

Inter-linkages between Academia and Industry: the Case of Chinese Universities

Dr. Lan Xue, Executive Associate Dean
School of Public Policy and Management

Tsinghua University

Beijing, China



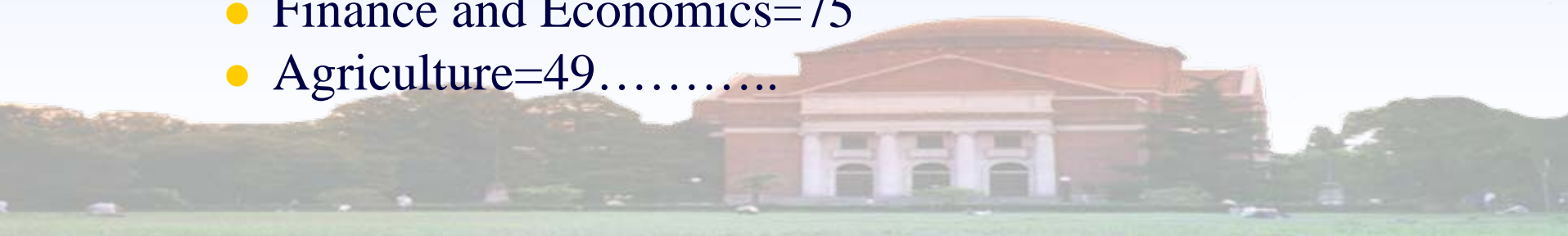
Questions to be discussed:

- Overview of the Chinese university system
- Changing roles of universities in China's national innovation system since the reform
- Linkages with the market
- future directions



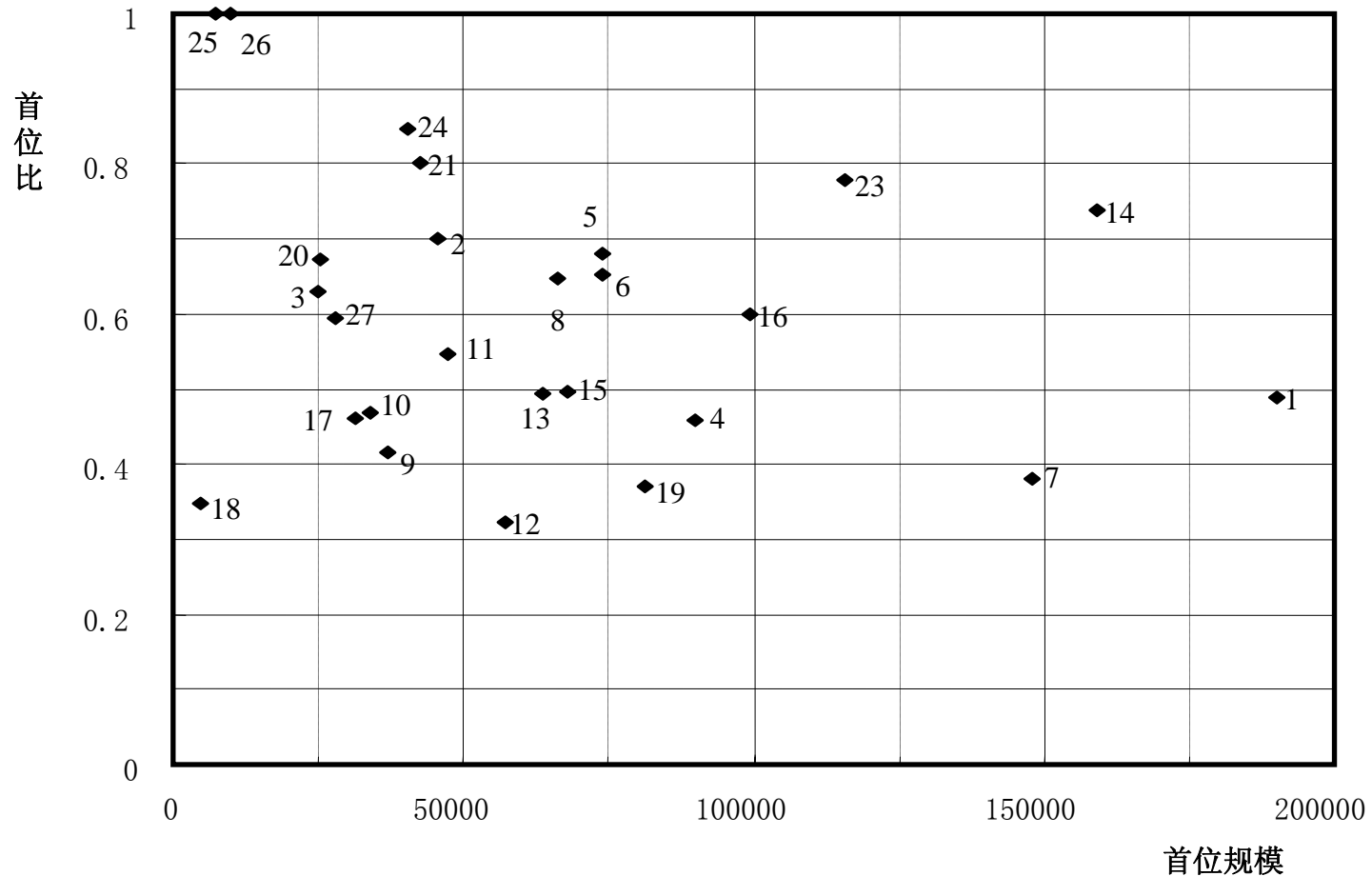
Overview of China's Higher Education System prior to Recent Reform (1998)

