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China's higher education expansion and the task of economic revitalization

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Abstract This paper centers on the expansion from elite to mass higher education in China and its effects on China's economic development. These effects are twofold, including both the immediate influence of expanded enrollment in higher education on China's economy, and the human capital accumulation for the long term. The paper first provides a description of key changes in the Chinese higher education system during this radical expansion. This is followed by an analysis of the relation between higher education expansion and economic development both in terms of short and long term goals, using the Keynesian economic principle and human capital theory. The analysis found that it is premature to conclude whether the expansion policy has revitalized the economy or not in the short term. China is achieving its long term goal of accumulating human capital; however, the mounting unemployment of postsecondary graduates is jeopardizing students' private returns.

Keywords Higher education · China · Expansion · Economic development

Introduction

In the past decade, China has witnessed unprecedented expansion in its higher education, with the gross enrollment rate jumping from 9.8% in 1998 to 24.2% in 2009. There were 29.79 million students enrolled in postsecondary institutions, making it the largest higher education system in the world.

This wave of radical growth began in dramatic fashion in June 1999, when the central government made the decision to expand the higher education system in China. The Ministry of Education was required to amend its annual recruitment plan for the fall of

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1999 to accept more students. The rationales for this sudden move by the Chinese government include: (1) easing the immediate pressure of secondary school graduates on the labor market, (2) meeting the consistently high public demand for higher education in Chinese society (Wan 2006), (3) the political will of the government to develop higher education under the pressure of global trends, especially the move of nearby developing countries in this direction (Xie 2007), and most importantly, (4) accumulating human capital for future development. The former vice Premier Lanqing Li (2003), who was in charge of education when the policy was made, further acknowledged these rationales in his book.

However, the most immediate intention that led to this radical move was to stimulate consumption after the Asian Financial Crisis of 1997. According to Xinhua net (2008), in December 1998, Dr. Min Tang from the Asian Development Bank submitted a proposal entitled *Some Thoughts on Revitalizing the Chinese Economy: Double Enrollment in Higher Education* to the central government. He proposed that higher education institutions should double their enrolment in 3–4 years and charge full cost tuition fees to the new students. Thus, higher education expansion would create a demand in infrastructure construction and students' consumption of educational resources, spur China's economic growth, and bring the economy out of stagnation in the short term.

Since the central government was keen to stimulate domestic consumption, it immediately accepted the proposal and tentatively planned to increase its recruitment by 22% in 1999. After a decade of expansion, it is time to examine whether the economic goals of the expansion have been met, as was the expectation of this policy initiative. The policy of higher education expansion corresponded to Keynesian economic principles and human capital theory, which were used as the theoretical foundation for this study.

Conceptual framework

The Chinese government's move to expand higher education after the Asian Financial Crisis can be traced back to the influence of two economic theories: the Keynesian economic principle and human capital theory.

The Keynesian economic principle has roots in some elements of the free market tradition. It emphasizes that government policy can be an effective tool in managing the economy in times of economic recession. Keynes advocated counter-cyclical fiscal policies which act against the tide of the business cycle through deficit spending. He argued that governments should solve short-term problems rather than waiting for market forces to do it, because "in the long run, we are all dead (Keynes and Maynard 1923, p. 80)." That is, government spending on such things as basic research, public health, education, and infrastructure could help the long-term growth of potential output. Keynes believed that government investment in unused capacity can stimulate consumption, and in turn, bring the economy out of stagnation. If the government spends, the people who receive this money then spend most of it on consumption goods and save the rest. This extra spending allows businesses to hire more people and pay them, which in turn allows a further increase in consumer spending (Keynes 1936).

China's move towards mass higher education is also underpinned by human capital theory, even though the relation between human capital and economic growth has remained a much debated topic over the twentieth century. Instead of measuring the number of years of formal education of individuals in the labor force, the number of people who have completed higher education is often adopted as a measurement of human capital.

