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Higher Educational Transformation in China and Its Global Implications

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A major transformation of higher education has been underway in China since 1999 and will have potential impacts for the global educational structure.[1] Reflecting China's commitment to continued high growth through quality upgrading and the production of ideas and intellectual property as set out in both the 10th (2001-2005) and 11th (2006-2010) five-year plans, this transformation focuses on major new resource commitments to tertiary education and also embodies significant changes in organizational form.

The number of undergraduate and graduate students in China has been growing at approximately 30 percent per year since 1999, and the number of graduates at all levels of higher education in China has approximately quadrupled in the last six years. The size of entering classes of new students and total student enrollments have risen even faster, and have approximately quintupled. Prior to 1999 increases in these areas were much smaller. Much of the increased spending is focused on elite universities, and new academic contracts differ sharply from earlier ones, with no tenure and annual publication quotas often used. All of these changes have already had large impacts on China's higher educational system and are beginning to be felt by the wider global educational structure. Skilled labour supply in China now equals around 40 percent of that in all OECD countries. The growth rate of student numbers is much higher than in the OECD. Even more major impacts may well follow for these changes in the years to come and there are implications for global trade both directly in ideas, and in idea-derived products. These changes, for now, seem relatively poorly documented in literature.

Changes in Education Linked to Changes in Economic Policy

The changes we discuss also reflect a wider strategy of attempting to upgrade both the quality and skill content of production in China through large increases in higher educational resource inputs, along with a series of other changes in economic policy in China. This strategy is driven by strategic decisions made at high policy levels in China, and is seemingly not driven by analysis of the demand side of labour markets defining potential requirements of labour of different types. One result so far has been a sharp increase in the number of individuals with high educational attainment in various areas

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The number of graduates at all levels in China has quadrupled in the last six years.

independent of the size of respective job markets, and this has created significant short-term problems of absorption and unemployment for labour associated with these activities. These education policies have also been a factor in China's increasing inequality. The educational transformation underway in China seemingly differs from that in other low-wage economies at either similar or earlier stages of development, in focusing heavily on tertiary education rather than on primary or secondary (unlike, say, India).

The potential implications for the global educational system are major. One is the relative size of changes in China's labour force by category relative to the world supply of labour by type or profession. Other implications include the impacts on academic performance outside China, via potential international paper submissions and publications, and also impacts on the global supply and trade in ideas and idea-related products. The potential global implications of these changes are also important in terms of the ways in which perceptions of the education-growth link may change. China seems to be alone among lower-income economies in having focused its educational transformation in recent years on the tertiary educational sector, but at the same time China is clearly undergoing radical change in many different areas of economic activity and the educational system is only one of these. Previous efforts in other countries to use educational transformation as a mechanism either to maintain high growth or to initiate episodes of high growth have generally been regarded as unsuccessful, but the focus has been primary and secondary education, not tertiary. In China's case, these latest efforts seem to be motivated by a desire to maintain high growth by using educational transformation as the primary mechanism for skill upgrading and raising total factor productivity. If China succeeds, other countries may follow with higher educational competition between countries as a possible outcome.

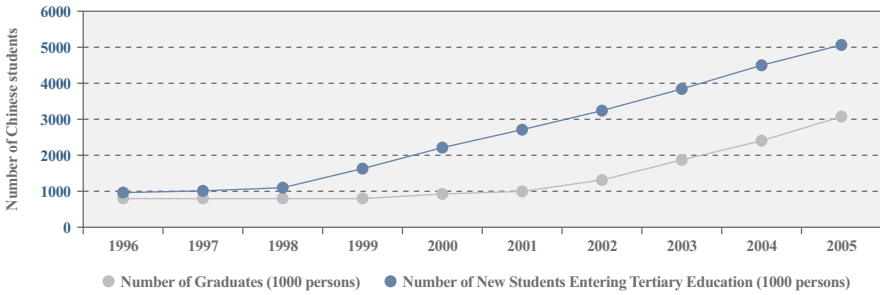
Dimensions of the Higher Educational Transformation in China

Large increases in the number of students

The number of graduate and undergraduate students in China has approximately quadrupled in the last six years. Before 1999, the number of students both graduating and enrolling was stable. In 1998, the total number

of graduates from tertiary education was 8 million; in 2005, it was more than 30 million, an increase by a factor of 3.7. The number of enrollments (both for new students and total students) has risen even faster, and approximately quintupled between 1998 and 2005. The new student enrollment and the total enrollment are 4.7 and 4.6 times larger in 2005 than in 1998, respectively.

