

# Applications of SNA to International Trade

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# World Trade Web

	2002	2003	2004	2005	2006
Size	179	179	179	179	179
N. of links	18468	18695	18848	19217	19678
Total trade**	5965	6981	8464	9620	11075
AVBT***	3230	3734	4490	5006	5628
Efficiency	0.33	0.32	0.32	0.31	0.30
Density	0.58	0.59	0.59	0.60	0.62
In-Dc CE	0.39	0.39	0.40	0.39	0.39
Out-Dc CE	0.41	0.41	0.41	0.41	0.41
Bc CE	0.009	0.008	0.008	0.007	0.006
Apl	1.42	1.41	1.41	1.40	1.38
Adc	103	104	105	107	110
Cl	0.68	0.69	0.69	0.70	0.72

## Legend

\*\*\*values in  $10^5$ ;

\*\*\*\*values in  $10^3$ ;

**Size** = number of nodes;

**AVBT** = average value of bilateral trade, which results from world trade divided by the number of actual exchanges;

**Density** (dichotomized) = when the values of the links are not considered;

**In-Dc CE** = in-degree centralization with economic values. In this case we used the base-2 logarithm values;

**Out-Dc CE** = out-degree centralization with economic values. In this case we used the base-2 logarithm values;

**Bc CE** = betweenness centralization;

**Apl** = average path length;

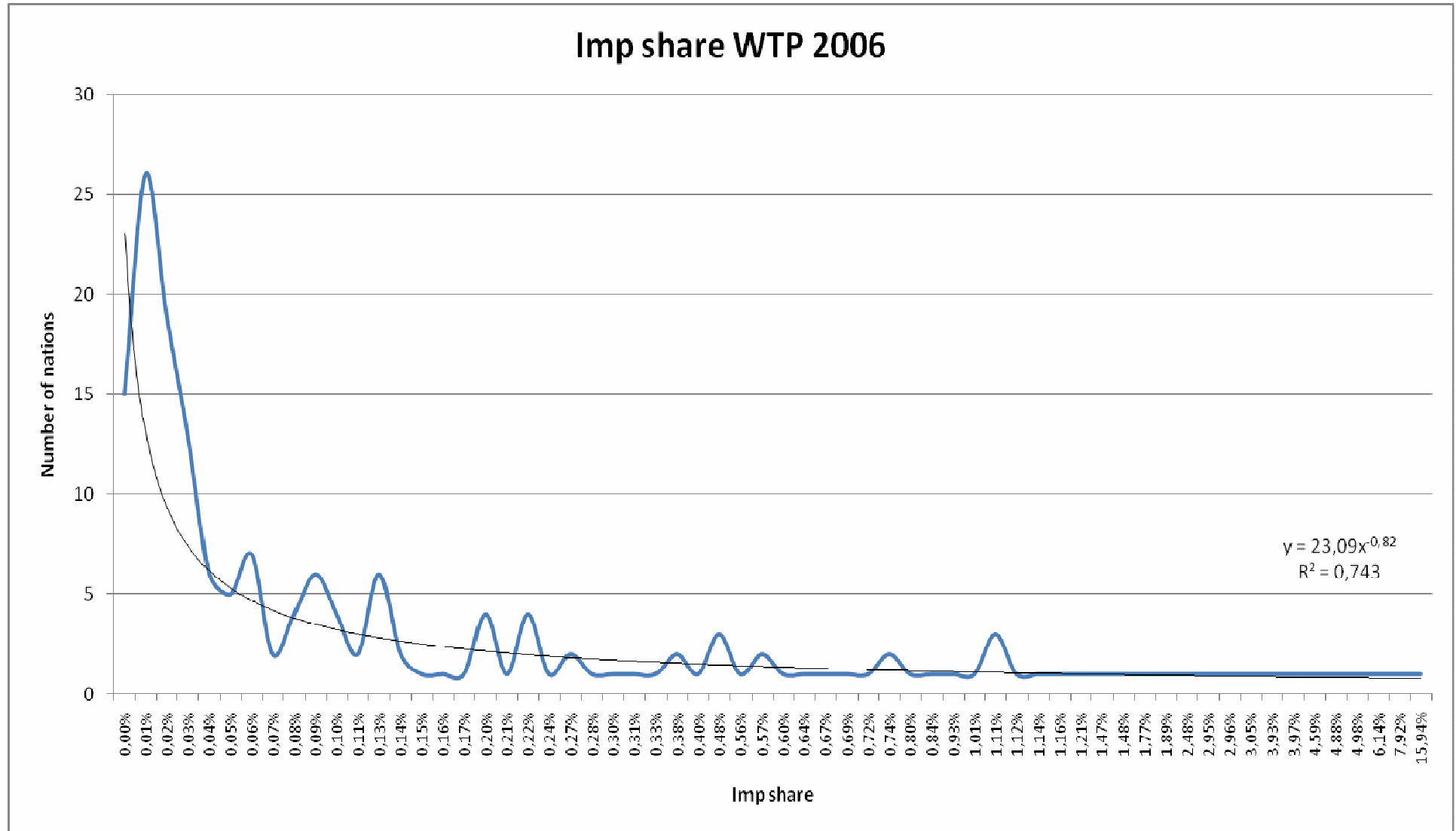
**Adc** = average degree centrality dichotomized;

