

ACO China Conference

Panel: China's Science and Education: Collaborator or Competitor?

University of Groningen

28 November 2008

S&T developments in China: Prospects for bilateral cooperation in research



Z. Bob Su,
ITC, Enschede
b_su@itc.nl
ww.itc.nl/wrs



Acknowledgements

- Prof. Peter Ho for his invitation to this interesting China conference
- Dr. Charlotte van Hees for posing some challenging questions

- Prof. Jun Wen (CAREERI/CAS, Lanzhou)



- Prof. Yaoming Ma (ITP/CAS, Lhasa)



- Prof. Yunxuan Zhou (SKLEC, Shanghai)



Content of talk



- What are the similarities and differences in research culture in China and Europe?
- Can China become top 5 world knowledge economies in 2020?
- Is the Netherlands still interesting in research cooperation for the Chinese?

Research Culture - 1



- Organisation of research funding streams
 1. National Research Programme
 - 1) National Basic Research Program of China (973)
 - 2) High-Tech Research and Development Program of China (863)
 - 3) National Key Technology R&D Program
 - 4) National Natural Science Foundation of China (NSFC)
 - 5) Ministry of S&T also sponsors international cooperation projects
 2. Ministerial level R&D fund (Each ministry has an S&T department)
 3. Provincial government S&T commission (bureau)
 4. Industrial sectors