Some human capital theorists (Becker 1964; Denison 1962; Schultz 1961) have examined the relationship between education and economic growth, and have asserted that education can enhance human capital, increase the individual's productivity, and contribute to economic development. Jorgenson and Fraumeni (1992) state that "educational investment will continue to predominate in the investment requirements for more rapid growth" (p. 51). Other scholars (Denison 1979, 1983; Wolf 2002) rebut this by noting that excessive investment in education did not prevent the slowdown of economic growth during the second half of the seventies in both developed and developing countries. By examining Japan's economic catch-up with the U.S. from 1890 to 1990, Godo (2002) concludes that education may prove to be the investment outlet of the highest economic return in the long run, yet the return may not be so attractive in the short run. Godo (2002) and Heckman (2003) believe that only balanced investment in human capital and physical capital can yield rapid economic development.

Scholars have disparate opinions on whether higher education can promote economic development. Armer and Liu (1993) found that only primary and junior high school education have strong positive effects on economic growth. Wolf (2002) does not regard higher education as an engine of economic growth, but he mentioned that higher education can contribute to economic development through training intellectuals and through scientific and technological innovation. Meulemeester and Rochat (1995) suggested that higher education can promote growth if its content is shaped towards such an objective, and both the social, political and economic structures and the technological level of the society to which the educational system belongs are such that graduates can actually make use of their accumulated knowledge. Studies by Murphy et al. (1991) and Lin (2004) revealed that engineering and natural science majors play the most prominent role in the process of growth, while the number of humanities majors is indirectly related to growth-promotion. Benhabib and Spiegel (1994) regarded human capital as an engine for growth because human capital plays an important role in attracting physical capital.

Background

With the foundation of the People's Republic of China in 1949, China modeled itself on the former Soviet Union and established its socialist economic system and higher education institutions with highly fragmented disciplines and a highly centralized administration. The objective of higher education was to serve national construction. China's higher education has been under government control since then. Higher education development has experienced ups and downs with the tremendous upheavals in the political, cultural, and socio-economic realms. "Neither autonomy nor academic freedom were at issue in these deliberations, with the overriding emphasis being on how higher education could be shaped to serve the new socialist economy and polity" (Hayhoe 1999, p. 76). It was not until 1977 that China ceased its decades-long series of radical political movements and transformed itself from a highly centrally planned economy to a market economy, shifting from socialist construction to the track of modernization. Higher education has nevertheless remained under the guidance and control of the central government.

Expansion: from elite to mass higher education

China has witnessed unprecedented expansion in its higher education since 1999, with the gross enrollment rate increasing from 9.8% in 1998 to 15% by 2002, the year in which the

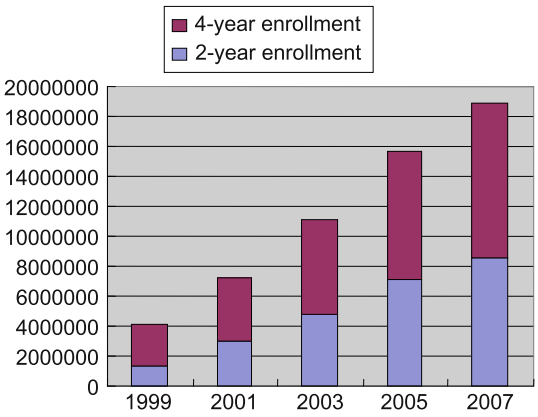

Fig. 1 Enrollment in 4- and 2-year programs by year. *Sources*: Ministry of Education of China (1999a, 2001b, 2003b, 2005b, 2007b)

system transited from an elite to a mass one. It continues to grow; the gross enrollment rate reached 24.2% in 2009. There were 29.79 million students enrolled in higher education institutions.[1]

The total enrollment in higher education in China is composed of two parts: formal programs in regular and adult higher education institutions, and flexible modes of learning such as part-time or web-based studies, and courses preparing students for exams awarding formal qualifications. The analysis of national statistics reveals that regular higher education, which contributed to about 70% of the total enrollment in 2008, expanded much faster than adult higher education (accounting for about 20%) and other modes of higher learning. For this study, we have focused on regular higher education, since it has played the most important role in the expansion process.