**Cl** = clusterization index (clustering coefficient).

# Analyzing the World Trade Web

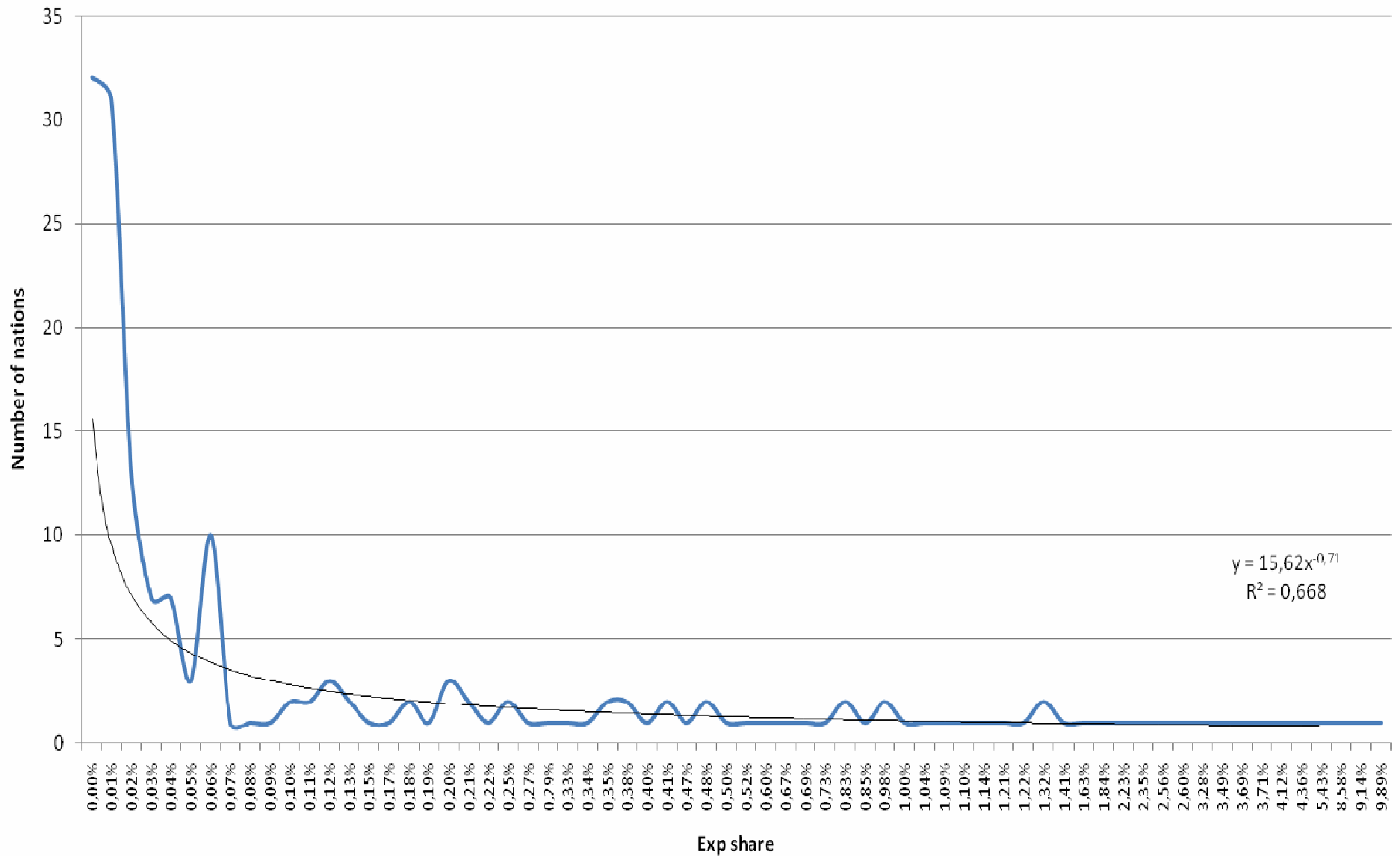
- Notwithstanding the network is very (and increasingly) dense (62%) (and hence the intermediating power absent), both imports and exports are very concentrated (and constant around 40%)
- The network has a tremendous small-world shape (72% in 2006)
- Hence, with less than 1,5 step each country can reach everyone else
- It has a power-law structure