- Total number of Universities=1022
 - 591 offer bachelor degree or above;
 - 431 offer 2-3 year education in specialized fields;
- Administration
 - MoE, other ministries, and provincial government;
- Disciplinary and geographic distribution
 - Comprehensive=72
 - S&T=271
 - Education=229
 - Medicine=118
 - Finance and Economics=75
 - Agriculture=49.....



Regional Distribution of College Students

图1 各行政区划首位规模与首位比



World class University Program and university mergers

- “World class university (985)” project
 - Focused support for 2 (Tsinghua University and Beijing University) +9 universities;
- Merging specialized institutes=> comprehensive universities.
- In total, 637 universities merged to create 270 new universities;
- 317 universities signed cooperative agreement to form 270 learning conglomerates.



The Role of Chinese Universities in China's NIS prior to the Reform

- Based on Russian model:
 - basic research=>Chinese Academy of Sciences;
 - applied research=>Ministerial research institutes;
 - Development=>enterprises
 - Universities=>S&T manpower;
- Some elite universities involved in major national research programs, mostly engineering and science-based universities;
- Funding for research was limited



University in China's Innovation System in 1987

Table 1. A profile of China's innovation system in 1987

Types of R&D Institutions	Number of R&D Institutions	R&D Personnel	R&D expenditures (in million yuan)
<i>Public Research Institutes (PRIs)</i>	5222	385,857 (47.2%)	10,683 (60.7%)
<i>Universities</i>	934	178,292 (21.8%)	700 (4.0%)
<i>Enterprise R&D Units</i>	5021	252,781 (31.0%)	6,214 (35.3%)
<i>Total</i>	11,177	816,930 (100%)	17,597 (100%)

Source: (Xue, 1997)

China 's S&T System Reform Since 1985

- Key Objective => Making China's research institutions directly serve the need of national economic development.
 - Funding cuts to all research institutes;
 - New R&D funding from competitive projects
 - Encourage horizontal linkages
 - Establishing technology markets
 - New approaches to the management of research organizations



Universities in China's Innovation System Since Economic Reform

- Universities' role in the national innovation system has become more important;
 - Overall R&D spending increased (see table below)
 - The roles of Chinese universities in the national innovation system (see the following 2 tables)
 - Sources of university funding has changed (see table and graph)



China R&D Expenditures (1991-2002)

(100 million yuan ,%)

Year	Research Institution	Large & Medium-sized Enterprise	Institutions of Higher Learning
1991	79.0(52.2)	58.6(38.7)	13.7(9.1)
1992	91.6(49.0)	76.1(40.7)	19.2(10.3)
1993	111.3(47.5)	95.2(40.6)	27.8(11.9)
1994	128.8(44.5)	122(42.1)	38.7(13.4)
1995	146.6(42.0)	141.7	42.3(12.1)
1996	173.1(42.7)	160.5	47.8(11.8)
1997	206.7(40.5)	188.3	57.7(11.3)
1998	234.5(42.5)	197.1	54.4(10.4)
1999	261.2(38.4)	249.9	63.5(9.4)
2000	258.0(28.8)	537.0(60.0)	76.7(8.6)
2001	288.5(27.7)	630.0(60.4)	102.4(9.8)
2002	351.3(27.3)	787.8(61.2)	130.5(10.1)

