Innovation Systems
and
Global Production Networks
The case of China

Structure

1. Innovation Systems and Learning

2. The MNC's and Global Production Networks

3. FDI and Intellectual Property Rights (IPR)

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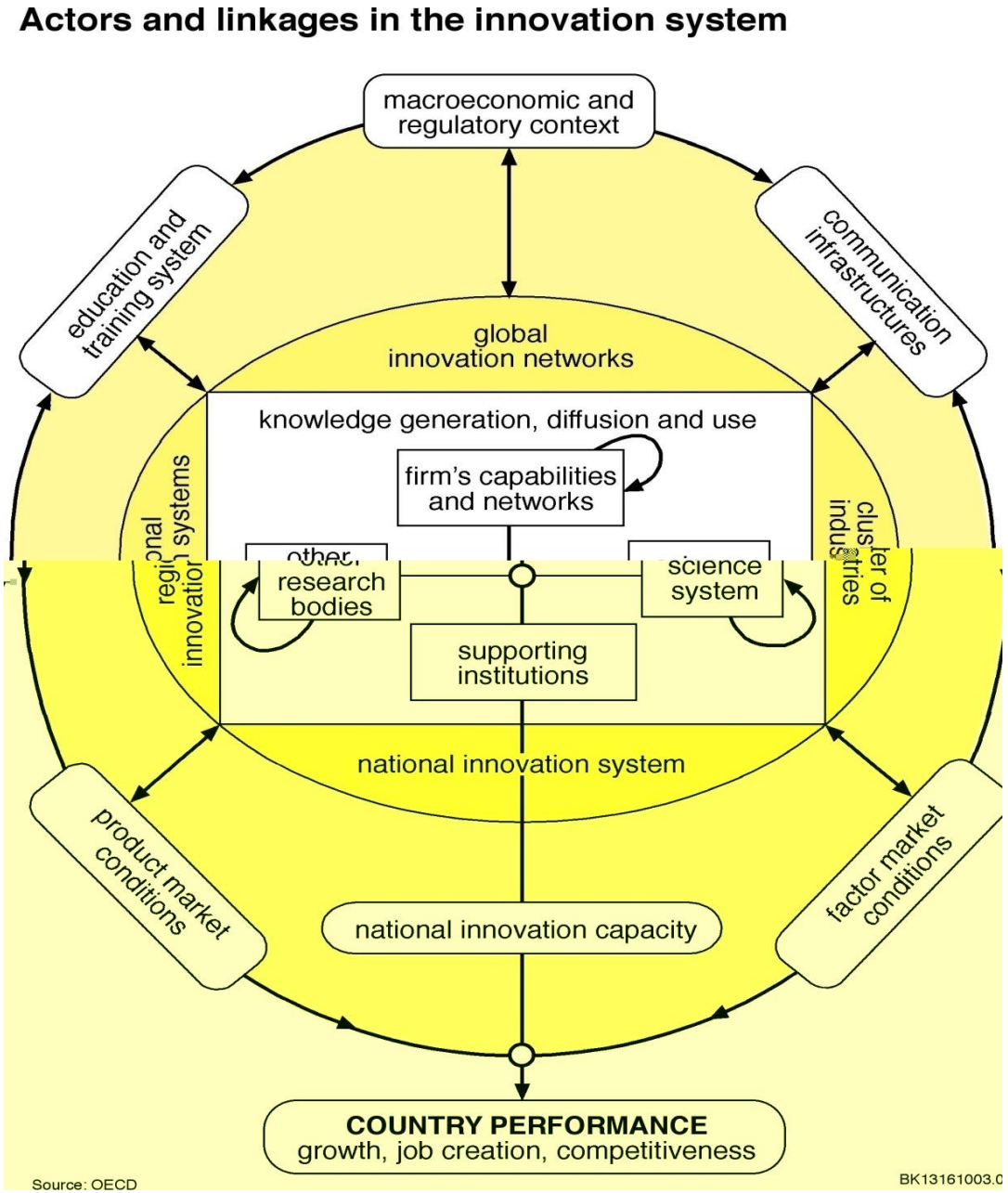

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Box 1

National innovation systems: definitions

A national system of innovation has been defined as follows:

- " .. *the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies*." (Freeman, 1987)
- " .. *the elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge ... and are either located within or rooted inside the borders of a nation state*." (Lundvall, 1992)
- "*... a set of institutions whose interactions determine the innovative performance ... of national firms*." (Nelson, 1993)
- " .. *the national institutions, their incentive structures and their competencies, that determine the rate and direction of technological learning (or the volume and composition of change generating activities) in a country*." (Patel and Pavitt, 1994)
- ".. *that set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies and which provides the framework within which governments form and implement policies to influence the innovation process. As such it is a system of interconnected institutions to create, store and transfer the knowledge, skills and artefacts which define new technologies*." (Metcalfe, 1995)

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Main features of a NIS

1. **A *dynamic system* containing flows of information, people and goods.**
2. **System of flows *generating* different types of *networks.***
3. **System of flows *generating clusters* and linking economic structures at different levels**

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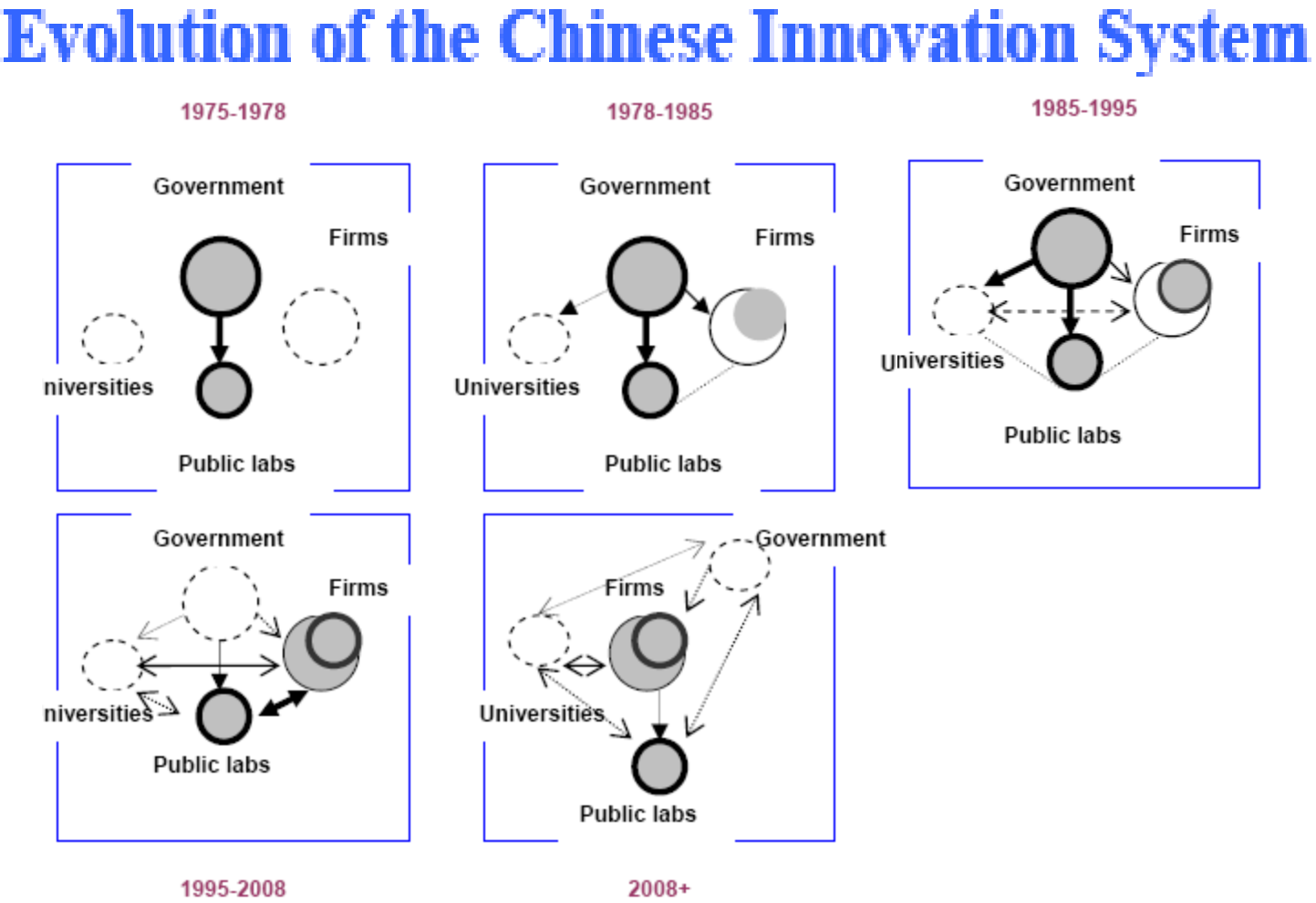