# The power law distribution

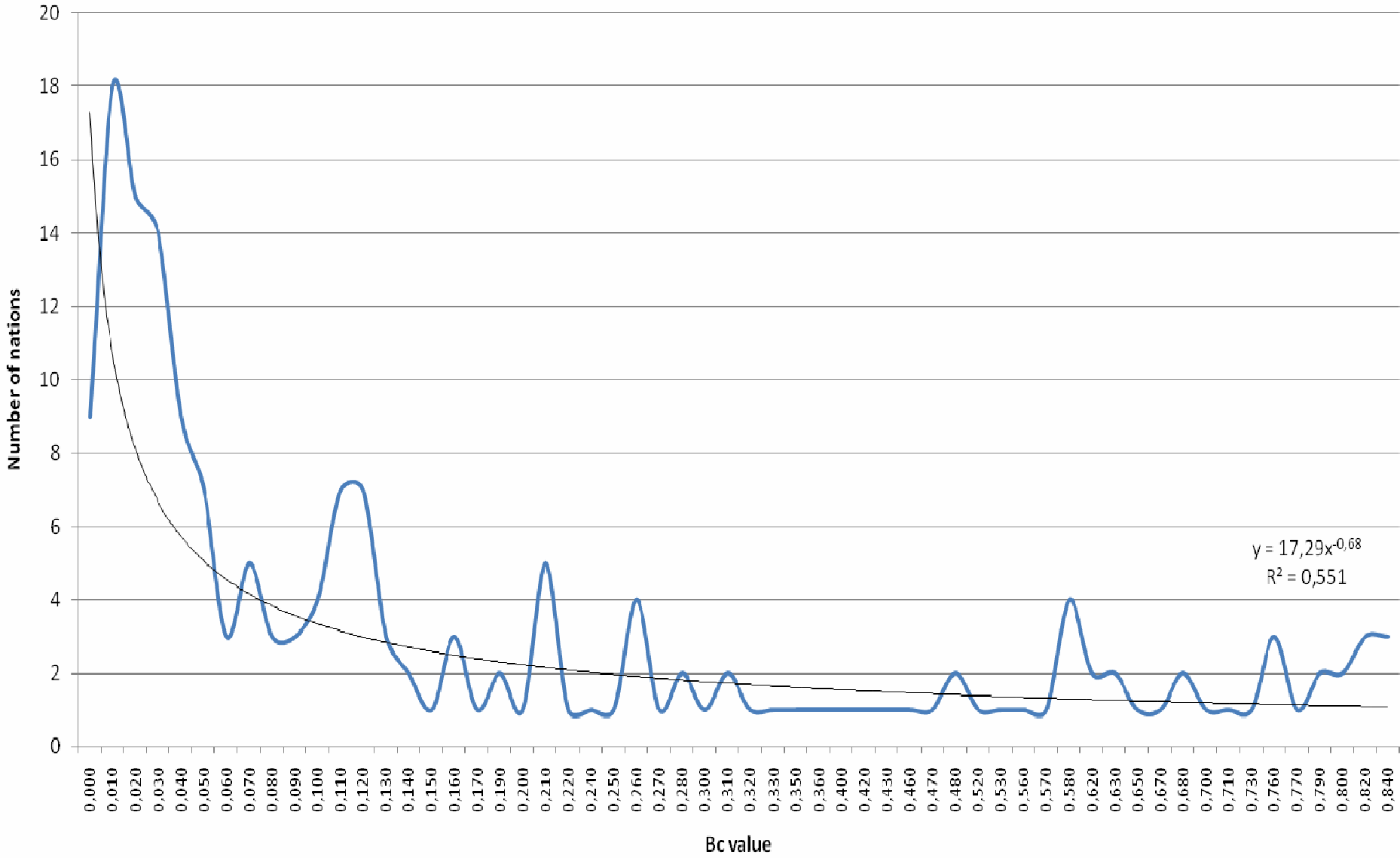


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# Exp share WTP 2006



# Bc WTP 2006

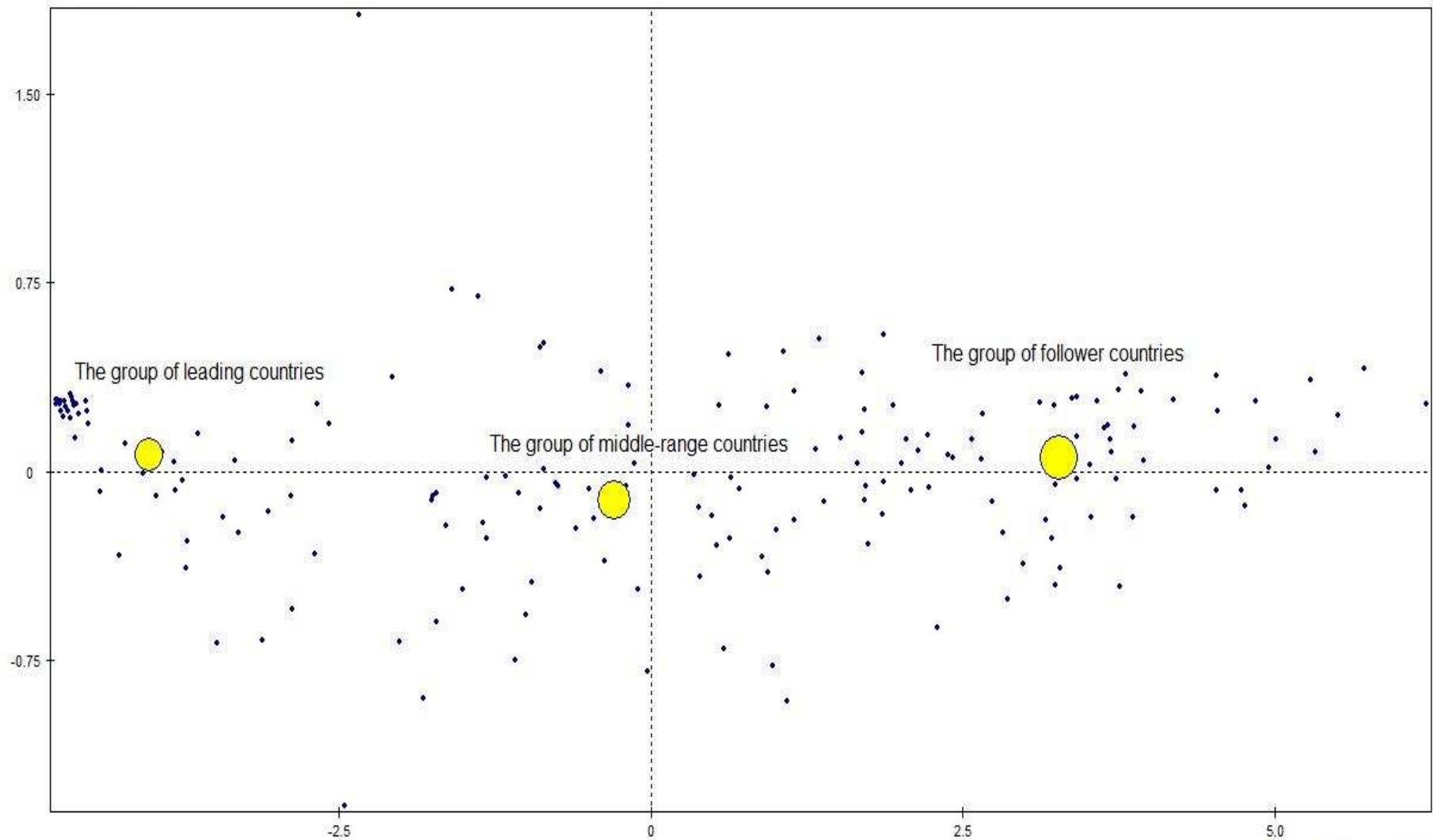


# **World trade web core-periphery analysis**

**An example of multi-methodological approach**

**Clusterization through Dc (direct centrality index) and export share in the 10 years**

Factor 2 1,27%



Factor 1 97,19%

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C1

<i>Middle</i>	<i>Leading</i>	<i>Follower</i>
Algeria	Argentina	Afghanistan
Bahamas The	Australia	Albania
Bahrain Kingdom of	Austria	Angola
Bangladesh	Belgium	Armenia Republic of
Barbados	Brazil	Aruba
Belarus	Bulgaria	Azerbaijan Republic of
Benin	Canada	Belize
Bolivia	China	Bermuda
Cameroon	Colombia	Bosnia and Herzegovina
Chile	Cyprus	Brunei Darussalam
Congo Republic of	Czech Republic	Burkina Faso
Costa Rica	Denmark	Burundi
Côte d'Ivoire	Egypt	Cambodia
Cuba	Finland	Cape Verde
Dominican Republic	France	Central African Republic

