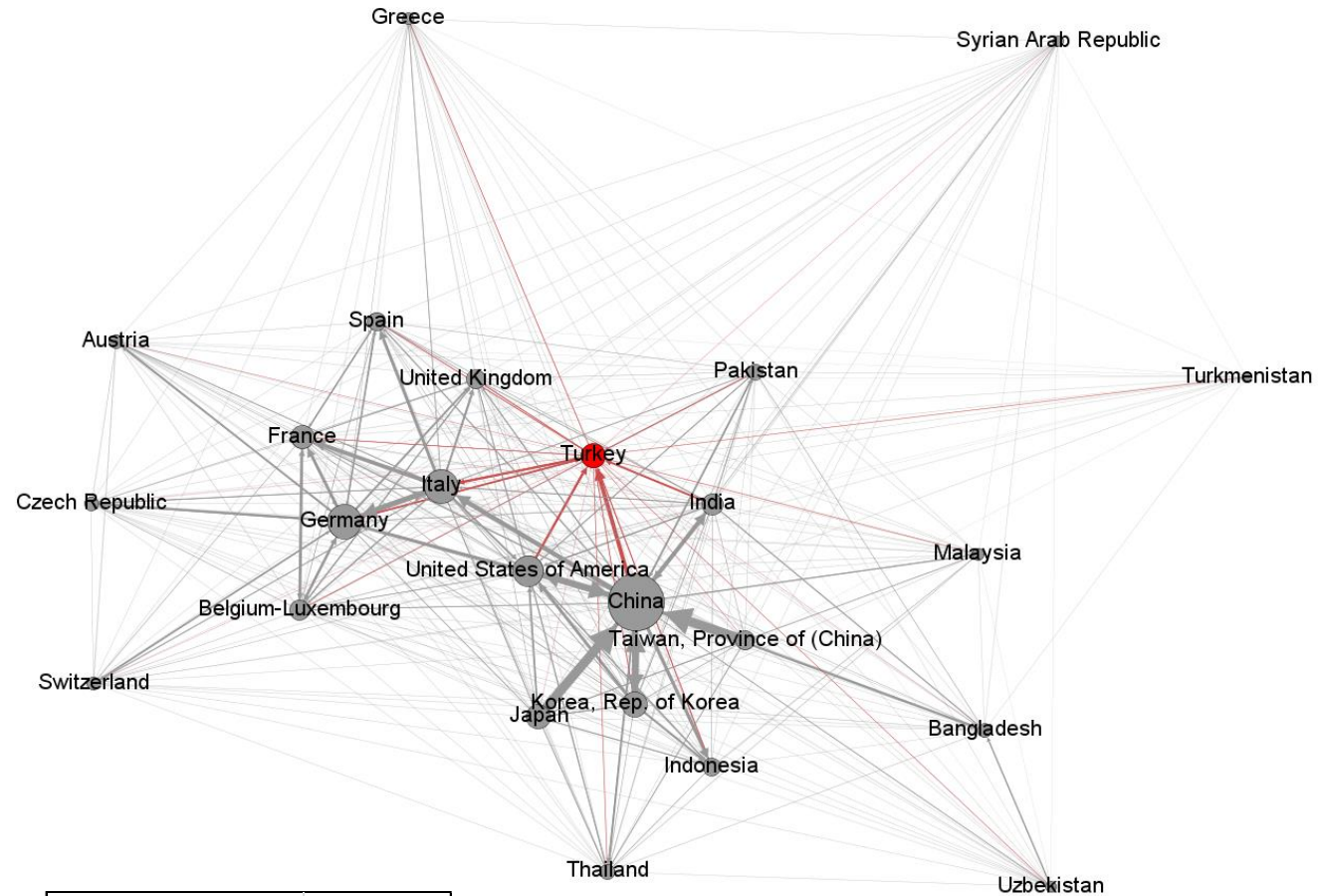
- Within each international trade network, we identify **the sub-networks around selected countries with higher scores of betweenness (ego-networks)**.
- Intermediate input suppliers of a country **c** characterised by high betweenness are first ordered in terms of market shares they hold in it . Then we calculate the cumulative function of the ordered market shares of suppliers and we define a **sub-network S** which includes the country **c** and those of **its suppliers** by which the country imports cumulatively at least **90% of its total imports**. The sub-network **S** comprises all bilateral intermediate input flows among them.
- The pattern of these sub-network composed by them and their main upstream countries is analysed both visually and using network measures to characterise properly their network **structure**.