Different perspectives on innovation

1. Fundamental innovations versus incremental innovations
2. Product or process innovations

3. Innovation as a dynamic process

Windows of opportunities:

1. Entering standardized production

2. Emergence of new technological and institutional conditions

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$$\ln A = (\ln Y_{i,t} - \ln L_{i,t}) - \alpha * (\ln K_{i,t} - \ln L_{i,t}) - \theta * (\ln H_{i,t} - \ln L_{i,t}) - \gamma * (\ln R_{i,t} - \ln L_{i,t})$$

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Table 6.1 **Value Added Shares of Industries As Percentage of Total National GDP**

Industry	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Average Growth rate 1996-2005
Medical and Pharmaceutical products	0,50	0,52	0,51	0,57	0,64	0,66	NA	0,75	Tba	0,84	18,63
Electronic and telecommunications equipments	0,93	1,14	1,33	1,50	1,84	1,86	NA	2,56	Tba	3,13	29,20
Textile	1,46	1,41	1,21	1,25	1,28	1,27	NA	1,40	tba	1,77	15,40
National GDP											10,80

Sources: Own calculation based on data from China Statistical Yearbook, various editions

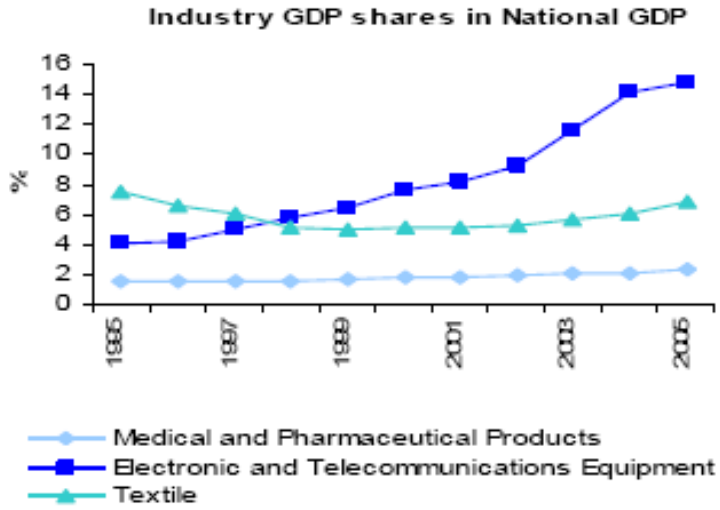

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Table 6.3 **R&D Intensity of Industries (R&D Expenditure per Worker)**

Industry	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Average Growth
Medical and Pharmaceutical products	5536	6550	8890	11155	16225	23481	NA	NA	23780	29366	22,64
Electronic and tele communicate equipments	7199	10835	25946	29214	49235	73697	NA	NA	88937	101609	49,71
Total High-tech sector*	6715	9761	14375	17572	28474	39416	68184	NA	105066	125011	39,57

Sources: Data from China Statistical Yearbook, various editions; * Wang & Szirmai, 2004 + MOST, various years

II The MNC's and Global Production Networks

Two important processes since the 1980”s

1. **From standardized production (fordist) to flexible production**

2. **From Global Commodity Chains to Global Production networks**

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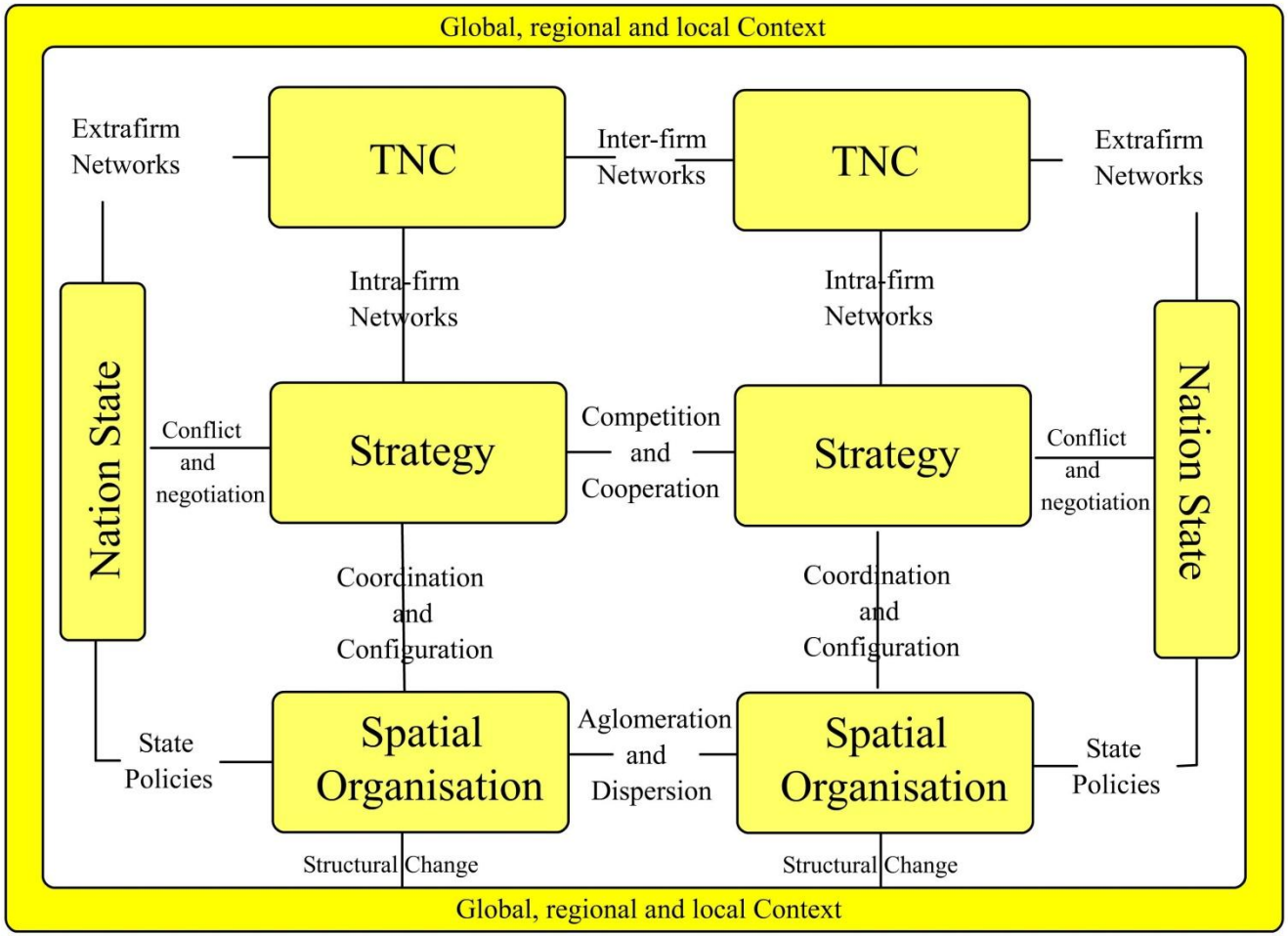
A network model of Trans National Corporations