## Diapositiva 10

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**C1**

Attenzione ai nomi dei cluster

Customer; 05/10/2009

Ecuador	Germany	Chad
Estonia	Greece	Comoros
Gabon	Hungary	Congo
Ghana	India	Croatia
Guatemala	Indonesia	Djibouti
Guinea	Ireland	Dominica
Honduras	Italy	El Salvador
Iceland	Japan	Equatorial Guinea
Iran Islamic Republic of	Korea Republic of	Ethiopia
Israel	Lebanon	Faroe Islands
Jamaica	Luxembourg	Fiji
Jordan	Malaysia	New Caledonia
Kazakhstan	Netherlands	Gambia The
Kenya	New Zealand	Georgia
Korea	Norway	Greenland
Kuwait	Pakistan	Grenada

	<b>World trade patterns</b>						
	Trade share of single clusters						
	Leading countries	Middle countries	Follower countries	Inter-clusters exchange	Top 10 bilateral trades (B)	Top 10 country trades (C)	(B)/(C)
1997	79	0.7	0.03	20	18	62	0.29
1998	80	0.7	0.04	19	19	62	0.31
1999	80	0.7	0.03	19	19	63	0.31
2000	78	0.9	0.03	21	20	61	0.32
2001	79	0.9	0.03	20	19	61	0.32
2002	79	0.9	0.03	20	19	60	0.31
2003	79	0.8	0.03	20	17	59	0.29
2004	79	0.9	0.04	20	17	58	0.29
2005	77	1.0	0.04	22	16	57	0.29
2006	77	1.1	0.04	22	16	56	0.28

	Shares of inter-cluster exchange			
	whole	high-mid	high-low	mid-low
1997	0.2	0.18	0.02	0.00
1998	0.19	0.17	0.02	0.00
1999	0.19	0.17	0.02	0.00
2000	0.2	0.18	0.02	0.00
2001	0.2	0.18	0.02	0.00
2002	0.2	0.18	0.02	0.00
2003	0.2	0.17	0.02	0.00
2004	0.20	0.18	0.02	0.00
2005	0.21	0.19	0.03	0.00
2006	0.22	0.19	0.03	0.00

# The structure of the top 10 bilateral trades at world level

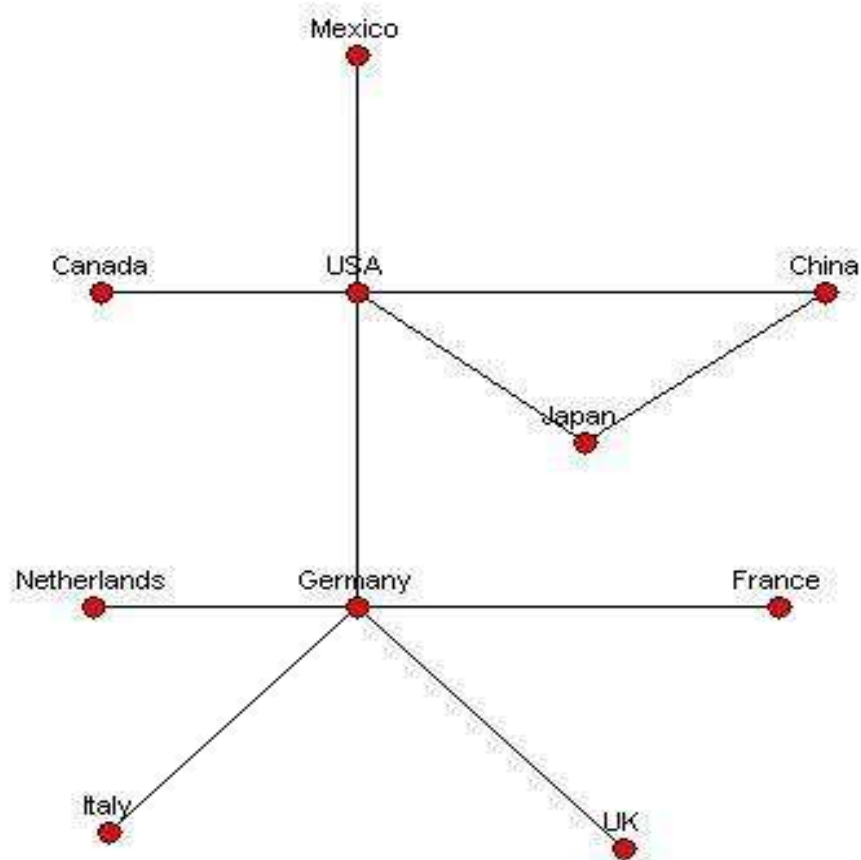
	2002	2003	2004	2005	2006
Size	10	10	11	10	10
Density	0.22	0.22	0.18	0.22	0.22
DC Cent	37%	37%	35%	37%	37%
Bc Cent	65%	65%	21%	66%	66%
Apl	2.13	2.13	1.6	2.24	2.24

# Analyzing top 10 bilateral trades at world level

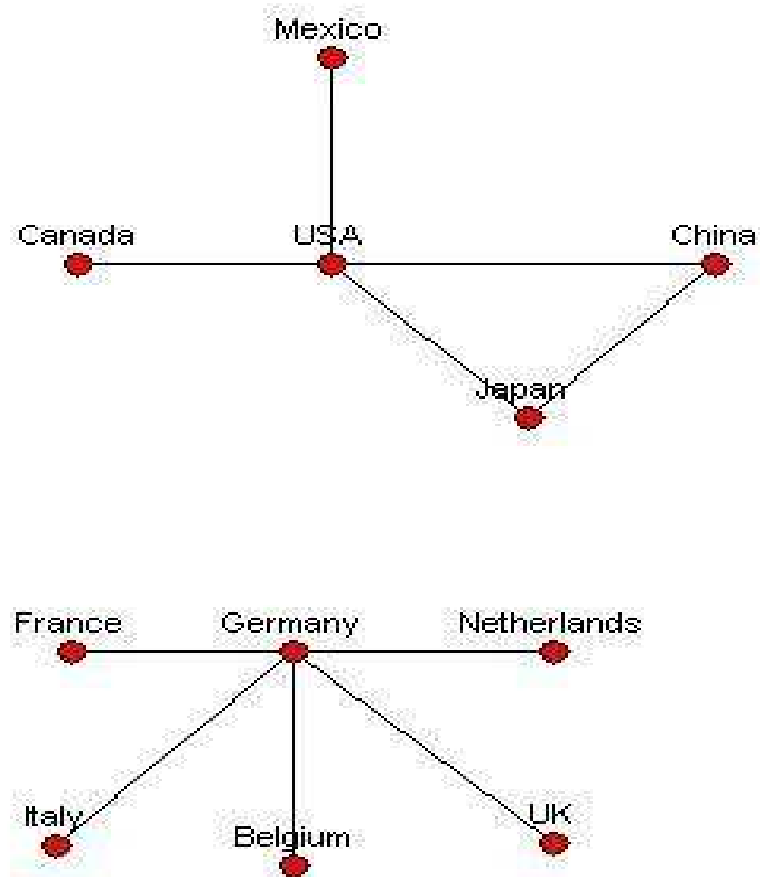
- The structure is highly concentrated and keeps invariant, and the intermediating power is dramatically concentrated
- Size is half of the potential
- 8 countries occur always: Canada, China, France, Germany, Japan, Mexico, The Netherlands, UK and USA
- Two sub-networks: Asian-North American and European