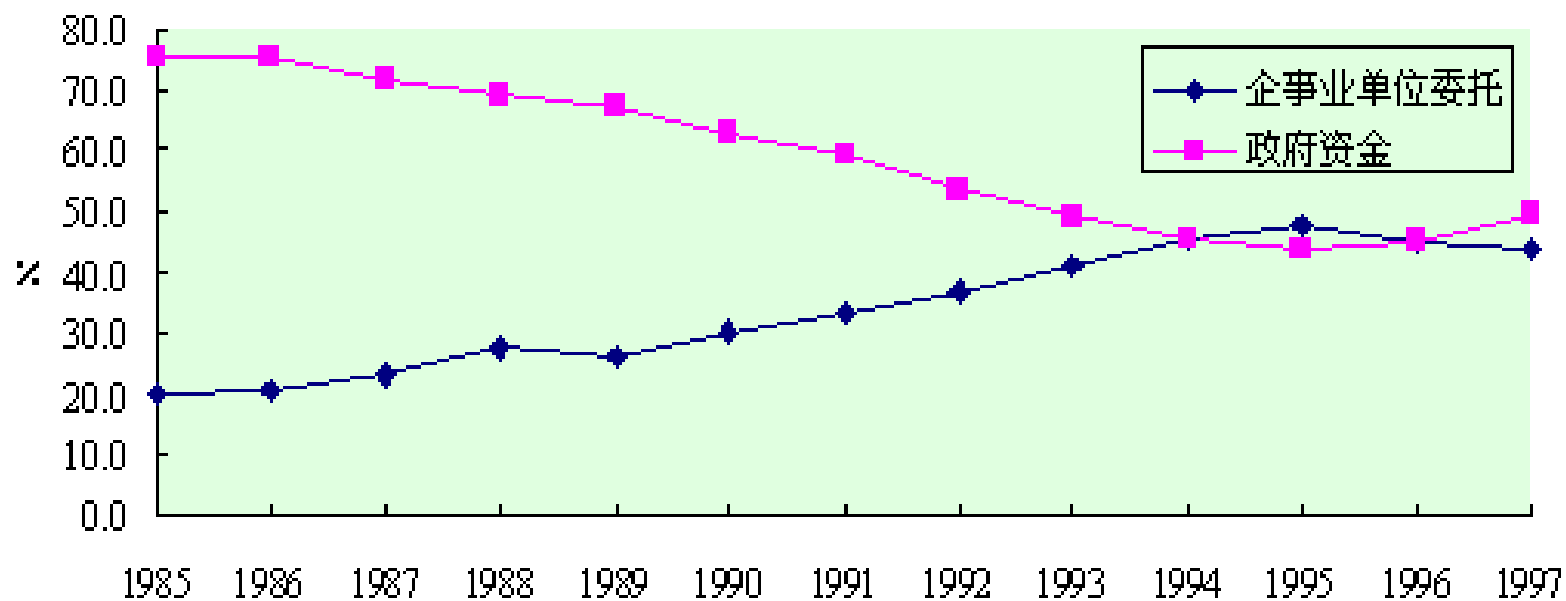
China's R&D Performance (1995)

	基础研究	应用研究	试验发展
企业(42.9%)	0.99%	12.3%	86.7%
研究所(42.9%)	7.3%	33.7%	59.1%
高校(12.1%)	16.7%	54.9%	28.4%



Funding Source for University Research

图2 高校科技经费的来源结构



数据来源：中国科学技术指标-1998

Linkages with the Market

- University-industry contracts (joint research, consulting, technical services, etc)=>almost 1/2 of its R&D income
- Licensing and sales of patents (see tables)
- Incubator and university-based science parks
- University-run enterprises



University-affiliated Enterprises

- Enterprises that are still in one way or another controlled by the universities they are affiliated with. There are 5451 of them in 2000 in China.
 - Companies totally owned by universities;
 - Shareholding companies in which universities have shares;
 - Companies started with university money but now with fuzzy ownership.



Growth of University-affiliated Enterprises

- Early 1980s-1990==initial development: university-run factory, technology service companies, and JV (1989=470 million yuan);
- 1991-2000==rapid growth: expansion and getting on the stock markets (see tables below)
- 2001-current==Reflection and adjustment: doubts about university-affiliated enterprises and new policy initiatives



Growth of University-affiliated S&T Enterprises (1997-2000)

Year	Sales	Profit	Income to university
1997	18.49	1.82	0.68
1998	21.50(16.3)	1.77(-2.7)	0.66(-3.8)
1999	26.73(24.3)	2.16(21.8)	1.39((111.6)
2000	36.81(37.7)	3.54(64.3)	



Issues and future development

- What should be the role of university in NIS in a developing country like China (Division of labor among institutions)?
 - How should universities differentiate their roles from CAS, and enterprise R&D units?
 - Comparative advantages of institutions?
- With regard to academia and industry relationships:
 - **Should there be differences between different industries?**
 - **Should there be differences between different development stages?**
 - **Should there be differences among different type of universities?**
- What should be the future directions for university-industry relationship in China?



Thank you!