Figure 1. Number of entering students and graduates of tertiary education in China

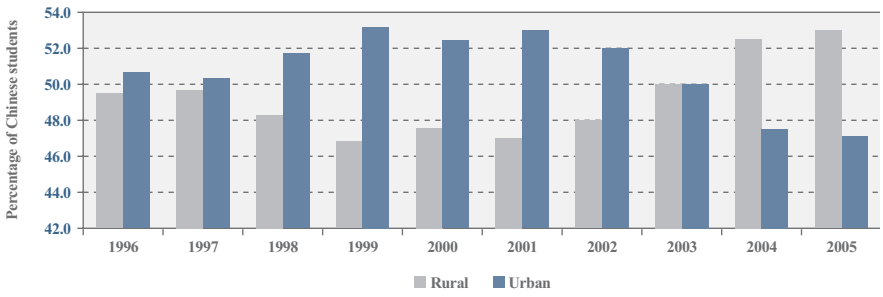


Source: National Bureau of Statistics of China (2006).

More PhD engineers and scientists in China by 2010 than in the United States

It is widely recognized that there will be substantially more PhD engineers and scientists in China in 2010 than in the United States, since on a flow basis China produces three times the number of engineers compared to the US. Only 5 percent in the US were engineers among 24-year-olds in 2001 who had a Bachelor of Science or Bachelor of Arts degree, compared to 39 percent in China and 19 percent or more in South Korea, Taiwan, and Japan. R.E. Smalley, a Nobel Prize-winning scientist from Rice University, recently concluded that by 2010 90 percent of all PhD physical scientists and engineers in the world will be Asian living in Asia. Among Asian PhD engineers and scientists, most will be produced by China. National Science Foundation data also shows that the US is now producing fewer engineers than from other parts of the world, and particularly from Asia.

Figure 2. Student admissions at Chinese universities: urban and rural



Source: Gou (2006).

Sharply changed access to higher education for urban and rural households

A further feature of China's higher educational transformation is considerably improved access to higher education for rural households. As a result,

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the gap in access between rural and urban areas is gradually diminishing. In the mid-1990s, conditional upon being in the urban sector (including counties and towns) the probability of high school graduates obtaining admission to university was around 0.3. That probability in 2005 was almost 0.5.[2] Admission rates are higher than these since not all high school graduates register for higher education entrance exams, and entrance exams are organized all over China. Admission rates for the population in rural areas have risen much faster than admission rates for the urban population.

Promotion of elite universities and consolidation of other universities

A further feature of recent Chinese higher education policy has been both to promote so-called "elite" universities and also to consolidate other universities and reduce their numbers. Elite universities are the top ten universities in China, which receive the largest education funds from central and local governments. They have priority in selecting students through national entrance exams and have the best faculty and research resources in China. The focus of policy is to elevate a small number of Chinese universities to world-class status, and both strengthen them and make them bigger. All universities in China have in recent years been subject to directives from central ministries to substantially increase their numbers of undergraduate students, even if significant increases in infrastructure to handle this increase in student numbers lags. Increases in undergraduates of 30 percent a year have been common in many universities are as a result of this policy.

