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China Economic Review 16 (2005) 50-70

# China's human capital investment

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#### Abstract

This paper discusses human capital investment in China. China's current policies favor physical capital investment over schooling and urban human capital investment over rural human capital investment. Current migration policies discriminate against children of migrants. A more balanced investment strategy across rural and urban regions and types of capital is appropriate. Private funding for education through tuition and fees should be encouraged and can supplement government funding and make schools more financially self-sufficient. However, if this policy is enacted, capital markets for financing education need to be developed to avoid discouraging students from poor families from attending school.

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Keywords: Human capital; Economic growth; Migration

# 1. Introduction

In 1995, China, at all levels of government, spent about 2.5% of its GDP on investment in schooling.<sup>2</sup> At the same time, roughly 30% of its GDP was devoted to physical investment. In the United States, those figures were 5.4% and 17%, respectively. In South Korea, they were 3.7% and 30%. See Table 1 for a comparison of China with other countries in its governmental expenditure of GDP on education. China was below average

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<sup>&</sup>lt;sup>2</sup> See UNESCO, Statistical Yearbook (New York: UNESCO, 1999).

<sup>1043-951</sup>X/\$ - see front matter  $\ensuremath{\mathbb{C}}$  2004 Elsevier Inc. All rights reserved. doi:10.1016/j.chieco.2004.06.012

Table 1 Public expenditures on education as a percentage of GNP in 1995

	-	
World	5.2	
China	2.5	
Philippines	3	
Thailand	4.1	
India	3.3	
Malaysia	4.7	
Singapore	3	
Pakistan	2.8	
Turkey	2.2	
South Korea	3.7	
Egypt	4.8	
Mexico	4.9	
Brazil	5.1	
Argentina	3.8 <sup>a</sup>	
United States	5.4 <sup>a</sup>	
Japan	3.6 <sup>a</sup>	
Canada	$6.9^{\mathrm{a}}$	
Germany	4.8	
Russian Federation	3.5	
Poland	5.2	
Hungary	5.3	

Source: UNESCO (1999).

<sup>a</sup> Data were only available for 1994.

even among its peers in its expenditure on investment in people. Recent trends in governmental human capital investment are favorable, but the investment proportion is still low by world standards, rising to 3.3% in 2002 (see Table 2). More than 45% of GDP was invested in physical capital in 2002. Even the dramatic growth in private spending on

Table 2 Government appropriation for education as a percentage of GDP in 100 million Yuan

001011110110	overmient uppropriation for education as a percentage of ODT in foo minion fuan							
Year	Government appropriations for education	GDP	Educational expenditure as percentage of GDP					
1991	618	21,618	2.9%					
1992	729	26,638	2.7%					
1993	868	34,634	2.5%					
1994	1175	46,759	2.5%					
1995	1412	58,478	2.4%					
1996	1672	67,885	2.5%					
1997	1863	74,463	2.5%					
1998	2033	78,345	2.6%					
1999	2287	82,068	2.8%					
2000	2563	89,468	2.9%					
2001	3057	97,315	3.1%					
2002	3491	104,791	3.3%					

Source: China Statistical Yearbook 2003.

education in the past 10 years, while encouraging (see Tables 3 and 4), is not enough to fully redress the imbalance.

China's ratio of annual investment in physical capital to human capital is much higher than that in most countries. This imbalance might be warranted if the economic rate of return to physical capital were much greater than the economic rate of return to human capital. Below, I summarize evidence that indicates that the true rate of return to education and skill formation is very high and that the imbalance in human capital investment relative to physical capital investment is symptomatic of a serious distortion in current policy that retards economic development in China. Conventional methods for computing rates of return to human capital that are useful in less regulated labor markets, and are frequently applied to the study of the Chinese labor market, give a misleading estimate of the true social rate of return to human capital. Other methods must be used to estimate the true social return.

A basic result of economics is that resources should flow to their most productive use. A policy that equalizes returns across all investment types and across all regions increases economic growth. Current Chinese policy tends to ignore this fundamental rule not only by promoting physical capital investment over human capital investment, but also by restricting the flow of resources across regions and investing in education at different rates in different regions and by investing in physical capital in an imbalanced fashion. These policies reduce the economic growth of China and promote inequality, both in the short run and in the long run.

In this paper, I first present the potential benefits that flow from investment in human capital. Then, I discuss the empirical evidence on the rate of return to education in China and evidence on regional and geographic imbalances in expenditure on human capital investment. I then consider alternative policy reforms that would foster skill acquisition and enable China to harvest the benefits of investment in both physical and human capital.

I make seven points. (1) The benefits of human capital investment are substantial. (2) The current level of investment in human capital in China is low compared to what is

Government and	Sovermient and total funds devoted to education in 100 minion fuan						
Year	Total	Government appropriations for education	%				
1991	731.5	617.8	84.5				
1992	867.0	728.8	84.1				
1993	1059.9	867.8	81.9				
1994	1488.8	1174.7	78.9				
1995	1878.0	1411.5	75.2				
1996	2262.3	1671.7	73.9				
1997	2531.7	1862.5	73.6				
1998	2949.1	2032.5	68.9				
1999	3349.0	2287.2	68.3				
2000	3849.1	2562.6	66.6				
2001	4637.7	3057.0	65.9				
2002	5480.0	3491.4	63.7				

Government and total funds devoted to education in 100 million Yuan

Source: China Statistical Yearbook 2003, and China Educational Finance Statistical Yearbook 2003.