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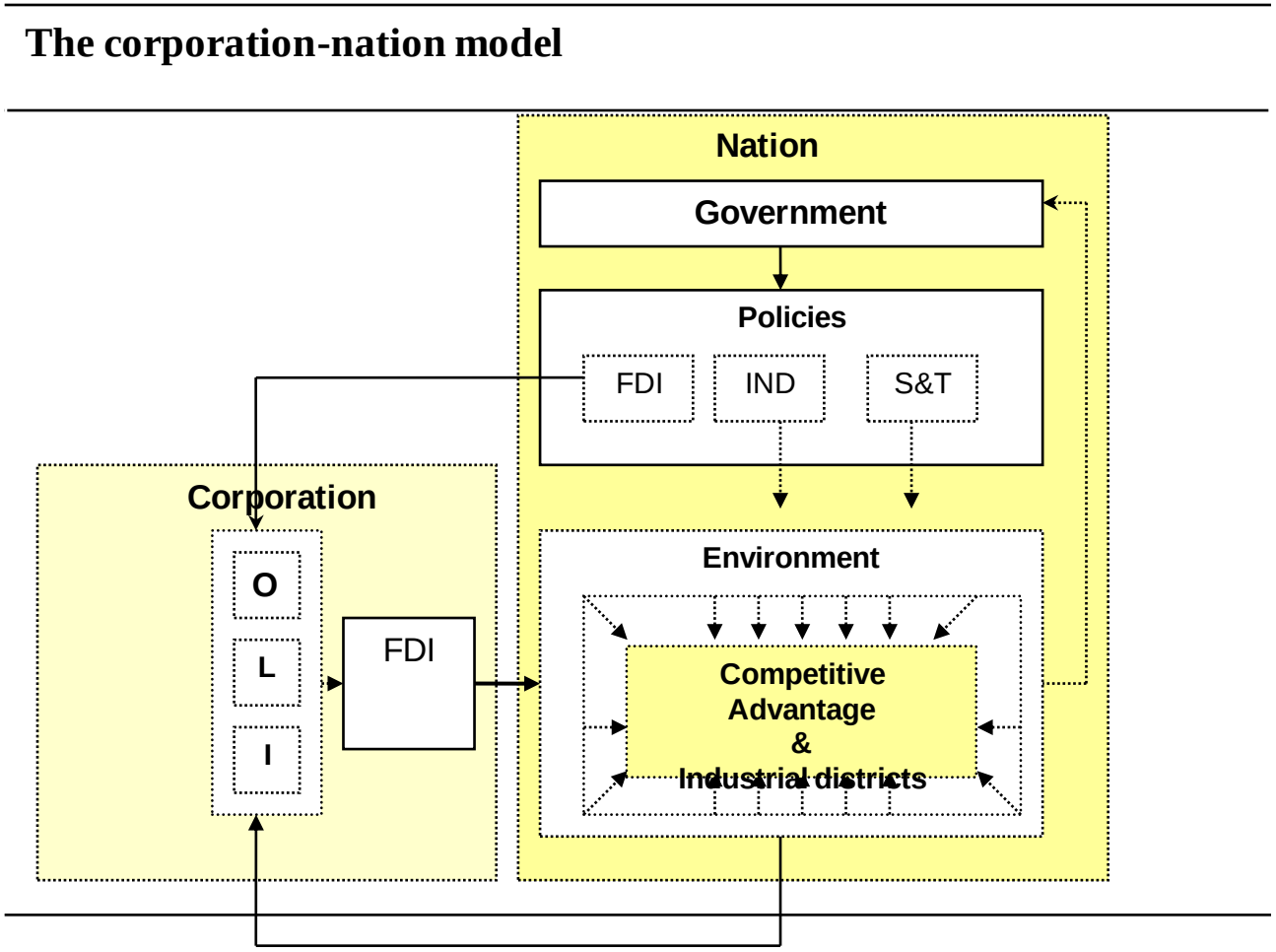

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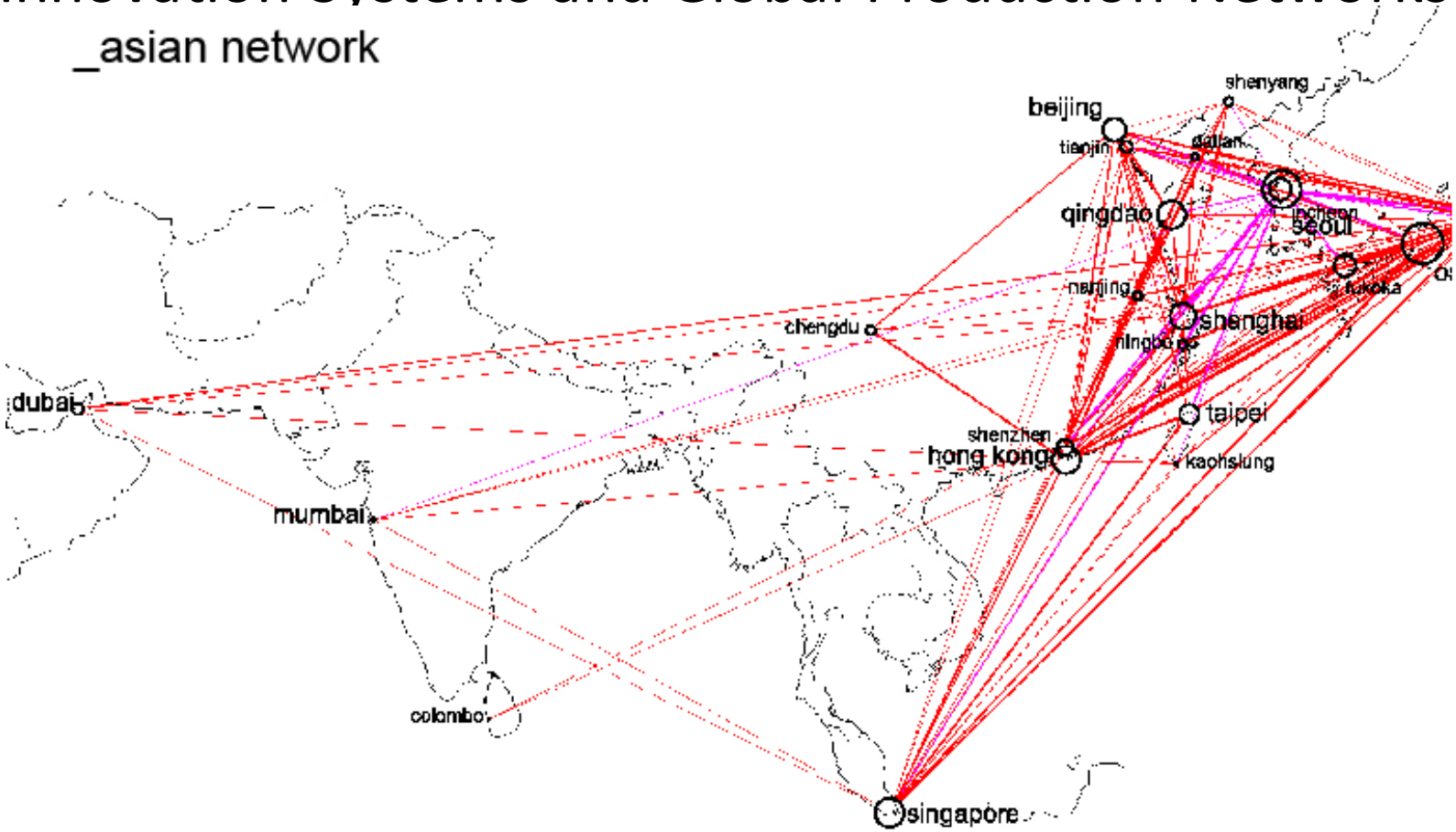