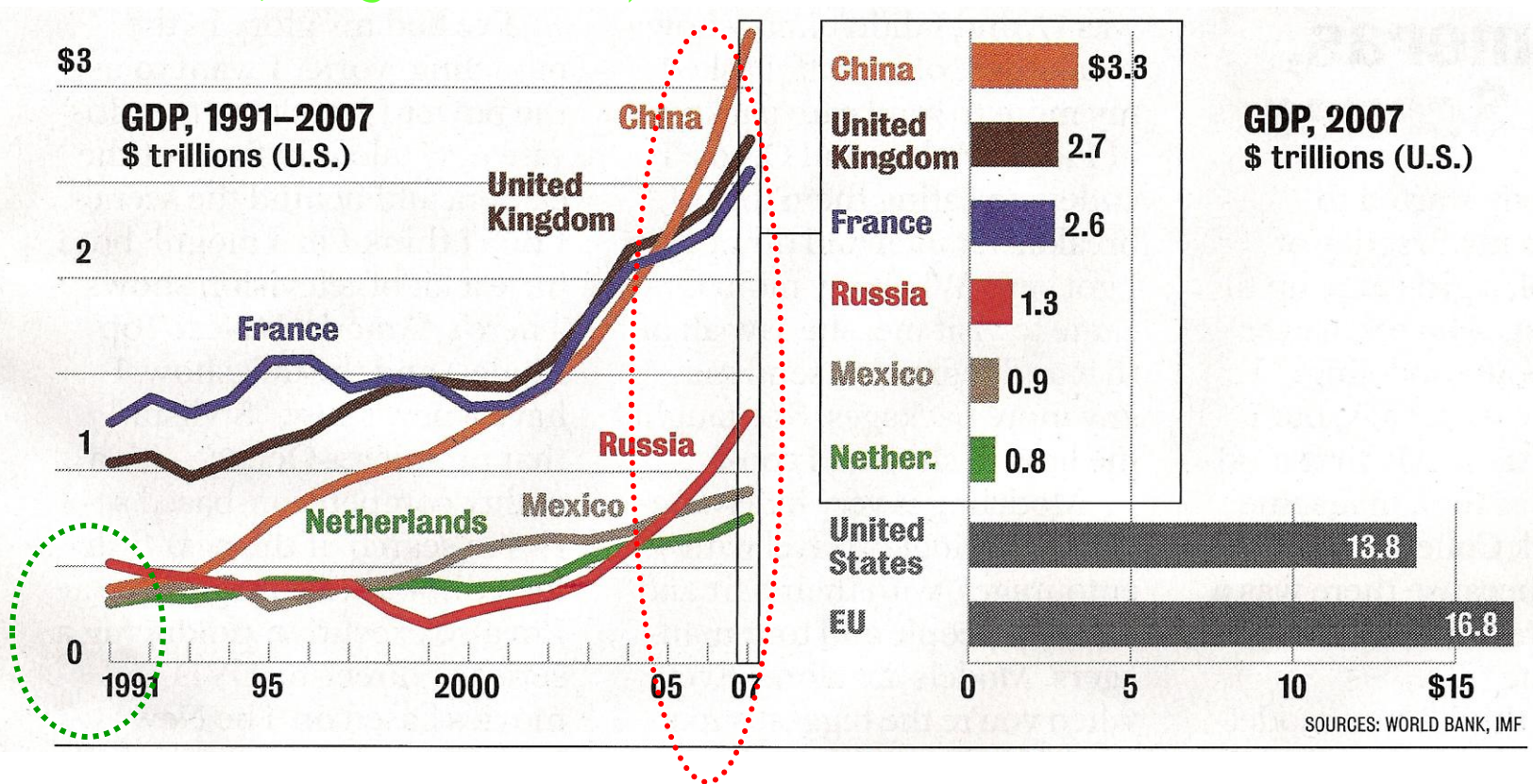
Research Culture - 2



- Management of PhD students
 - Difference quite large (**Confirmed with my own students**)
 - Free to explore in NL but supervisor-dominated in China
 - Relative equality in NL and absolute leadership style in China
 - Chinese-style education do not encourage students to explore but easy to manage, exactly the opposite in NL
 - (My NL students never do what I like, I care little as long as they produce sound results; Some of my CN students always do what I ask, I send them home if they do not perform.)
- Sharing research output & communication
 - Reluctance of sharing data cause difficulties in collaborations between Chinese and Dutch partners (**Lack of confidence in data quality**)
 - Collaboration with NL help influence positively thinking and behavior of CN researchers (**Increase soundness of research output via outspoken NL impoliteness**)

Quality of Research - 1

- China invests heavily in research infrastructure, researchers and stimulate Chinese migrants to return home (Many of my friends are guest professors, 100 scholars, Yangtze scholars).



S&T investment of China 2.3% GDP in 1960, 1.3% in 2005, 2% in 2010 11th five-year plan

Quality of Research – 2



Statistics by Country

	Country	Top 20	Top 100	Top 200	Top 300	Top 400	Top 500
1	USA	17	54	90	114	139	159
2	UK	2	11	22	33	38	42
3	Japan	1	4	9	12	18	31
4	Germany		6	14	24	35	40
5	Canada		4	6	18	18	21
6	Sweden		4	4	9	9	11
7	France		3	7	14	17	23
8	Australia		3	6	9	14	15
9	Switzerland		3	6	7	7	8
10	Netherlands		2	9	9	11	12
11	Denmark		2	3	3	4	4
12	Israel		1	4	4	6	6
13	Norway		1	1	2	3	4
14	Finland		1	1	1	3	6
15	Russia		1	1	1	2	2
16	Italy			5	7	12	22
17	Belgium			4	6	7	7
18	China			1	10	16	30