During the period of dramatic expansion, 2-year programs have grown much more quickly than 4-year degree programs, though the latter still made up more than half of the total enrollment after the expansion. In 1998, the total enrollment was 3.409 million in regular higher education, with 2.235 million (65.6%) registered in 4-year programs and 1.174 million in 2-year programs. By 2008, 4-year programs accommodated 11.422 million students, which is 5.1 times the number in 1998, and accounted for 54.6% of the total; 2-year programs had 9.168 million students, 7.8 times the number in 1998 (see Fig. 1).

National statistics show that the enrollment in local higher education institutions (including those at provincial, prefectural and municipal levels) increased much faster than that in the institutions under the jurisdiction of ministries of the central government (national institutions). In 1998, the enrollment was 2.258 million in local colleges and universities, and this number hit 14.578 million in 2008 (6.5 times that of 1998). By contrast, the enrollment in national universities in 2008 was only slightly higher (1.705 million) than that in 1998 (1.541 million). This could be attributed to the implementation of a policy of jurisdiction transfer at the end of the 1990s, whereby 250 of a total of 367 colleges and universities under the jurisdiction of ministries of the central government were transferred to provincial jurisdiction.

After decentralization, the relatively "flat" structure of the higher education system became more vertically differentiated. Most 2-year programs in national universities were closed, with enrollment dropping from 206,858 in 1998 to 64,995 in 2008. By contrast, 2-year programs flourished in local institutions. The enrollment in these programs

[1] Figures on higher education without citations are from the website of the Ministry of Education of China.

increased from 997,854 to 7,404,422 (7.4 times that of 1998), and accounted for more than half of the total enrollment in local public institutions in 2008. At the same time, the prestige and capacity of national universities was further strengthened through the implementation of two earmarked projects. The 211 Project selected one hundred top universities for priority investment in 1993 and the 985 Project, launched in May of 1998, provided even more significant funding to 43 universities to raise them to a "world class" level.

Private higher education also played a role in the massive expansion of the system. Although the first *Minban* (people-run) college, a euphemism for new private institutions, was established in 1982, private higher education has only begun to flourish with the policy of rapid expansion. In 1997, there were 20 private higher education institutions providing formal programs with an enrollment of 14,000 students, only 0.2% of total enrollments. After the *Law for Promoting Minban Education* was passed in 2003, the number of private higher education institutions providing formal programs rapidly increased to 278 in 2008. Another interesting phenomenon is the development of second-tier independent colleges, which are affiliated with public universities, but receive little public funding and are heavily dependent on student fees. Student intake is at a lower academic level than in the public university with which the independent college is affiliated, but the public university is expected to assure basic academic quality. Private institutions and independent colleges together enrolled 3.927 million students, which accounted for 19.4% of total enrollment in 2008 (see Fig. 2).

The disciplines of humanities and social sciences expanded faster than those of natural sciences and engineering, although engineering programs still enrolled the largest percentage of students in 2008 (40%; see Fig. 3). The past situation where enrollment in 4-year programs dominated in all disciplines had changed.