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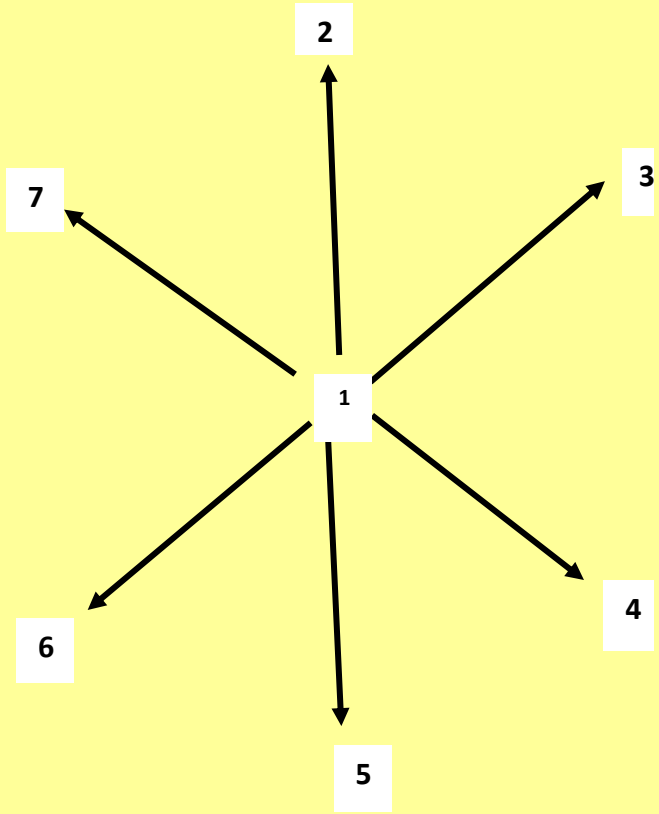
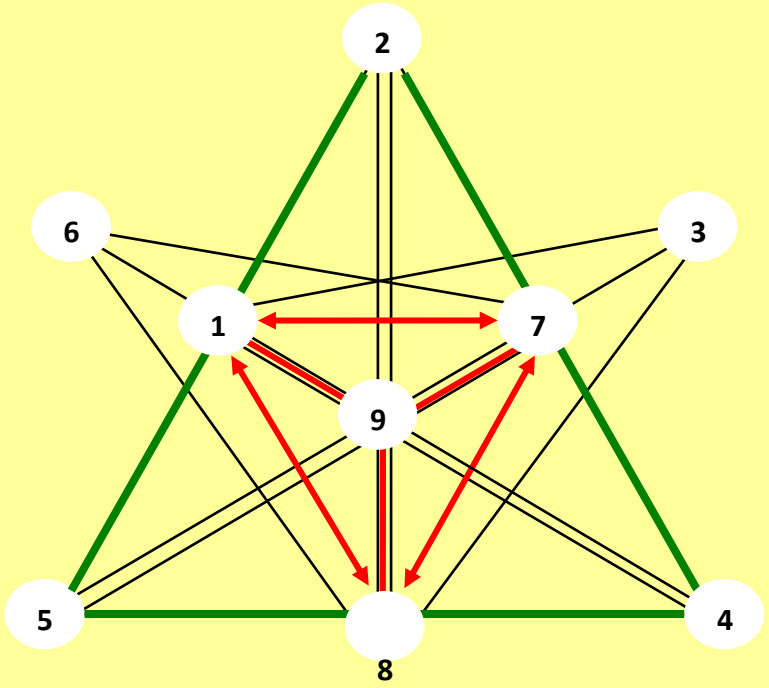


Regional Dominance



Core-Periphery Pattern

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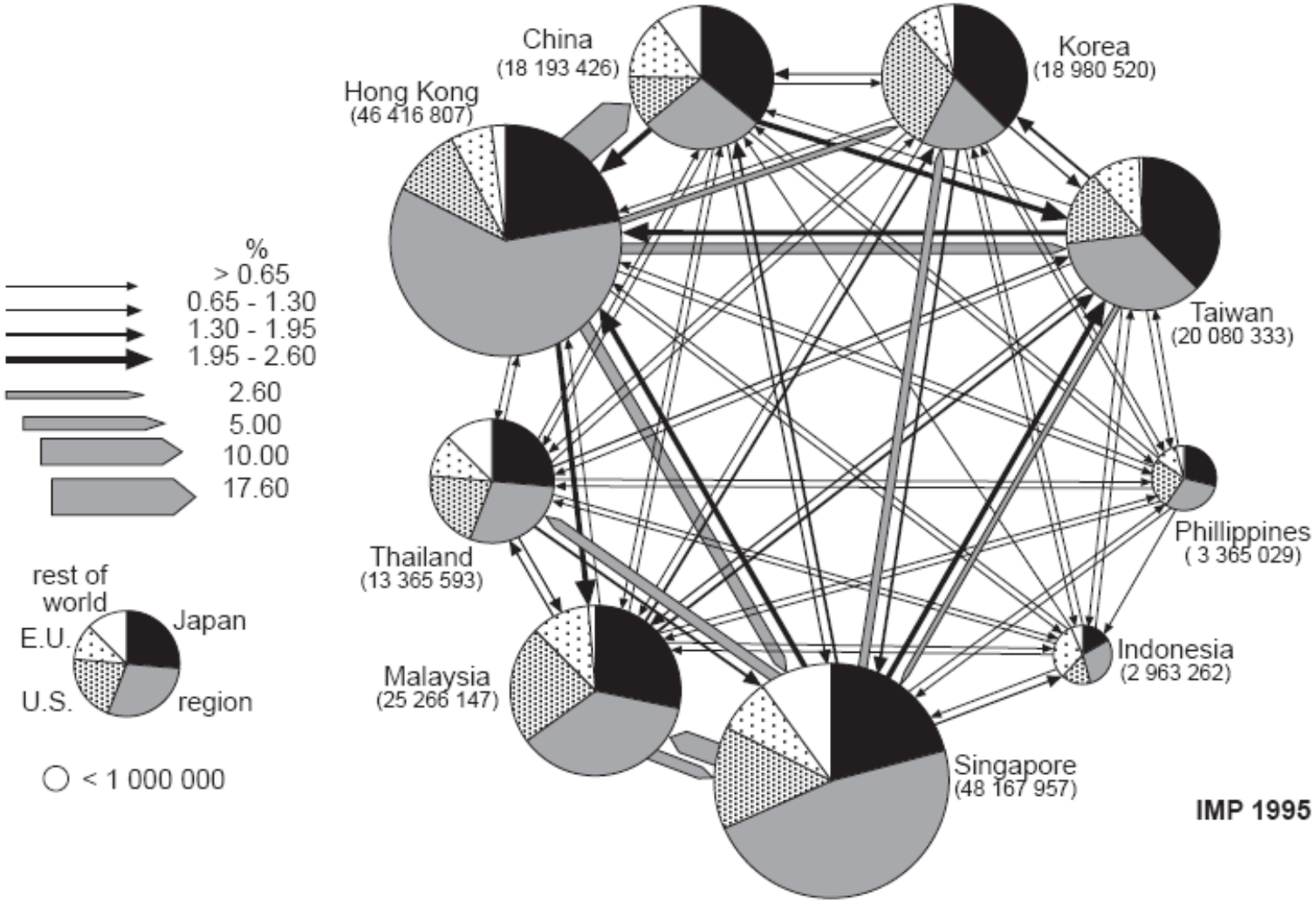

MFPT rank 1990		MFPT rank 1995		MFPT rank 2000	
US	2.83	US	3.17	US	3.45
Eu 15	3.34	Eu 15	4.25	Eu 15	4.36
Japan	9.87	Japan	8.25	Japan	8.71
Singapore	12.08	Singapore	9.84	***China***	***12.17***
Hong Kong	14.36	Hong Kong	12.75	Singapore	12.45
Taiwan	14.66	Malaysia	16.07	Hong Kong	12.49
Korea	27.22	***China***	***18.71***	Taiwan	16.00
Malaysia	27.77	Taiwan	19.99	Malaysia	17.14
China	***34.14***	Korea	23.30	Korea	17.53
Thailand	48.38	Thailand	35.02	Philippines	33.44
Philippines	73.62	Philippines	39.25	Thailand	43.06
Indonesia	99.30	Indonesia	97.26	Indonesia	170.70