Quality of Research – 3



World Rank	Institution*	Region	Regional Rank	Country	National Rank
47	Univ Utrecht	Europe	9	Netherlands	1
76	Univ Leiden	Europe	23	Netherlands	2
101-151	VU Univ Amsterdam	Europe	35-58	Netherlands	3-5
101-151	Univ Amsterdam	Europe	35-58	Netherlands	3-5
101-151	Univ Groningen	Europe	35-58	Netherlands	3-5
152-200	Delft Univ Tech	Europe	59-79	Netherlands	6-9
152-200	Erasmus Univ	Europe	59-79	Netherlands	6-9
152-200	Radboud Univ Nijmegen	Europe	59-79	Netherlands	6-9
152-200	Univ Wageningen	Europe	59-79	Netherlands	6-9
201-302	Chinese Univ Hong Kong	Asia/Pac	23-41	China-hk	1-3
201-302	Hong Kong Univ Sci & Tech	Asia/Pac	23-41	China-hk	1-3
201-302	Nanjing Univ	Asia/Pac	23-41	China	1-6
201-302	Peking Univ	Asia/Pac	23-41	China	1-6
201-302	Shanghai Jiao Tong Univ	Asia/Pac	23-41	China	1-6
201-302	Tsinghua Univ	Asia/Pac	23-41	China	1-6
201-302	Univ Hong Kong	Asia/Pac	23-41	China-hk	1-3
201-302	Univ Sci & Tech China	Asia/Pac	23-41	China	1-6
201-302	Zhejiang Univ	Asia/Pac	23-41	China	1-6
303-401	City Univ Hong Kong	Asia/Pac	42-68	China-hk	4-5
303-401	Fudan Univ	Asia/Pac	42-68	China	7
303-401	Hong Kong Polytechnic Univ	Asia/Pac	42-68	China-hk	4-5
303-401	Univ Maastricht	Europe	125-168	Netherlands	10-11
303-401	Univ Twente	Europe	125-168	Netherlands	10-11
402-503	China Agr Univ	Asia/Pac	69-100	China	8-18
402-503	Dalian Univ Tech	Asia/Pac	69-100	China	8-18
402-503	Eindhoven Univ Tech	Europe	169-210	Netherlands	12
402-503	Harbin Inst Tech	Asia/Pac	69-100	China	8-18
402-503	Huazhong Univ Sci & Tech	Asia/Pac	69-100	China	8-18
402-503	Jilin Univ	Asia/Pac	69-100	China	8-18
402-503	Lanzhou Univ	Asia/Pac	69-100	China	8-18
402-503	Nankai Univ	Asia/Pac	69-100	China	8-18
402-503	Shandong Univ	Asia/Pac	69-100	China	8-18
402-503	Sichuan Univ	Asia/Pac	69-100	China	8-18
402-503	Tianjin Univ	Asia/Pac	69-100	China	8-18
402-503	Zhongshan Univ	Asia/Pac	69-100	China	8-18

Research cooperation with NL? (1)



- How interesting is research cooperation with Dutch partners for the Chinese?
 - Chinese are very interested in doing joint researches with Dutch scientists
 - Chinese generally consider that NL is very well-developed in agriculture and agroproducts, and PhD training has a very high international level
 - Compared to other European countries, NL has a better language environment
- China's current scientific and technical objective is to pay more attention to resolving the practical problems of national development and social needs
 - if relevant to these two areas, bilateral research projects in general can relatively easily be funded
 - international cooperation reflecting these national priorities can easily be established

Research cooperation with NL? (2)



- What are promising fields?
 - China's demand for nation-building area - national infrastructure and sustainable development important resources and environment
 - Clean-energy, clean transportation, water security, green chemistry, food production and safety, climate change
 - China pays more attention to cooperation through joint research projects to train researchers, PhD training in NL
 - (Individual studies in the West is not very encouraged by supervisors in China. After returning to China, such students have relatively limited space for development.)
- It does not appear to have a decreasing interest for bilateral cooperation with NL.

China as top 5 knowledge world economies in 2020?



- What are the chances that China reaches its ambition to become part of the top 5 knowledge economies in the world in 2020?
- Challenges
 - Very uneven levels of students and supervisors
 - China is one of the largest scientific paper producers, but the average quality of the papers are not convincing
 - China foreign technology dependence (FTD, proportion of technology imported to the whole technology) is 50% in 2006The FTD is expected to be less than 30%, with total R&D input reaching 2.5% of GDP by 2020 (Long Term S&T Development Plan, 2006-2020).
 - FTD of Japan and USA is only 5%.

China as top 5 knowledge world economies in 2020?