# Networks of top 10 trades

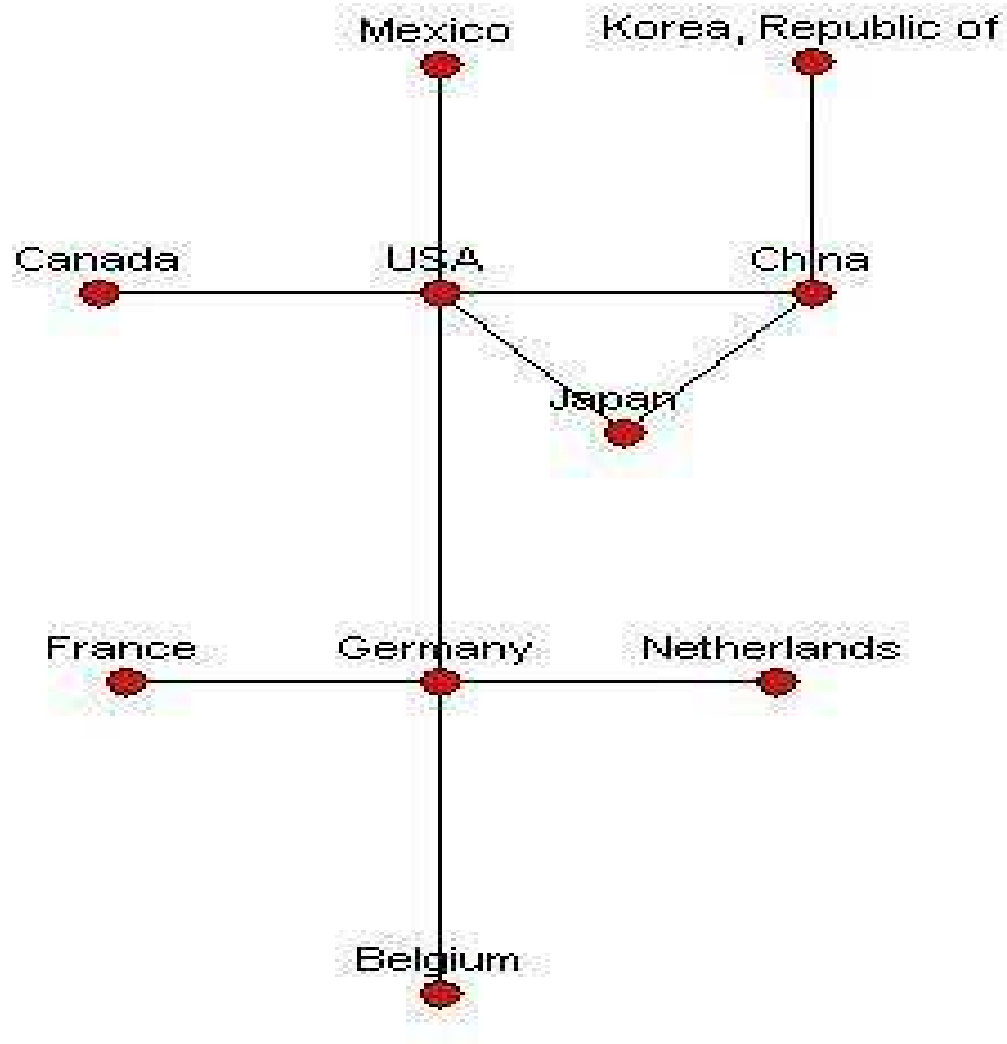
Top10 World 2002-2003



Top 10 World 2004



# Top 10 World 2005 - 2006



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# The structure of Asia's top 10 bilateral trades

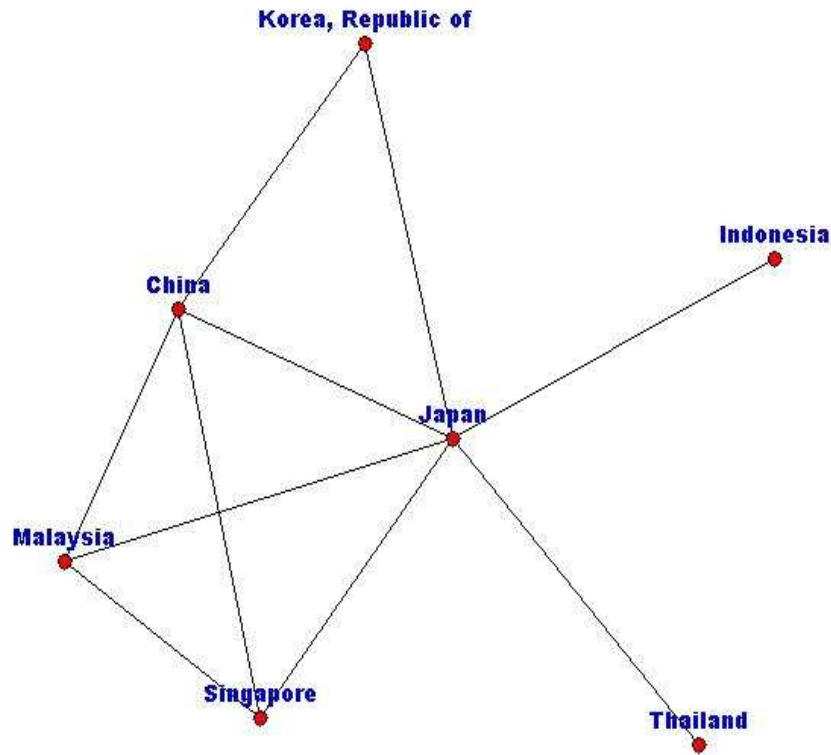
	2002	2003	2004	2005	2006
Size	7	7	7	8	9
Density	0.48	0.48	0.48	0.36	0.28
DC Cent	61%	42%	61%	41%	39%
Bc Cent	65%	36%	65%	50%	54%
Apl	1.52	1.61	1.52	1.82	2.11