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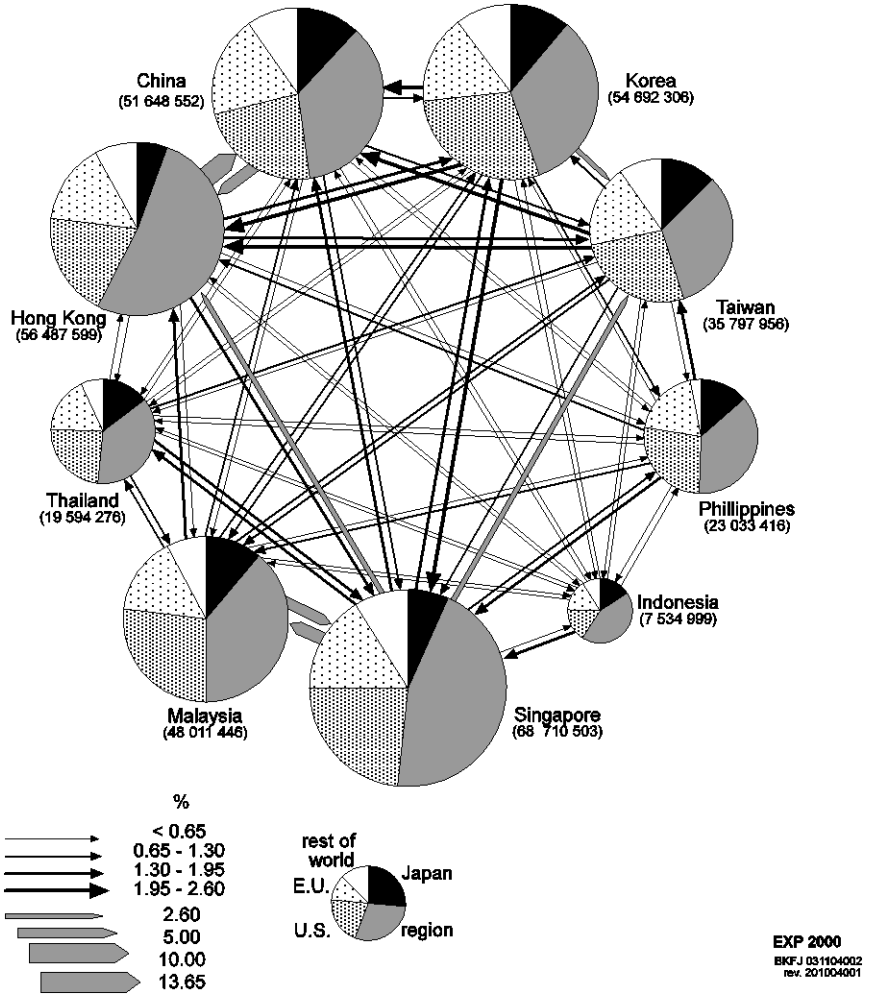
Asian Region Export Trade Structure (2000)



Asian Region Import trade Structure (2000)

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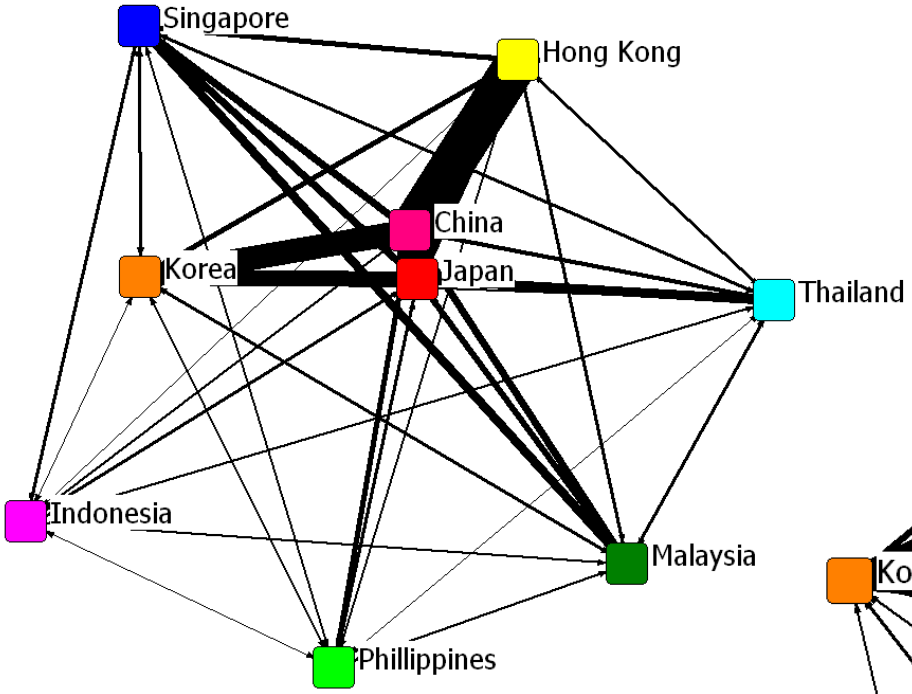
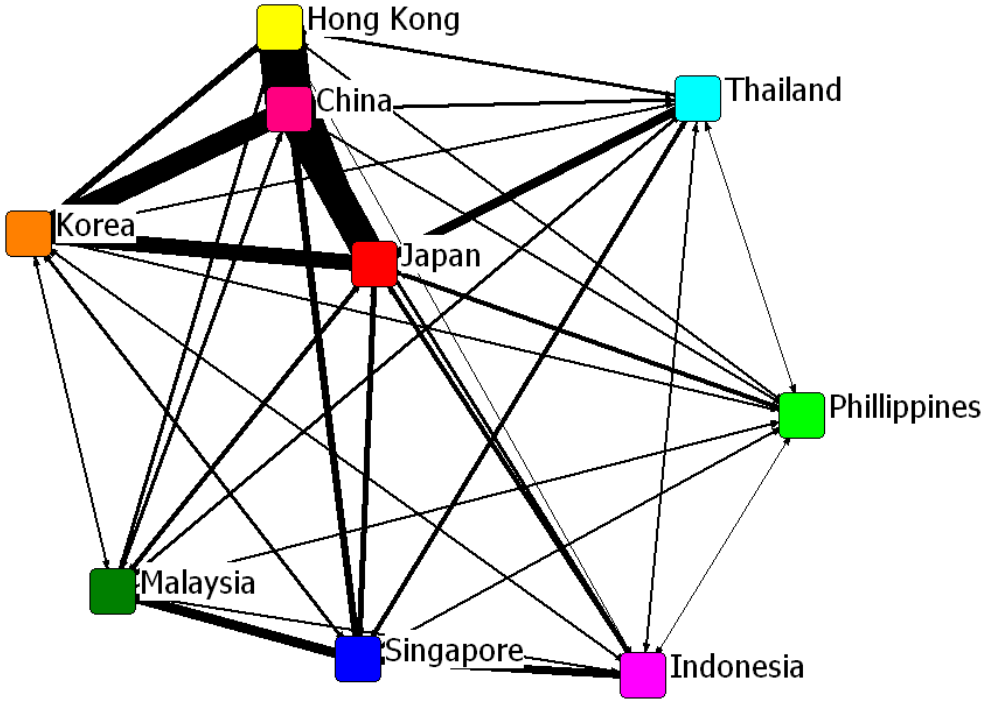
Import 2005