- What is the impact of population in knowledge economies?

<i>Ranking</i>	<i>Economy</i>	<i>(thousands)</i>
1	China	1,319,983
2	India	1,123,319
3	United States	301,621
4	Indonesia	225,630
5	Brazil	191,601
6	Pakistan	162,389
7	Bangladesh	158,572
8	Nigeria	147,983
9	Russian Federation	141,636
10	Japan	127,771
11	Mexico	105,281
12	Philippines	87,892
13	Vietnam	85,140
14	Germany	82,268
15	Ethiopia	79,087
16	Egypt, Arab Rep.	75,467
17	Turkey	73,888
18	Iran, Islamic Rep.	71,021
19	Thailand	63,832
20	Congo, Dem. Rep.	62,399
21	France	61,707 ^a
22	United Kingdom	61,034
57	Chile	16,595
58	Netherlands	16,381
59	Kazakhstan	15,481

Population 2007
World Bank

China as top 5 knowledge world economies in 2020?

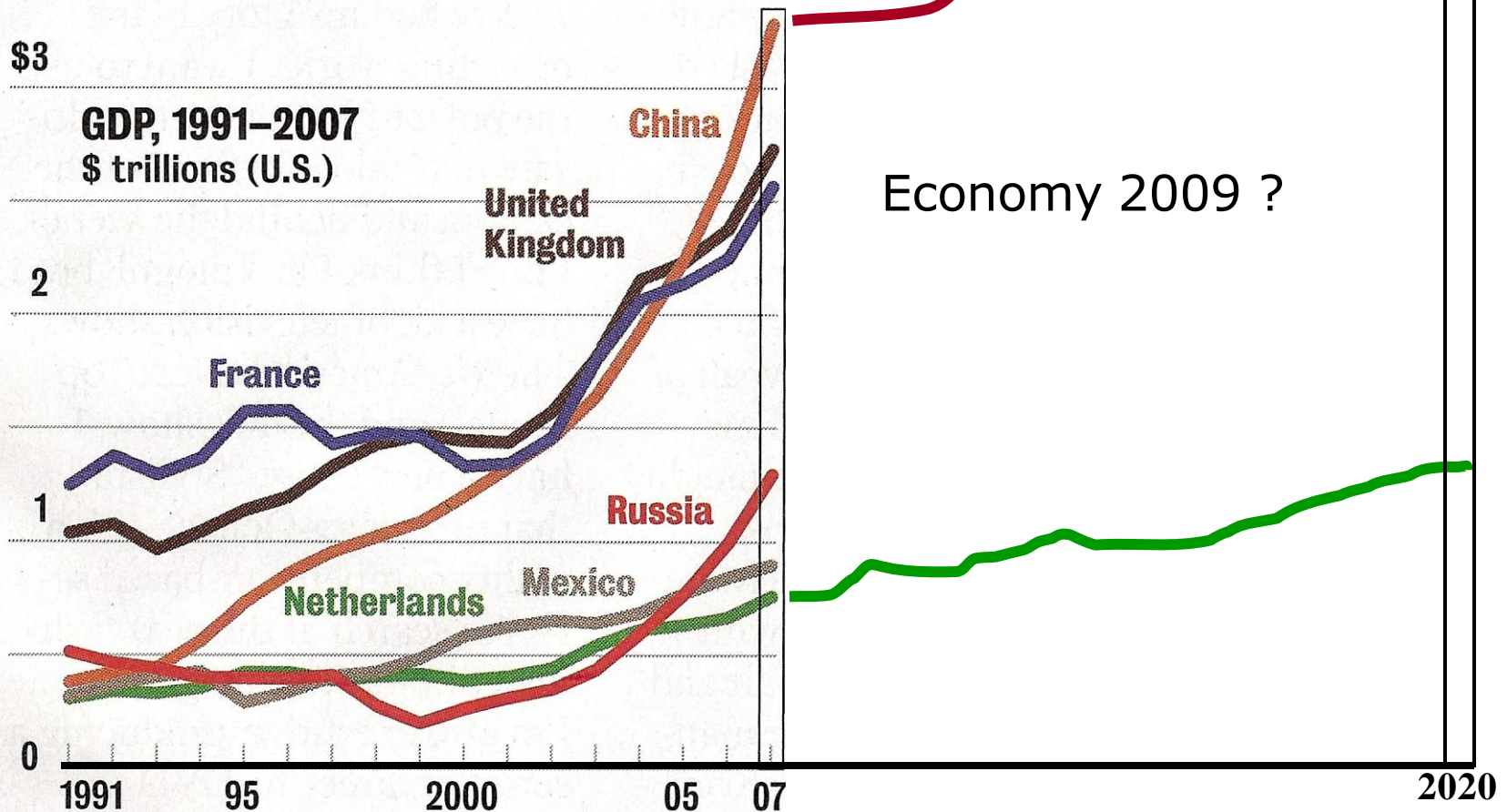


Gross national income per capita 2007, Atlas method and PPP, World Bank

Ranking	Economy	Atlas methodology (US dollars)	Ranking	Economy	Purchasing power parity (international dollars)
1	Liechtenstein	.. a	1	Luxembourg	63,590
2	Bermuda	.. a	4	Kuwait	49,970 a
3	Norway	76,450	5	Norway	53,320
4	Luxembourg	75,880	6	Brunei Darussalam	49,900 a
5	Qatar	.. a	9	Singapore	48,520
6	Switzerland	59,880	10	United States	45,850
7	Denmark	54,910	12	Hong Kong, China	44,050
8	Iceland	54,100	13	Switzerland	43,870
9	Channel Islands	.. a	17	Netherlands	39,310
10	Andorra	.. a	120	El Salvador	5,640 b
11	Cayman Islands	.. a	121	Egypt, Arab Rep.	5,400
12	Ireland	48,140	122	China	5,370
13	San Marino	45,130 a	124	Jordan	5,160
14	Sweden	46,060	125	Namibia	5,120
15	United States	46,040			
16	Netherlands	45,820			
17	Finland	44,400			
130	Cape Verde	2,430			
130	Samoa	2,430			
132	China	2,360			
133	Tonga	2,320			
134	Morocco	2,250			

China as top 5 knowledge world economies in 2020?