# Analyzing the structure of Asia's top 10 bilateral trades

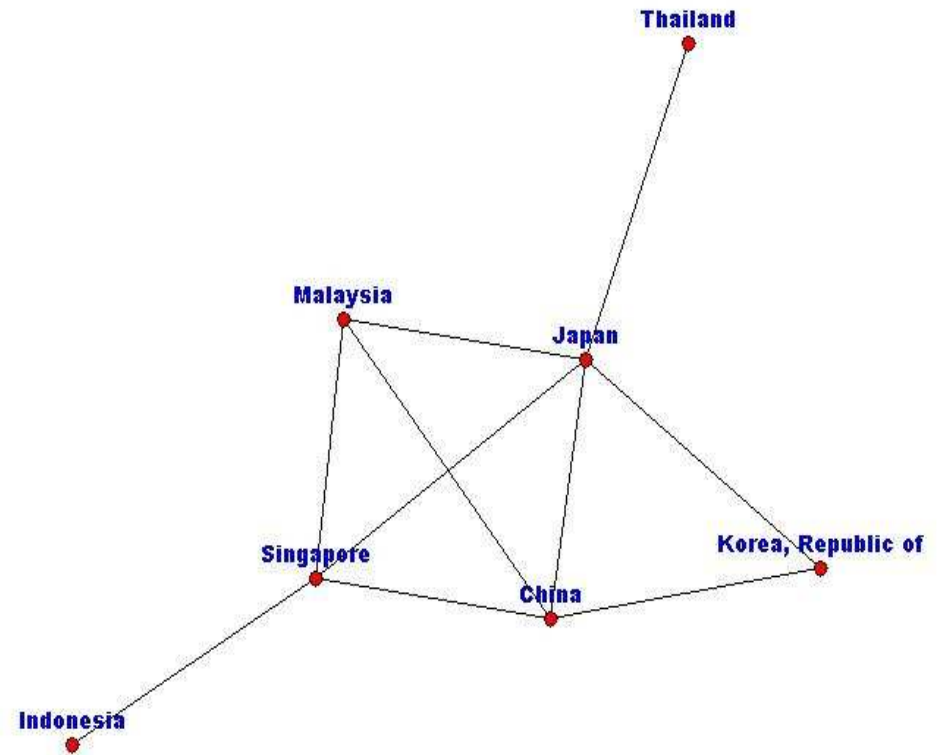
- At the beginning of the period this network was far more concentrated than that at world level, but over time they got closer
- 7 incumbent countries: China, Indonesia, Japan, Korea, Malaysia, Singapore, and Thailand
- Even though China and Japan are key players, they are not so relevant as USA and Germany at world level