Export 2005



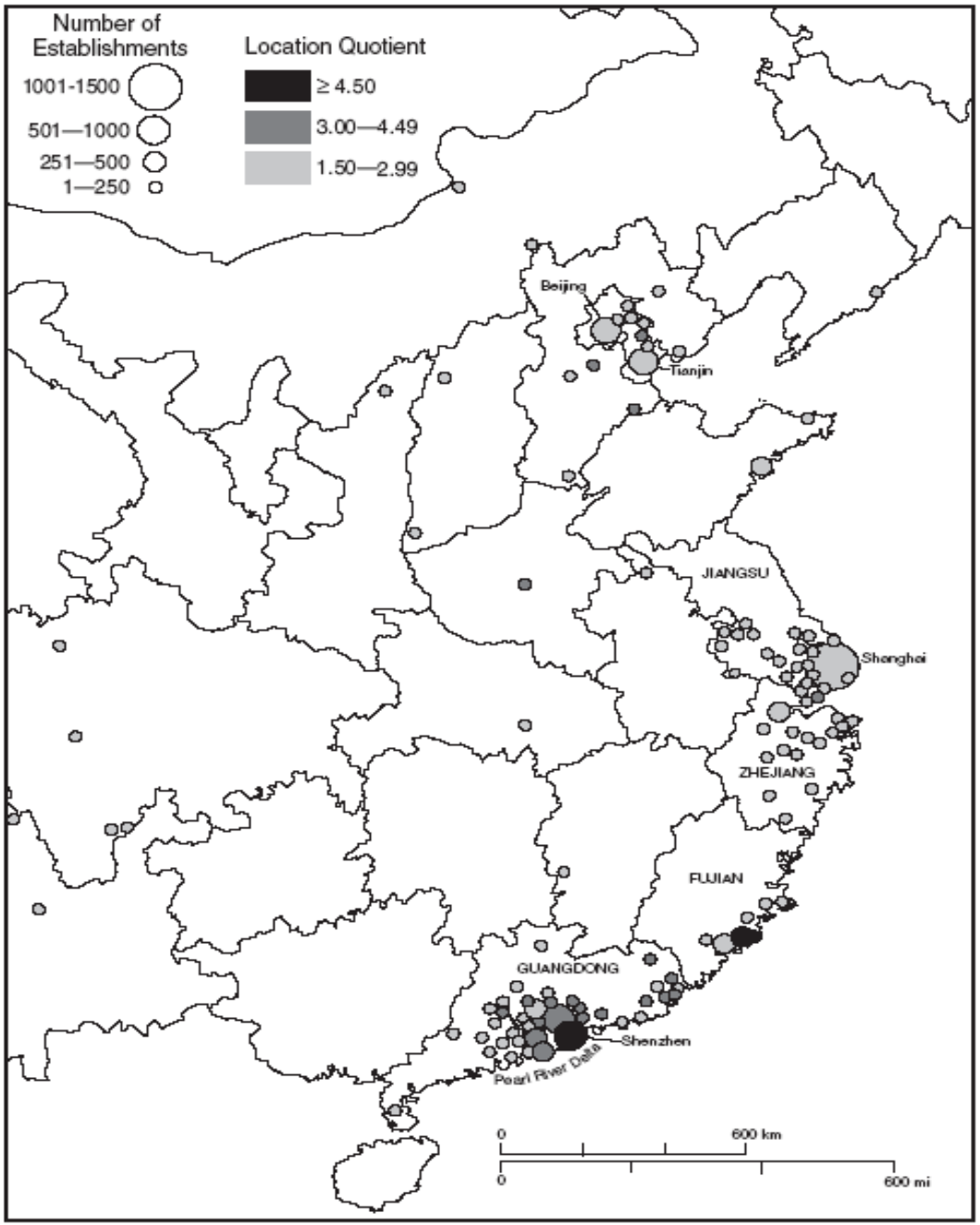


Figure 2. Distribution of establishments in the consumer electronics and garments industries by county, China, 1995. Figure based on four-digit data from the 1995 Industrial Census provided by the State Statistical Bureau, People's Republic of China. *Note:* Counties in which the number of

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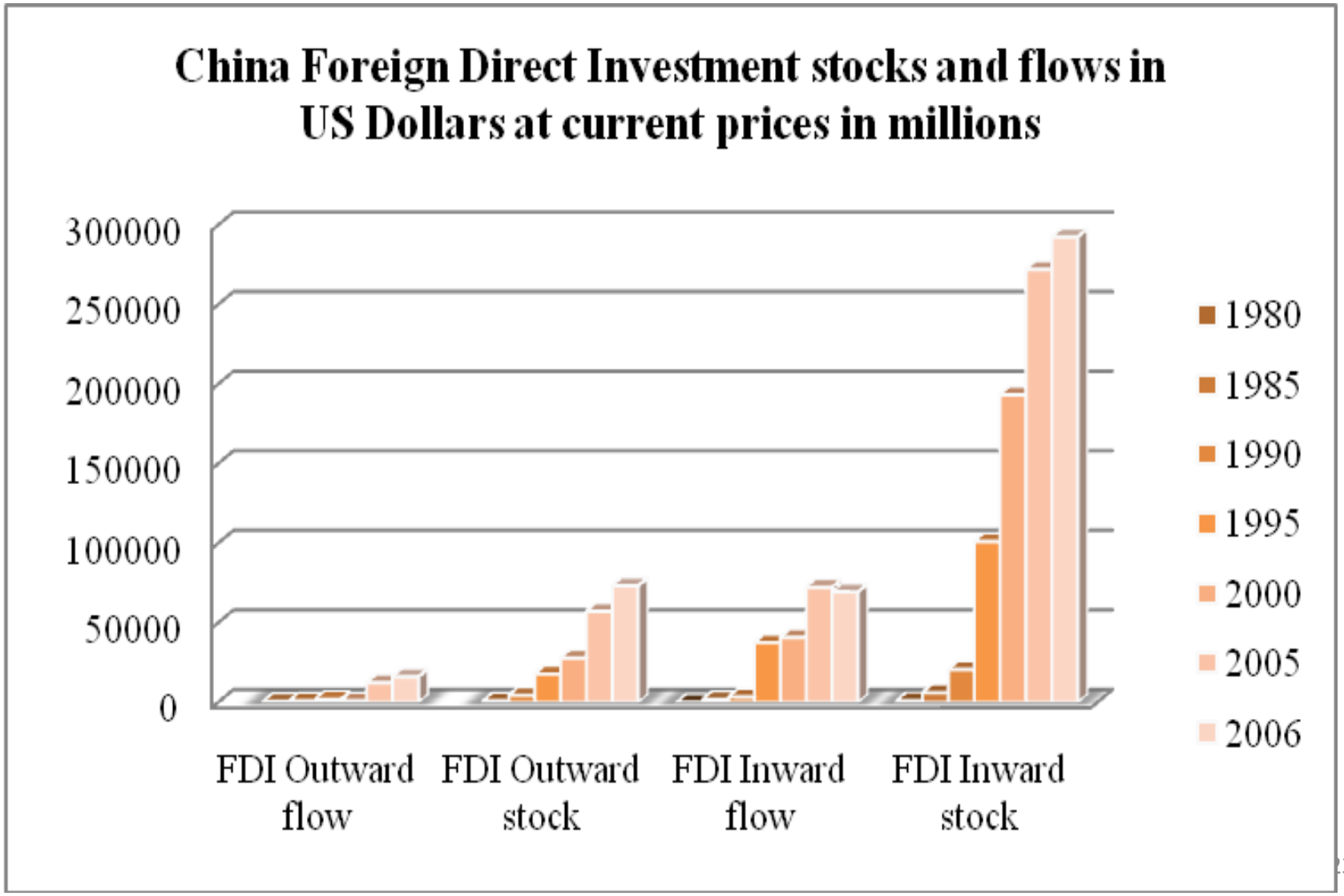

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Export of China by commodity with the rest of the world in million US dollar at current prices					
1990			2006		
1	Machinery and transport equipment	10833	1	Machinery and transport equipment	456343
2	Agricultural products	10060	2	Office and telecom equipment	287331
3	Clothing	9669	3	Electronic data processing and office equipment	134507
4	Textiles	7219	4	Telecommunications equipment	123615
5	Fuels and mining products	6559	5	Clothing	95388
6	Chemicals	3752	6	Textiles	48683
7	Office and telecom equipment	3126	7	Chemicals	44530
8	Transportation	2706	8	Fuels and mining products	38606
9	Telecommunications equipment	2623	9	Other commercial services	36456
10	Travel	1738	10	Travel	33949

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Import China by commodity with the rest of the world in million US dollar at current prices					
1990			2006		
1	Machinery and transport equipment	21513	1	Machinery and transport equipment	357021
2	Agricultural products	7855	2	Office and telecom equipment	197948
3	Chemicals	6683	3	Fuels and mining products	158273
4	Textiles	5292	4	Integrated circuits and electronic components	121722
5	Office and telecom equipment	4058	5	Chemicals	87047
6	Transportation	3245	6	Agricultural products	51653
7	Iron and steel	2852	7	Other commercial services	41636
8	Fuels and mining products	2822	8	Electronic data processing and office equipment	40692
9	Telecommunications equipment	2539	9	Telecommunications equipment	35534
10	Automotive products	1796	10	Transportation	34369

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"IPRs are the rights relating to: literary, artistic and scientific work; performances of artists, phonograms, and broadcasts; inventions in all fields of human endeavor; scientific discoveries; industrial designs; trademarks, service marks, and commercial names and designations; protection against unfair competition; and all other assets resulting from intellectual activity in the industrial, scientific, literary or artistic field".