In social sciences, programs in management and administration had been placed under the broad category of economics until recently. Accordingly, economics saw a huge increase due to the rapid expansion of management and administration programs, but this

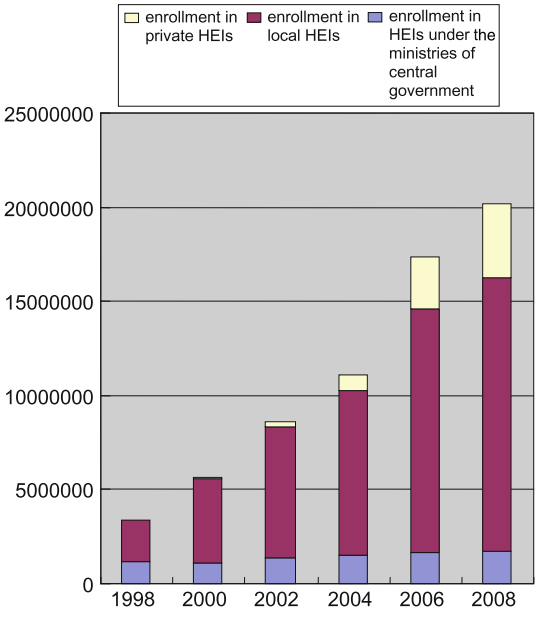

Fig. 2 The enrollment in national, local and private higher education institutions by year. *Sources*: Ministry of Education of China (1998, 2000a, 2002a, 2004a, 2006a, 2008a); Xu (2006)

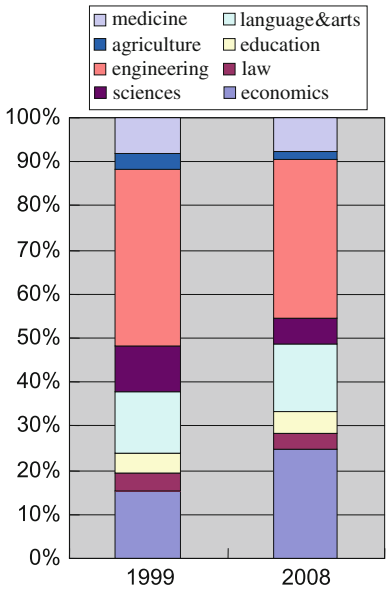

Fig. 3 The proportion of enrollment in eight disciplines in 1999 and 2008. *Sources*: Ministry of Education of China (1999c, 2008b)

has now become a separately defined category. The share of education, literature and arts also increased slightly. By contrast, the proportion of engineering and medicine students dropped slightly, while the share of sciences and agriculture nearly shrunk in half. The number of students enrolled in philosophy and history combined accounted for only about 0.3% of enrolments in 2008, so they are not included in Fig. 3.

It is also interesting to compare the ratio of enrollment of 4-year to 2-year programs by disciplines. In 2008, more students enrolled in 2-year programs than in 4-year ones in the disciplines of "education", "engineering", and "management and administration". The disciplines of "agriculture" and "medicine" also saw a much higher proportion of 2-year enrollments than was the case in 1999. The most drastic change took place in sciences, with enrollments in 4-year programs being 236 times that of those in 2-year programs in 2008.

Can higher education expansion stimulate economic growth?

Impact on short-term economic growth

China is still in the process of expanding its higher education, with its number of total enrollment still rising. It is premature to comment on whether higher education expansion has been successful in stimulating economic growth. Although the country's increase in GDP was 9.8% annually during the period of 1999–2007, it is not clear whether or not, and by how much, this can be attributed to higher education expansion. A preliminary analysis of some aspects of the higher education expansion will help to explain its implications for economic growth.

The government utilized the Keynesian economic principle as its theoretical foundation for national policies in the late 1990s. Keynes argued that governments could solve short-term economic problems through investment in education and infrastructure, which could

stimulate consumption, and in turn, bring the economy out of stagnation. He believed that if the government spends, the people who receive this money then spend most of it on consumption and save the rest. This extra spending allows businesses to hire more people and pay them, which in turn allows a further increase in consumer spending. Therefore, government policy can be an effective tool in managing the economy in times of economic recession.