Weakness of Chinese economy: investment – and export driven, the same grim situation as the USA in 1929!



China as top 5 knowledge world economies in 2020?



- Can China sustain its rapid economic development ?
- Growth rate 12% in 2007, projected growth rate 5% in 2009

Growth rate and years needed to reach the level of US economy

China	USA	Years	Year	China	USA	Years	Year
15%	2%	12	2020	7%	3.5%	43	2051
10%	2%	19	2027	5%	3%	74	2082
5%	0%	20	2028	...			
5%	1%	36	2044				
5%	2%	49	2057				
5%	4%	149	2157				

Most likely scenario – 2 to 3 generations or end of this century

Conclusions

Prospects for bilateral cooperation in research



- What are the similarities and differences in research culture in China and Europe?
 - The Dutch is the Chinese in the west, but the real Chinese has still lots to learn

- Can China become top 5 world knowledge economies in 2020?
 - No

- Is the Netherlands still interesting in research cooperation for the Chinese?
 - Sure

Conclusions

Prospects for bilateral cooperation in research



- How interesting is research cooperation with Dutch partners for the Chinese? Bilateral cooperation in research projects?
 - Very interesting

- The current financial and economic crises have generated unprecedented necessity for international cooperation, e.g. G20, scientific cooperation is a natural driver and forerunner of this process
 - Multilateral cooperation in research projects is the necessity and future (e.g. CO-REACH, EU FPs)?

- What are promising fields?
 - Geopolitical competitions will always be with us, but a global cooperation is inevitable for solving current and future problems facing the humanity - resources, environment, climate change to name a few.