III FDI and Intellectual Property Rights

Four different types of FDI (Dunning)

1. Market driven
2. Efficiency or cost-based
3. Resource-based
4. Knowledge-based

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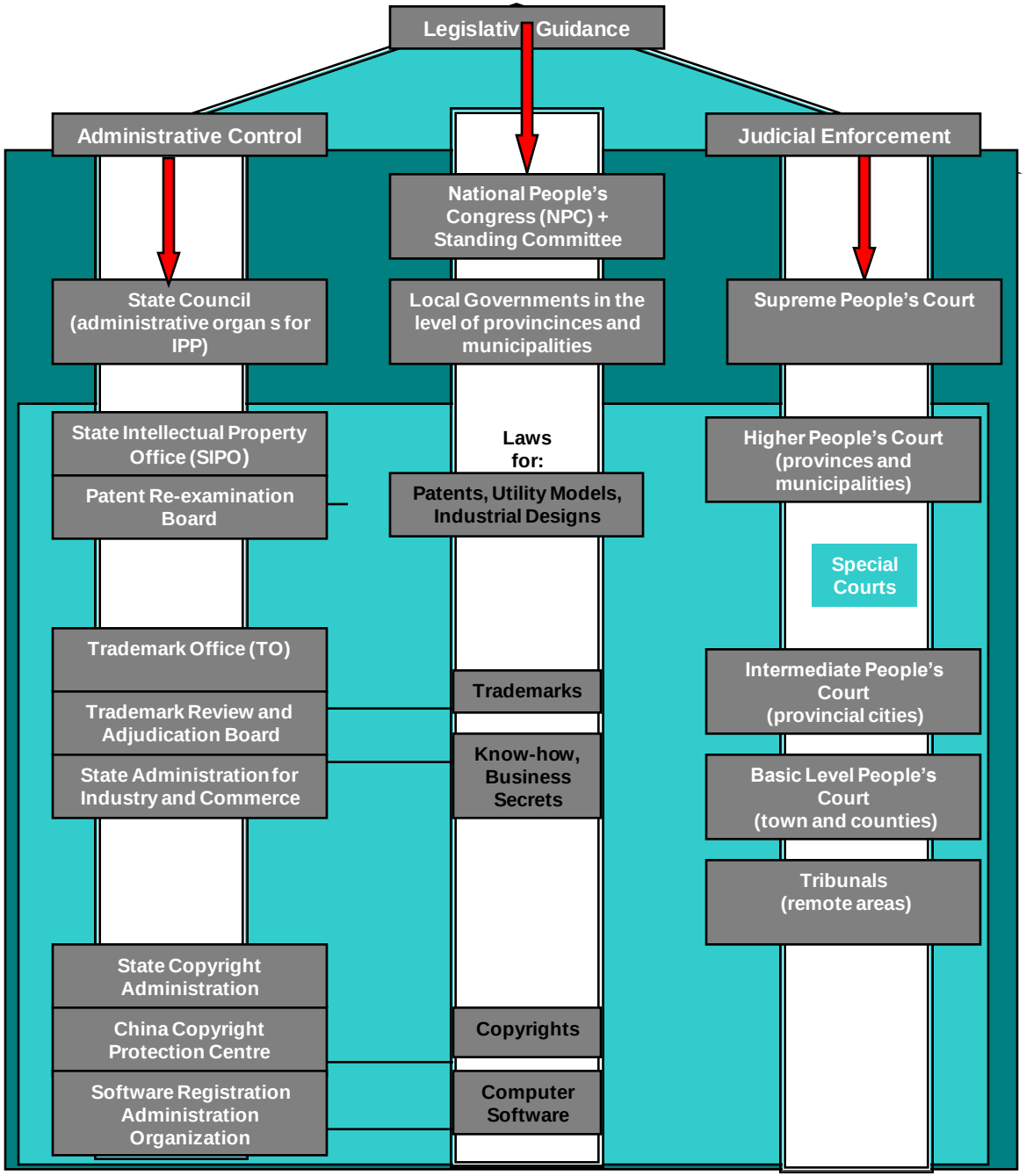
Major IP-related International Treaties	Signed	Purpose	
Convention Establishing the World Intellectual Property Organization (WIPO)	1967	Promoting & Administering IP Protection and Co-operation worldwide	1980
Convention for the Protection of Industrial Property	1883	Protection of Industrial Property	1985
Convention for Protection of Literary & Artistic Works	1914	Protection of Authors' Rights	1992
Agreement for the International Registration of Marks	1891	Protection of Industrial Trademarks	1989
Treaty on Intellectual Property in respect of Integrated Circuits	1989	Integrated Circuits and Layout Design	1989
Patent Cooperation Treaty	1970	International Application of Patent	1993
Agreement between WIPO and the WTO	1995	Arrangement for Co-operation	1995
TRIPS agreement (Trade-related Aspects of IPRs)	1995	Protecting all IPRs with Minimum Standards, Enforcement and Principles	2001


Legislative Guidance
Administrative Control
Judicial Enforcement
National People's Congress (NPC) + Standing Committee
State Council (administrative organ s for IPP)
Local Governments in the level of provincinces and municipalities
Supreme People's Court
State Intellectual Property Office (SIPO)
Patent Re-examination Board
Laws for:
Patents, Utility Models, Industrial Designs
Higher People's Court (provinces and municipalities)
Special Courts
Trademark Office (TO)
Trademark Review and Adjudication Board
State Administration for Industry and Commerce
Trademarks
Know-how, Business Secrets
Intermediate People's Court (provincial cities)
Basic Level People's Court (town and counties)
Tribunals (remote areas)
State Copyright Administration
China Copyright Protection Centre
Software Registration Administration Organization
Copyrights
Computer Software