The *2000 Report on the Work of the Chinese Central Government* (Zhu 2000) reveals that the government made efforts to create a demand in infrastructure construction as well as higher education, and raise people's incomes to stimulate consumption and expand domestic demand. For example, from 1998 to 2000, the government issued long term bonds worth 210 billion yuan to increase investment in infrastructure and finance the construction of over 5,100 projects, such as highways, railroads, and dikes on rivers and lakes. In tertiary education, total spending had increased tremendously since 1999, although the increase was not in proportion to the expansion in enrollment, and showed fluctuations (Table 1).

Funding per full-time equivalent (FTE) student decreased annually from 7,310 yuan in 2000 to 5,376 yuan in 2005 due to the rapid increase in enrollment; it climbed back slowly and reached 7,578 yuan in 2008 (see Table 2).

In fact, the proportion of government funds in the total income of regular higher education institutions had continuously decreased from 67.8% in 1997 and dropped to the bottom in 2005, to 42.0%. While government funding is one major source of financing, another major source of investment in university infrastructure construction is banks. According to Xinhua Net (2006), universities were estimated to have borrowed up to 200 billion yuan from banks for building or renovating stadiums, residences, libraries and other infrastructure construction. Therefore, the universities are accountable for the return of the principal and interest on these loans, which has created a great financial burden for universities.

A third source of finance is student tuition fees. From 1997, all higher education institutions in China began to charge tuition fees. The proportion of tuition and fees charged to students kept increasing, starting at 13.4% of total income in 1999, hitting a maximum of 32.4% in 2005 and then dropping a little bit in 2006/2007 (see Table 3).

As was planned by the government, a tide of large scale infrastructure construction and corresponding service industries emerged as universities expanded. What was not predicted by the economic principles was that the economic growth of these industries led to the risk of the collapse for some non-profit-making higher education institutions, and resulted in some economically disadvantaged students being deprived of access to higher education. The increasing tuition fees have created equity issues. For example, average tuition fees increased from 2,769 yuan in 1999 to 3,544 yuan in 2000 (Li 2006), and reached 6,489 yuan

Table 1 Increase of government budget appropriation, tertiary education enrollment, and the increase of GDP (%)

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Increase of budget approx.	10.7	28.8	24.5	23.6	20.8	11.6	16.5	29.8	15.5
Increase of enrollment	21.3	34.5	29.2	25.6	22.7	20.3	17.1	11.3	8.4
Increase of GDP	7.6	8.4	8.3	9.1	10.0	10.1	10.4	11.6	13.0

Sources: The Department of Finance of the Ministry of Education & The Department of Population and Employment Statistics (Social, Science and Technology Statistics) (2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008); Ministry of Education (1999b, 2000b, 2001a, 2002b, 2003a, 2004b, 2005a, 2006b, 2007a); National Bureau of Statistics of China (2006a, b, 2007, 2008)

Table 2 Average budgetary appropriation and operational fee per student in Chinese regular higher education by year—1997–2008

Year	Budgetary appropriation per student (RMB)	Budgetary operational expenditure per student (RMB)
2008	7,577.71	3,235.89
2007	6,546.04	2,596.77
2006	5,868.53	2,513.33
2005	5,375.94	2,237.57
2004	5,552.50	2,298.41
2003	NA	NA
2002	NA	NA
2001	NA	NA
2000	7,309.58	2,921.23
1999	7,201.24	2,962.37
1998	6,775.19	2,892.65
1997	6,522.91	2,865.60

Sources: Ministry of Education & National Bureau of Statistics, China (1997, 1998, 1999, 2000); Ministry of Education, National Bureau of Statistics & Ministry of Finance, China (2004, 2005, 2006, 2007)

Table 3 The proportion of government budgetary appropriation and tuition and fees in total income in regular higher education institutions by year 1997–2007

Year	Government budgetary appropriation/total income of regular HEIs (%)	Tuition and fees/total income of regular HEIs (%)
2007	42.6	29.2
2006	42.8	31.0
2005	42.0	32.4
2004	42.9	30.0
2003	44.7	27.0
2002	46.7	24.7
2001	47.9	21.3
2000	46.9	17.2
1999	49.6	13.4
1998	65.0	15.7
1997	67.8	14.4

Sources: The Department of Finance of the Ministry of Education & The Department of Population and Employment Statistics (Social, Science and Technology Statistics) (2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007)

in 2007. When other fees are added, such as accommodation, the total expense of a student exceeds 10,000 yuan (Bi 2009).