# Networks of Asian top 10 trades

2002

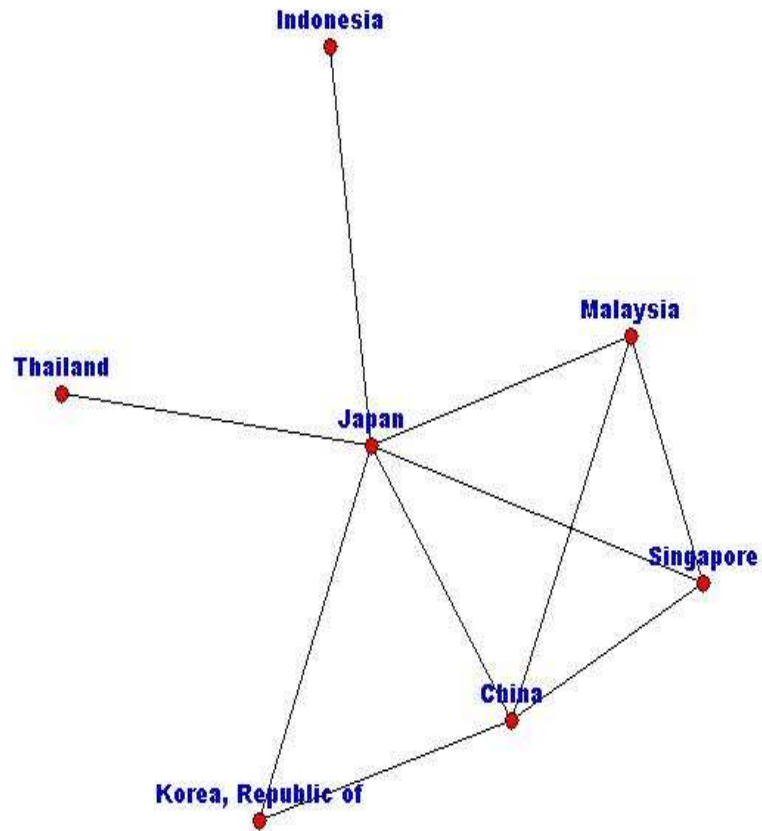


2003

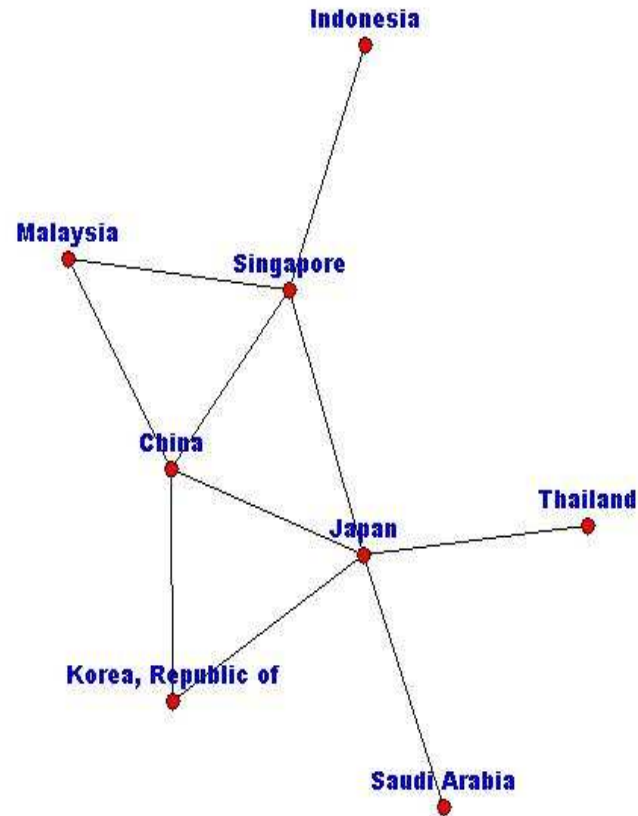


# Networks of Asian top 10 trades

2004

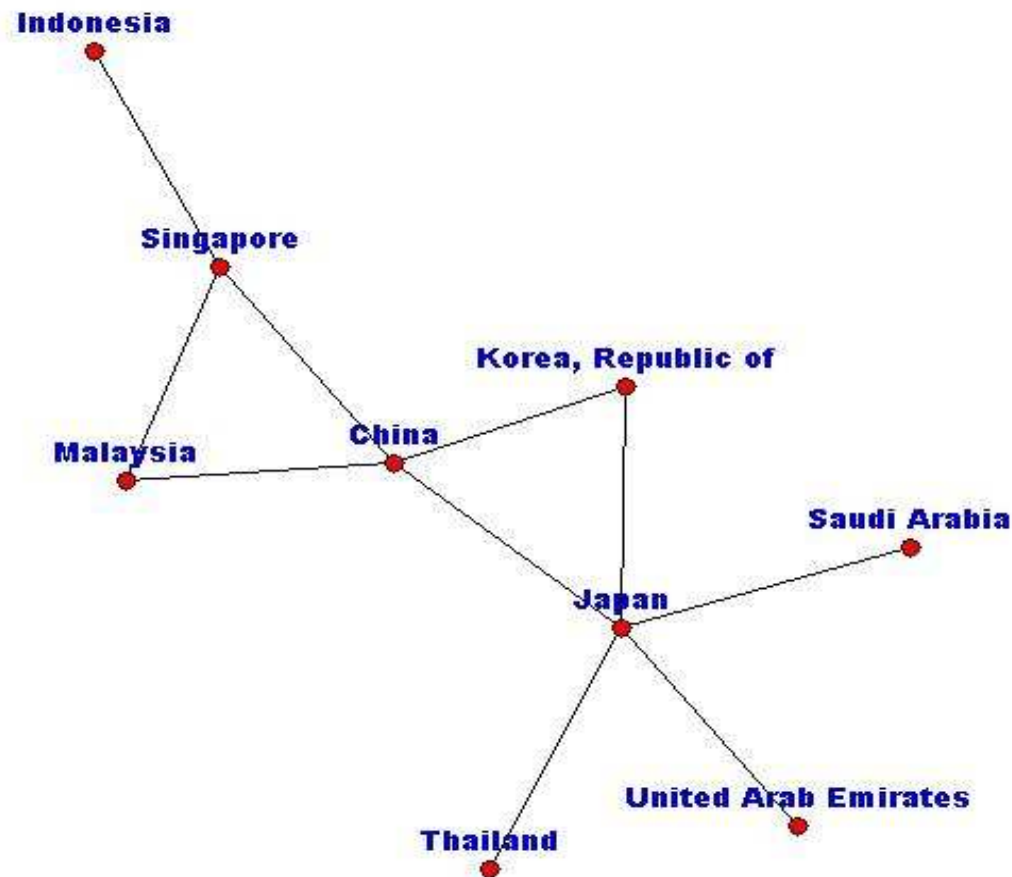


2005

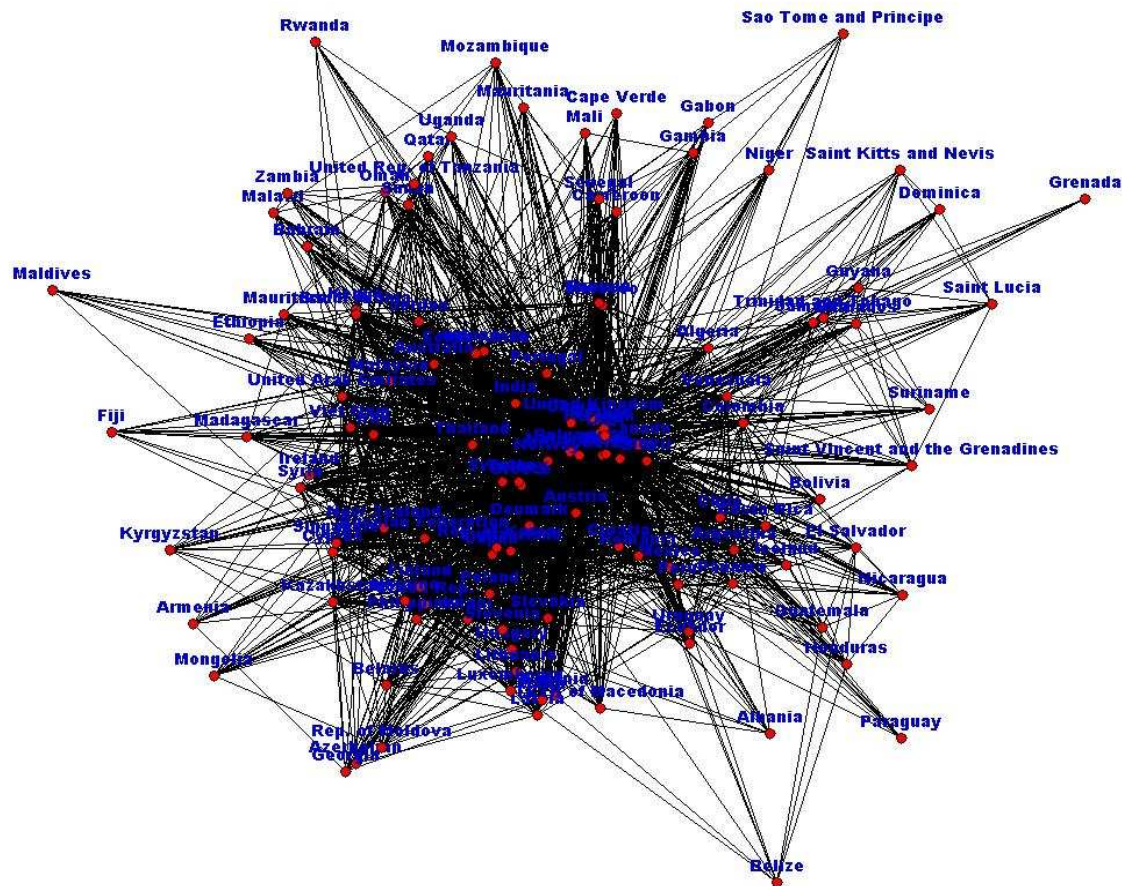


# Networks of Asian top 10 trades

2006



# Common Earth Materials (CEM) at world level



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# CEM at world level

	2002	2003	2004	2005	2006
Size	121	121	121	121	121
Density	0.25	0.26	0.27	0.29	0.29
$H_k$	0.12	0.15	0.08	0.06	0.06
DC Cent in	43%	43%	47%	53%	48%
DC Cent out	68%	67%	66%	61%	63%
Bc Cent	8.81%	7.89%	9.61%	9.46%	8.10%
Apl	1.789	1.771	1.77	1.739	1.726

# Analyzing CEM

## at world level 2002-2006

- Network size does not change (do the involved countries?), as well as density and the average path length
- Dyadic hierarchy halves
- The concentration of imports slightly increases while that of exports slightly decreases
- The intermediating power sensibly oscillates but comes back almost at the same level of 2002

# Comparing CEM with the whole world trade

- *69% of countries*
- *Less than half density*
- Lightly more concentrated imports