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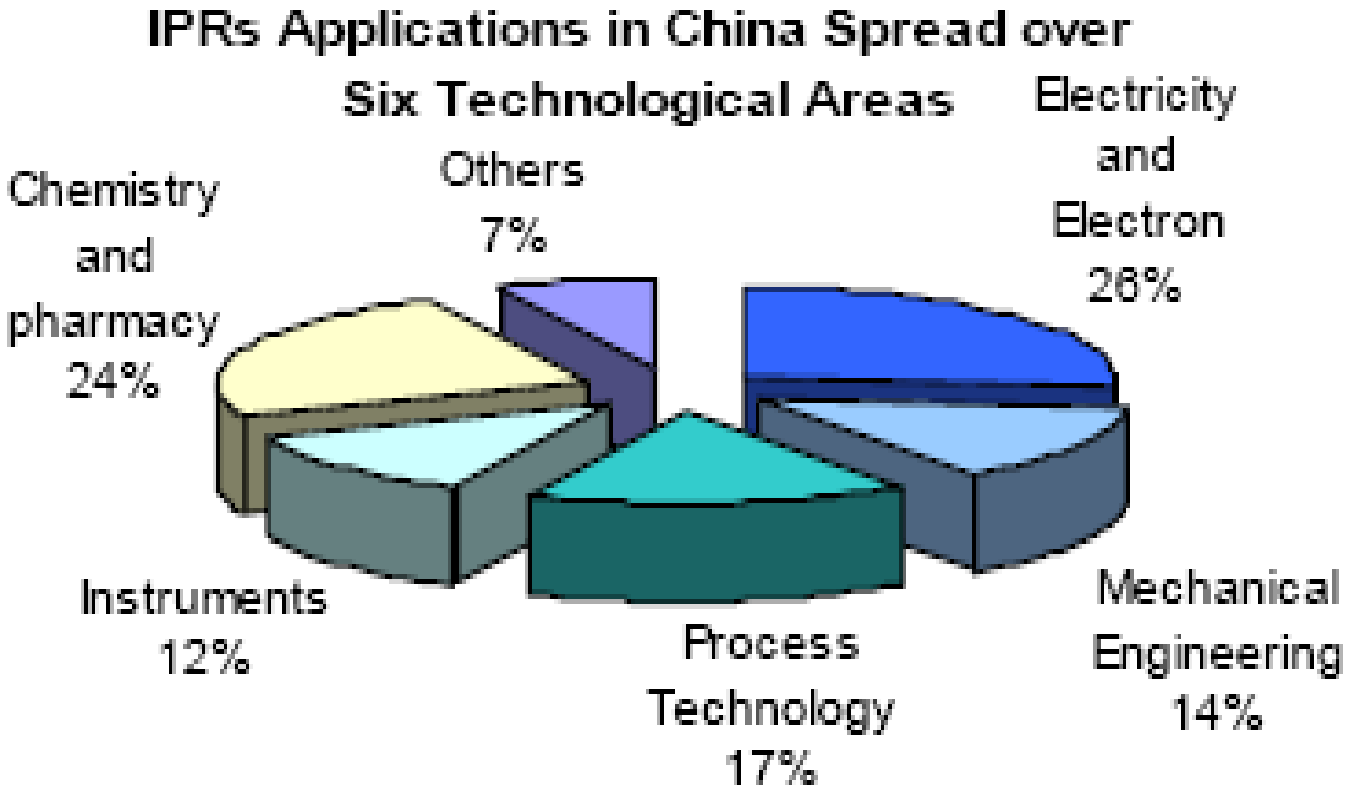

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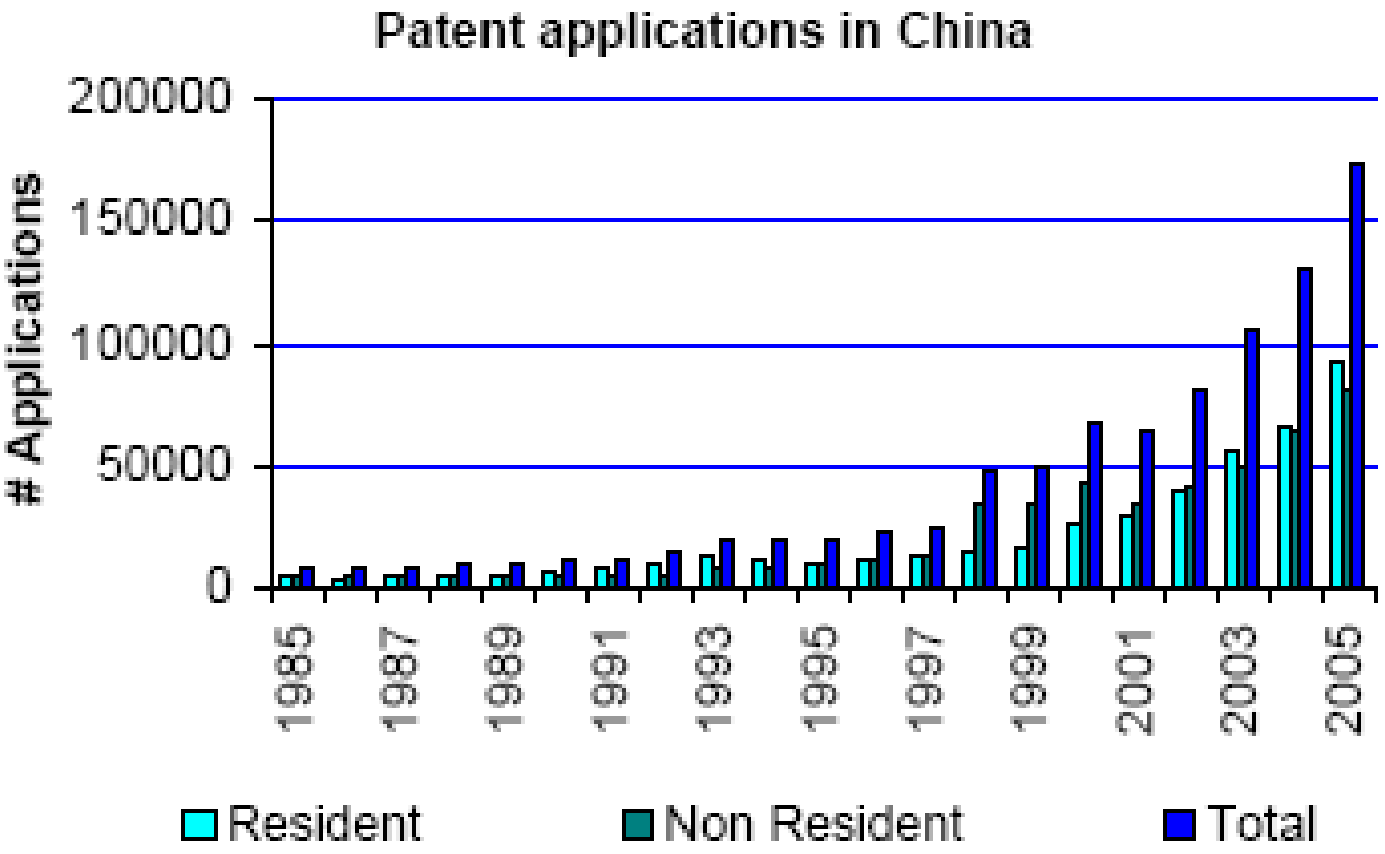

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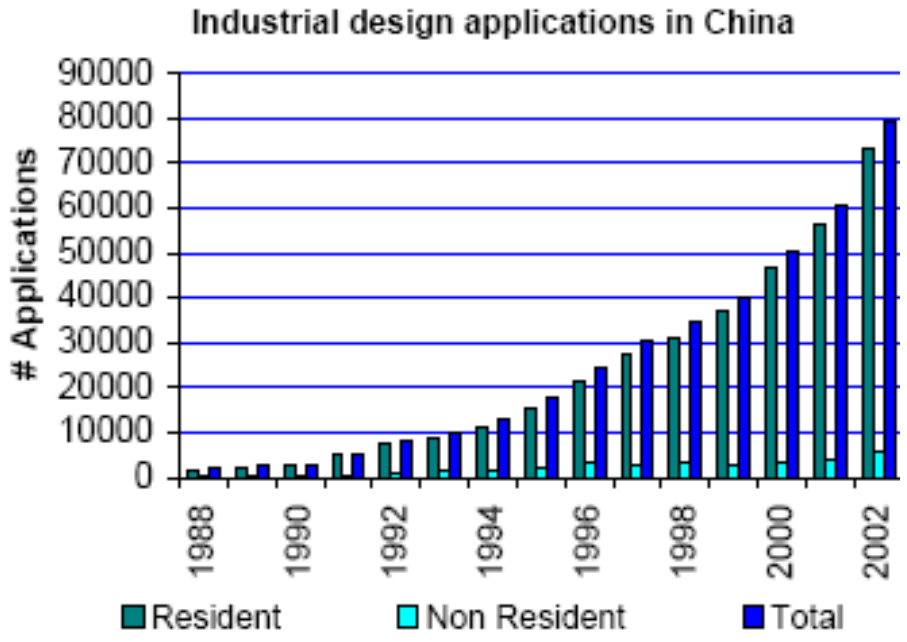

Conclusions

1. **The growth and development of China's NIS marks a shift from Public Research Organizations to firm centered innovation systems.**
2. **The integration of the Chinese economy in regional and global production networks is generating flows of inward FDI in knowledge intensive sectors**
3. **The development of a legislative , administrative and judicial system to protect IPR's stimulates FDI and contributes to sustained economic growth.**