The public ability to afford these skyrocketing tuition fees remains questionable. China's household bank savings reached 5,300 billion yuan at the end of 1998 with the richest 20% of households owning over half of the total household income (Wang 2000). 56.1% of China's population consists of rural residents, and the per capita net income of rural residents was 3,587 yuan in 2006, and 5,153 yuan in National Bureau of Statistics of China 2009 (National Bureau of Statistics of China). Students' ability to consume educational-related resources thus remains in doubt. China established a student loan scheme in 1997, and all public universities have their own student financial aid programs. However, due to a cultural reluctance to borrow money, the requirement that students repay loans by the time they graduate, and related concerns (Johnstone 1998), the student aid program is not satisfactory. Access without an appropriate support scheme cannot really be seen as opportunity.

The government's expectation that higher education and related services be consumed as a commodity by the larger population remains problematic. Household savings have been drained out of banks to universities as students have paid tuition fees. However, this consumption has turned out to be a kind of redistribution of money. It is very likely that higher education expansion might have reduced potential consumption or investment elsewhere. Under the influence of the Confucian tradition, Chinese people believe that receiving advanced education is a noble and lofty endeavor. Since there is usually only one child in a family, due to China's family planning policies, most parents prioritize their spending for their children's education. Parents whose children are enrolled in university will avoid or reduce other unnecessary expenses in order to pay for the tuition and fees. As higher education loses its status as a privilege for the few who can complete in highly selective entrance examinations, and accessibility to higher education further increases, many parents will start saving money for their children's future higher education. Education spending is actualized as an immediate economic activity at the expense of other kinds of consumption.

Expansion of enrolment by discipline and curricular change

The expansion of enrolment in individual disciplines and the curricular constellation of higher education have not been taken into consideration in terms of promoting economic growth. Studies by Murphy et al. (1991) and Lin (2004) indicate that engineering and natural science majors play the most prominent role in the process of economic growth, and humanity majors are indirectly related to growth-promotion. According to Wang (2009), China has increased its investment in high technology, and there is thus an increasing demand for talent from the programs of computer science and communication, manufacturing, and electronic engineering; there is a lesser demand for medicine, education, and sociology, by contrast. Due to the inadequacy of educational resources and infrastructure in the disciplines of engineering and natural sciences, it was impractical for those programs to accommodate large number of additional students with the immediate expansion in 1999 and even in the following years. The disciplines that expanded immediately included literature and arts, education, and management and administration. Meulemeester and Rochat (1995) claim that higher education can promote growth only if its content is designed for such an objective. However, higher education expansion in the past decade, especially the expansion of specific disciplines, did not incorporate this principle into the planning process.

In addition to the lack of attention to balance of discipline, the modes of teaching and learning changed little. Wang (2009) summarized these in the following abrupt and negative way: "curriculum outdated, teaching style outmoded, emphasizes knowledge imparting and neglects knowledge generation, lagging behind the requirement of the social needs". Higher education in China has been described as accommodating mass education with the mode of elite education, which means that teaching methods and content remain unchanged despite the drastic expansion.

Expansion of vocational education

Vocational education grew substantially during the expansion. As of 2007, the number of vocational institutions had risen to 1,015, and some universities offered some vocational education, too. The number of students in the higher vocational education stream increased to 7,404,422 by 2008, which was 7.4 times that of 1998. On the one hand, the number of students trained through vocational education was far from enough to meet the demands of

industry for skilled manpower; on the other hand, the curricula in vocational higher education were subject to criticism because they were inappropriate or out of date; most were condensed versions of the 4-year programs (Dai 2007; Yang and Yang 2006).