Change from quantity- to quality -oriented education

These higher education changes have also been accompanied by a change in focus from quantity flow-through in education in the pre-1999 period, to an elevated emphasis on quality post-1999. Educational attainment in China is now subject to firm quantity indicators that are designed to drive continued improvement of educational quality by participating institutions. Funding is no longer simply a matter of increasing the numbers of students enrolled; universities and institutions of high education in China are now subject to extraordinary pressures to upgrade themselves in terms of objective rankings. High priority is placed on international rankings taken as publications in international journals, citations, and international cooperation. These are used as demonstrations of elevation of attainment for each educational institution and funding is directly linked to these indicators. Some of this focus on improved educational attainment in China seems to be spontaneous and itself accelerated by the policy process that exerts the pressure. It is now accepted as important for universities and related institutions to achieve publication in journals of good ranking, and what is generated by publication citations counts equally for Chinese scholars in appointment, maintenance of position, and promotion. Indicators of educational attainments in terms of international rankings across countries, publications of papers, and citations feed directly into annual performance indicators for Chinese faculty in an ongoing process that goes substan-

The library at Peking University, one of the largest universities in China

tially beyond the lifetime tenure system outside China. It is not uncommon for an annual target of three international publications to be set for faculty members, with termination of employment to occur on non-fulfillment.

Table 1. Graduates by regions and field of study from China and the OECD

	Education	Science	Engineering, manufacturing and construction	Law	Business and Administration	Health	Agriculture
2003 (unit: 100,000 persons)							
OECD	7.35	6.28	7.36	2.66	10.72	4.92	1.02
China	4.67	1.86	6.85	1.18	2.94	1.24	0.54
Total (China and OECD)	12.02	8.14	14.22	3.84	13.66	6.16	1.56
China (%)	39%	23%	48%	31%	22%	20%	35%
1998 (unit: 100,000 persons)							
OECD	5.96	4.75	6.54	1.38	6.66	3.54	1.16
China	1.98	1.00	3.29	0.32	--	0.66	0.31
Total (China and OECD)	7.94	5.75	9.84	1.70	6.66	4.21	1.46
China (%)	25%	17%	33%	19%	--	16%	21%
Growth rate (1998-2003)							
OECD	23%	32%	13%	93%	61%	39%	-12%
China	136%	86%	108%	268%	--	86%	76%

Source: OECD data from The UNESCO/OECD/EUROSTAT (UOE) database; China data from China Statistical Yearbook

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Global Impacts Just Beginning

China may thus be the first case of a lower income country using major tertiary (rather than primary or secondary) transformation in educational delivery as a development strategy and on a scale reflective of China's growth rate and population size. This educational transformation started in the late 1990s and may still only be in its relatively early stages. Potential major impacts follow for China, the global economy, and for the global educational structure. These all reflect the increasing global importance of China's educational system and the competitive impacts on global educational delivery. The implications are relatively little discussed in available literature, but will increasingly form a central element in China's integration into the international economy. There is, in our view, a need for further research in the area.

Artist's rendering of the gymnasium at Peking University, the table tennis venue for the 2008 Beijing Olympics.

Endnotes

[1] This CIGI policy brief draws on Li, Y., J. Whalley, S. Zhang and X. Zhao (2008).

[2] We conclude this from data on numbers of high school graduates from "Educational Statistical Yearbook of China" and data on numbers of admissions to universities from Ministry of Education. The probabilities in 1996 and 2005 are 0.30 and 0.45, respectively.

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CIGI was founded in 2002 by Jim Balsillie, co-CEO of RIM (Research In Motion), and collaborates with and gratefully acknowledges support from a number of strategic partners, in particular the Government of Canada and the Government of Ontario. CIGI gratefully acknowledges the contribution of the Government of Canada to its endowment Fund.

Le CIGI a été fondé en 2002 par Jim Balsillie, co-chef de la direction de RIM (Research In Motion). Il collabore avec de nombreux partenaires stratégiques et exprime sa reconnaissance du soutien reçu de ceux-ci, notamment de l'appui reçu du gouvernement du Canada et de celui du gouvernement de l'Ontario. Le CIGI exprime sa reconnaissance envers le gouvernment du Canada pour sa contribution à son Fonds de dotation.

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