China's network of intermediate suppliers in Electronics



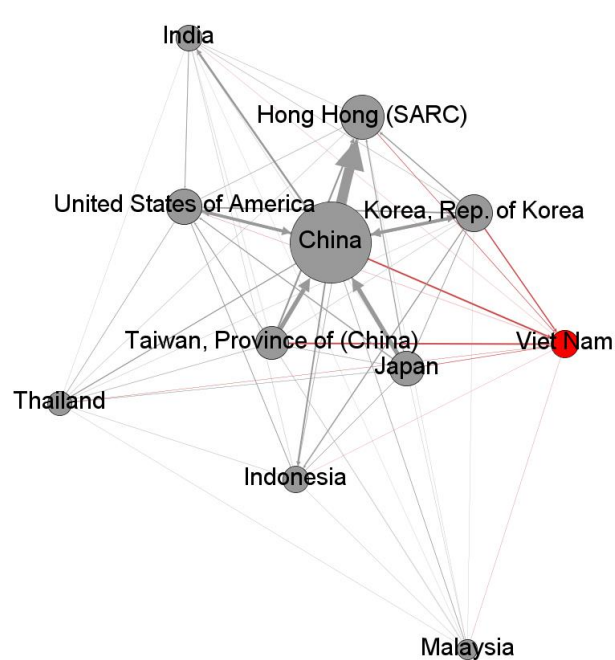
N	9
DENSITY_9	1
CLUSTERING_9	1

Turkey's network of intermediate suppliers in Textiles

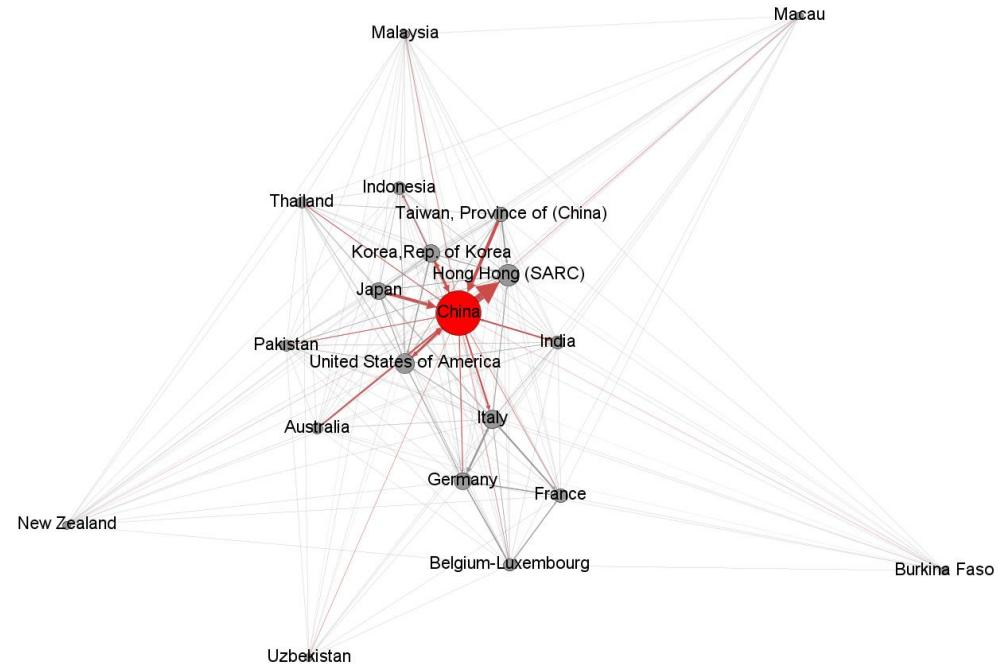


N	25
DENSITY_25	0.943
CLUSTERING_25	0.963

Vietnam and China's network of intermediate suppliers in Textiles

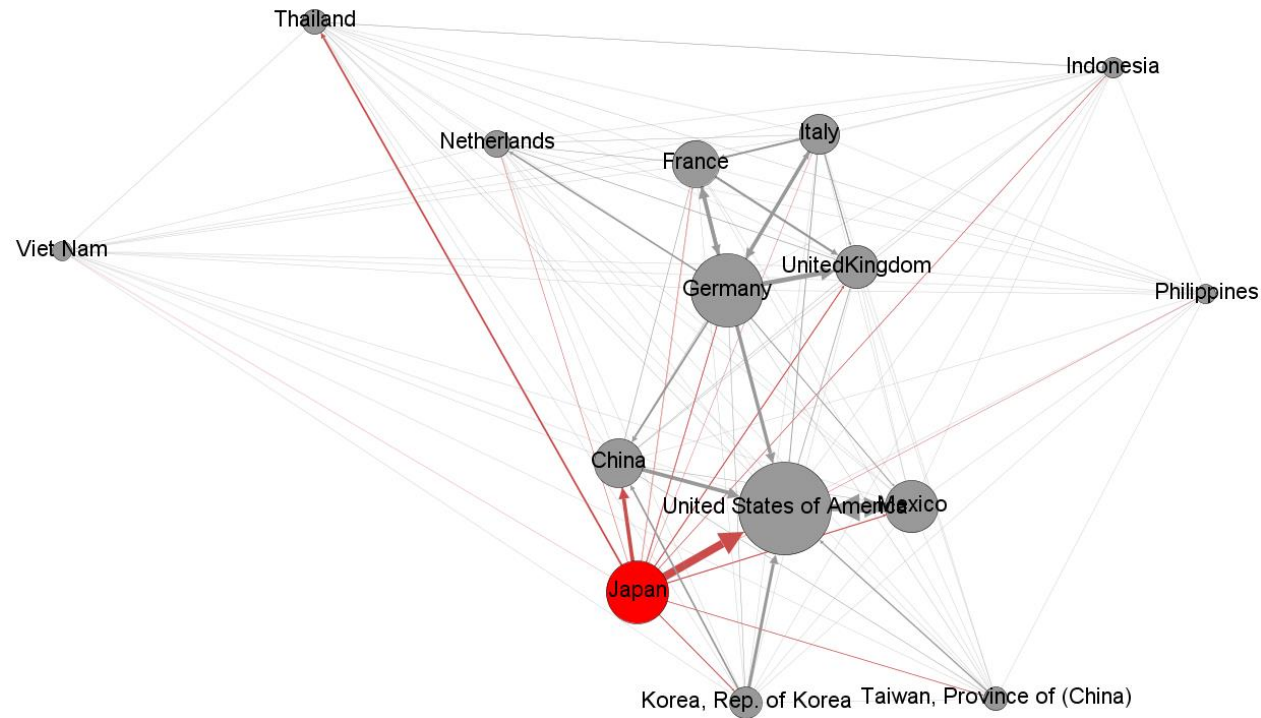


N	11
DENSITY_11	0.982
CLUSTERING_	0.982



N	20
DENSITY_20	0.921
CLUSTERING_20	0.944

Japan's network of intermediate suppliers in Motor Vehicles



N	15
DENSITY_15	0.9905
CLUSTERING_15	0.9905

Some general features

- Suppliers' networks have quite different size in terms of nodes
- All examined networks have high density and high clustering => high internal cohesion and many exchanges among suppliers => more IPNs than GVCs
- Regionalization is high in some cases, but not in all
- The «between» country around which the network is built is not always the most central

Conclusions

- Rise of emerging countries in the international trade network
- Trade regionalization, as measured by regional introversion indices, has fallen substantially between 1995 and 2011 in emerging regions
- Yet, the manufacturing core of international production networks tends to be regional more than global
- Different regional roles of the BRICs
 - China tends to play a role of export hub in South-East Asia
 - Brazil, India and Russia appear as dominant local suppliers in their regions
- Network analysis can provide additional information on the structure of international production networks, highlighting their different characteristics across sectors and regions
- Trade policies should pay attention to the regional character of «global value chains»