China's economy is still labor-intensive, and only one-third of its 70 million industrial workers are skilled workers.[2] The ranking of skills is: 4% in highly-skilled, 36% in middle-skilled, and 60% in low-skilled work. By comparison, economically developed countries, whose industrial workers are mostly skilled workers, have 35% in high-skilled, 50% in middle-skilled, and 15% in low-skilled work. Chinese industry needs to either upgrade its labor force or transfer fresh blood into the labor force from vocational programs (Ji 2006). The imbalanced structure of higher education expansion has led to millions of graduate students remaining unemployed on the one hand, and millions of positions filled by unqualified workers on the other.

China has been criticized for its over-investment in physical capital and under-investment in human capital. Economic performance will be enhanced by producing more human capital and by creating a more educated workforce (Heckman 2003), but this can only be achieved when the educational expansion produces the human capital that the economy is needed. When the government increased investment in tertiary education to accumulate more human capital, the rate of expansion of universities and vocational colleges was not strategically planned. The government could have taken advantage of the expansion to produce more skilled workers and update the vast unskilled work force by expanding the vocational colleges.

Unemployment of university graduates

Meulemeester and Rochat (1995) suggest that higher education can promote economic growth when both the social, political and economic structures and the technological level of the society in which the educational system is embedded are such that graduates can actually make use of their accumulated knowledge.

According to the statistics of the Ministry of Education, the number of unemployed graduates was 340,000 in 2001; 370,000 in 2002; 520,000 in 2003; 690,000 in 2004; and 790,000 in 2005. This number hit 1,590,000 in 2007, a shocking development (Zhou and Lin 2009). The expansion has created job opportunities in infrastructure construction and the third industry, but those positions have been mostly filled by those who were not university graduates. Although the graduates will be more flexible and adaptive in the face of emerging opportunities, it may take a while before an increased supply of graduates can be effectively utilized by the economy. The huge number of unemployed graduates from higher education reveals that China's current social, economic and political structures are not ready to absorb them. Graduate unemployment has minimized students' private returns on their investment in higher education.

Impact on long-term economic growth: human capital accumulation

Another rationale underpinning China's move towards mass higher education is the human capital theory. The central government urged the Ministry of Education to enlarge university enrollment in the hope that this move would cultivate and accumulate a large quantity of talent and manpower for economic prosperity.

[2] Figures concerning industries and workers are from the website of http://jwc.hbhgzy.com.cn/news/list.asp?id=377

Expansion of universities and the increase of research capacity

Higher education is a cornerstone for productivity, not only in terms of preparing talented people for the economy but also in conducting research and generating new knowledge. Even though the pivotal function of university researchers in science and technology innovation and its contribution to economic growth is undeniable, Wolf (2002) argued that it did not mean we need as many researchers as possible. The question is whether the expansion of universities has enhanced research capacity.

China has tremendously increased its research and development (R&D) funding in the past decade, from 40 billion yuan in 1996 to 371 billion yuan in 2007. However, the proportion of total national R&D investment that goes to universities is comparatively lower than in such economically developed countries as the U.S., Japan, the U.K. and Canada. Although funding for higher education institutions increased from 6.31 billion yuan in 1999 to 31.47 billion yuan in 2007, it only accounted for 8.5% of the national R&D investment in 2007 (see Table 4). The research capacity in aggregate may have expanded in the past decade due to the increase of funds and number of graduates, but it is not clear whether university expansion significantly altered the research capacity due to the fact that the quality of graduate education has deteriorated.

A cautious examination of the expansion rate and disciplines of individual institutions reveals that it is hard to conclude that higher education expansion significantly enhanced China's research capacity by providing more qualified researchers, since it is largely the teaching-intensive universities that have increased student enrollment. The prestigious research-intensive universities controlled their enrollment very tightly during the massive expansion.