- *Exports are much more concentrated (>20 points)*
- *The intermediating power is 10 times more concentrated*
- A little bit higher average path length

# CEM in Asia

	2002	2003	2004	2005	2006
Size	23	23	23	23	23
Density	0.44	0.49	0.49	0.53	0.54
H <sub>k</sub>	0.17	0.08	0.17	0.08	0.08
DC Cent in	25%	29%	29%	40%	29%
DC Cent out	48%	44%	53%	49%	48%
Bc Cent	10.7%	12.3%	8.6%	13.5%	5.0%
Apl	1.55	1.51	1.48	1.45	1.46

# Analyzing CEM in Asia 2002-2006

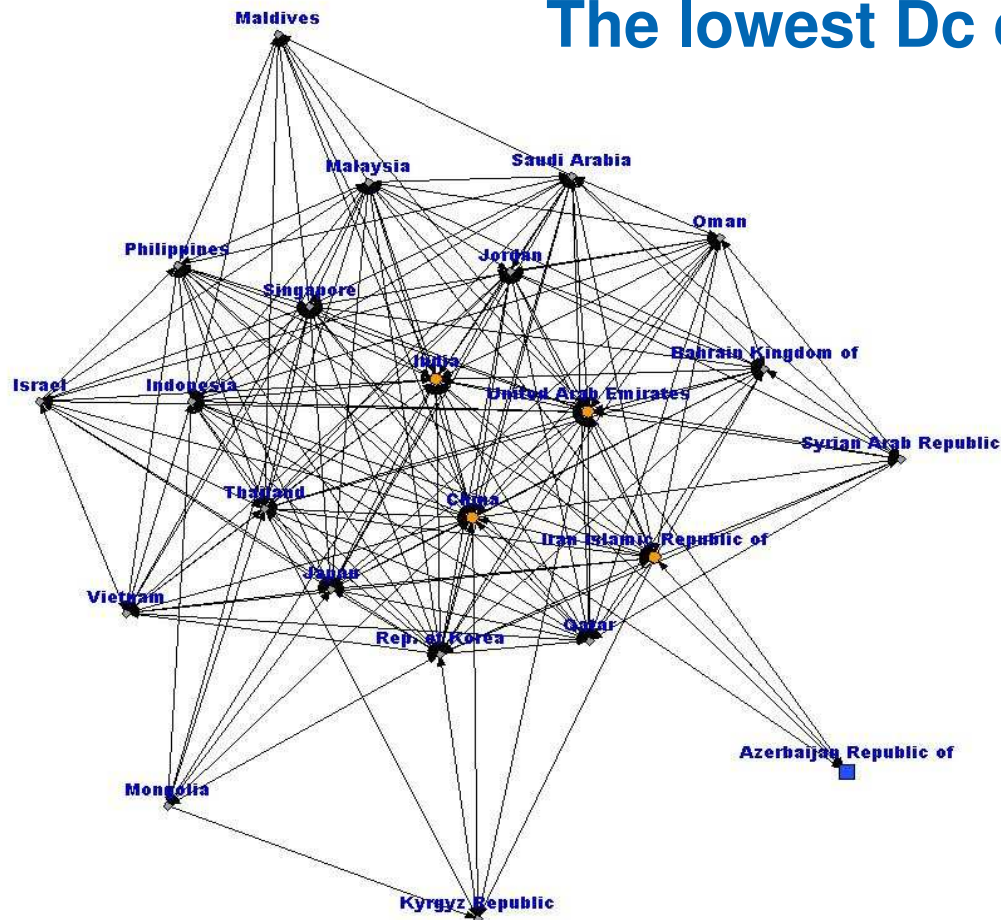
- Network size does not change (do the involved countries?), but the density significantly increases (10 points)
- Dyadic hierarchy halves
- The concentration of imports slightly increases, while that of exports keeps invariant
- The concentration of the intermediating power significantly oscillates and halves
- Country distance slightly increases

# Comparing Asian with world CEM

- 19% of countries
- Doubly dense
- Almost equally hierarchical
- Significantly less concentrated both in imports and in exports
- More intermediating power and slightly more distance between countries

# CEM Asian Egonetworks

The lowest Dc egonetwork (2006):  
Azerbaijan



# CEM Asian Egonetworks

The highest Dc egonetwork (2006):  
China