Parallel with the expansion at the undergraduate level, most schools of graduate studies have also increased their enrollment since 1999. The rationale for graduate education expansion is twofold: first, to meet the demands of undergraduate expansion by providing teaching staff; second, to enhance research capacity by providing more researchers. The number of students enrolled in Masters and Ph.D. programs increased from 233,513 in 1999 to 1,195,047 in 2007. However, the number of faculty members did not increase in proportion to graduate student numbers. In 1999, the ratio of graduate students to supervisor was 2.9:1, while in 2006, it increased to 12.4:1. The shortage of education resources and teaching staff has greatly jeopardized the quality of graduate education.

Discussion and conclusion

Higher education institutions undertake the preservation, development and reinterpretation of a nation's vast cultural heritage and the formation of shared values in the social, political, and foreign policy arenas (Hayhoe 1999), as well as sheltering and developing

Table 4 R and D input for higher education institutions

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007
Billion Yuan	6.31	7.71	10.21	13.0	16.16	20.06	24.23	27.68	31.47
Percentage	9.3	8.6	9.8	10.1	10.5	10.2	9.9	9.2	8.5

Sources: The Ministry of Science and Technology of China (1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007)

thinkers, experimenters, inventors, teachers, and students (Flexner 1968, p. 10). It was a daring and innovative move for the Chinese government to include higher education expansion as a part of an economic revitalization plan in 1999. Nevertheless, developing economies cannot expect a quick harvest from educational investment (Godo 2002). The overemphasis on economic benefit at the beginning stage created many issues for China, although gradual modifications have been made to minimize these negative side-effects.

Mass higher education in China was such a radical move, made without adequate consideration of commensurate state policies, that it created a series of social and educational problems. Inequity tends to be a major issue for China's higher education. Without an advanced financial aid program, mass higher education is likely to deprive potential students of the opportunity to enter universities because of increasing tuition fees. Another issue is graduate employment. China's current social, economic and political structures are not ready to absorb all of the graduates, nor to enable all of them to make use of their knowledge. Unemployment has greatly minimized graduates' private return for their investment in higher education. Trow (1973) believes that the character of mass higher education tends to differ from that of elite education. As the government partly devolves responsibility for investing in higher education expansion, higher education institutions become accountable for billions in loans and the incremental interest due to banks, which may lead to their collapse.

Turning back to China's original goal of economic growth, it is premature to conclude whether China has actualized short-term growth through its higher education expansion. The short-term economic growth expected by the government turned out to be more a redistribution of household savings. Students may consume education related resources, but parents in turn have curbed other consumption activities. University infrastructure construction stimulated economic growth to a certain degree; however, the debt of billions of yuan may drag some universities into a financial crisis.

It would have been a wise move for the government to accumulate human capital and enhance its research capacity for China's economic growth in the long term, had its expansion policy been carefully designed to provide the actual kind of human capital needed by industry through the expansion of polytechnic/vocational colleges; had the higher education institutions accommodated the economic needs through reforming the higher education curriculum according to the economy's requirements; and had China's social, political, and economic systems enabled the graduates to make use of their accumulated knowledge.

In the past few years, higher education has experienced a tremendous expansion and has leaped into the era of mass higher education. The major purpose of this move was to revitalize China's economy and accumulate talent for China's future economic prosperity. Although the annual GDP has increased at 9.8% on average during the period from 1999 to 2007, there is no evidence that shows how much of this can be attributed to higher education expansion. As a developing country with a low GDP per capita and a huge gap between economically advantaged and disadvantaged groups, the expectation of China's policymakers that they could reboot the country's economy through education-related consumption turns out to be in doubt. The distribution of enrollments in humanities, social sciences, and sciences and engineering, the proportion of general and vocational education, as well the employment rate of graduates all resulted in an oversupply of talent personnel that is not needed by China's economy, although research capacity in aggregate may have expanded as both funds and the number of graduate students increased.

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