Table 3

Year	Total education funds <sup>a</sup>	GDP	%
1991	732	21,618	3.4
1992	867	26,638	3.3
1993	1060	34,634	3.1
1994	1489	46,759	3.2
1995	1878	58,478	3.2
1996	2262	67,885	3.3
1997	2532	74,463	3.4
1998	2949	78,345	3.8
1999	3349	82,068	4.1
2000	3849	89,468	4.3
2001	4638	97,315	4.8
2002	5480	104,791	5.2

Table 4 Total expenditures on education as a percentage of GDP in 100 million Yuan

Source: China Statistical Yearbook 2003, and China Educational Finance Statistical Yearbook 2003.

<sup>a</sup> Total education funds, including government appropriation for education, organization and citizens running schools, and other funds.

required to complement the very high investment in physical capital and the large influx of unskilled labor into urban areas. (3) At current levels, investment in human capital is inequitably and inefficiently distributed across geographical regions and rural and urban areas within the regions. (4) The imbalance in investment in human capital compared to physical capital reduces the return to physical capital and thwarts physical investment initiatives designed to foster growth in interior China and regions targeted for rejuvenation. (5) A more balanced portfolio of investment will promote economic growth and reduce inequality in the long run. (6) Open labor markets, functioning markets for loans to human capital, and fewer restrictions on the mobility of workers will foster human capital growth at little cost to governments. (7) The current growth in private sector financing of education is encouraging (see Table 3). It has substantially boosted the share of total GDP devoted to education (see Table 4). Reliance on the private sector has great potential for increasing formation of human capital without raising taxes. The percent of funds coming from private sources varies greatly across regions [see Appendix A (Table 1)]. Some of the poorest regions use fees to pay for schooling. Unless access to capital markets to finance education is improved, reliance on tuition fees to finance education will deny access to education to children from poor families.

#### 2. The benefits of human capital investment

When economists first began to measure the sources of economic growth, what previously had been considered an unexplained residual was shown to be attributable to human capital. From studies of the development of the American economy, and the sources of growth of many countries around the world, it has become recognized that human capital—the skill of the population—plays a major role in explaining differences in productivity and inequality among nations (Becker, 1964; Schultz, 1981). Human capital

is another, very valuable, kind of capital. It is costly to acquire, like physical capital, and pays off over time, like physical capital.

The term human capital suggests to some a depersonalization or commercialization of the individual and is often associated in popular discussions with a dehumanizing society that equates men with machines. In fact, it is just the other way around. The human capital concept recognizes that human beings are as important, if not more important, than physical capital in creating wealth. Investment in people is an appropriate concept for the People's Republic of China. To understand how human capital affects the economy and why China should promote it, consider how human capital improves productivity.

First, human capital is productive because of its effect on raising the skills of those invested in. Thus, for example, if you train an individual to be a better accountant, the accounting performance of that individual will rise. If you train a worker to fix an engine, the worker will be more productive in fixing engines. These are the obvious direct effects of making people more skilled.

Human capital also improves adaptability and allocative efficiency. More skilled workers allocate resources more effectively across tasks and are more able to adapt to change and to respond to new opportunities (Nelson & Phelps, 1966; Schultz, 1975). These benefits of human capital investment are especially relevant today. China is changing. Its labor markets and capital markets are changing along with the rest of the world's economy. Numerous empirical studies demonstrate that more educated and skilled people adapt better to change. They are able to benefit from opportunities that become available and create new opportunities of their own. They enhance productivity in the workplace. Greater skill also facilitates worker mobility across occupations, industries, and regions in response to new opportunities. It helps people reallocate resources, both human and physical, toward more productive opportunities, and even to realize that those opportunities exist. A more educated workforce is a more flexible workforce. More educated people are better able to absorb new ideas, adopt foreign technologies, improve local technologies, and understand and apply knowledge from outside China to local situations.

As China enters world markets, it has access to newer forms of technology and organizational arrangements. The need for a more skilled workforce will increase. By developed world standards, China's percentage of college-educated workers is low (see Table 5). The proportion of college educated workers in many developed societies is in excess of 30%. There is substantial regional variability in educational attainment levels, so that the educational infrastructure for modern growth is deficient. I suspect that if a full accounting were made of on-the-job training—postschool investment that is a vital component of human capital formation in modern economies—this would only strengthen the conclusion that human capital is in short supply in modern China.

The new technology being brought into China by its investment in physical capital requires more skilled workers to operate it. Unskilled workers migrating into industrial areas require skilled workers to train and complement them. Capital and skill are complementary. So are unskilled workers and skilled workers. Each factor raises the productivity of the other. An investment strategy that emphasizes physical capital over human capital fails to capture the benefits that arise from a more balanced investment strategy. It takes skilled workers to make the most efficient use of modern technologies.

Region	Population	Fraction w	Fraction within each provinces						
	(age 6 and over, thousands)	Illiterate	Primary education	Junior secondary school	Senior secondary school	College or higher level			
Beijing	13,239	4.99	14.86	35.67	23.99	20.49			
Tianjin	9522	6.36	23.16	37.36	22.57	10.57			
Hebei	62,588	6.80	34.41	42.50	11.61	4.69			
Shanxi	30,192	5.66	31.63	45.41	12.67	4.63			
Inner Mongolia	22,236	11.93	29.70	37.82	14.91	5.64			
Liaoning	39,676	4.96	29.75	46.68	13.09	5.52			
Jilio	25,500	4.33	32.23	39.78	17.16	6.50			
Heilongjiang	36,007	6.12	31.07	43.24	14.71	4.87			
Shanghai	15,469	7.64	17.50	34.70	25.10	15.07			
Jiangsu	69,427	12.39	31.96	38.69	13.14	3.83			
Zhejiang	43,244	12.21	34.23	34.54	13.25	5.77			
Anbui	58,813	14.66	36.65	38.66	7.39	2.64			
Fujian	32,162	11.89	38.72	32.04	13.15	4.20			
Jiangxi	38,249	9.10	41.68	34.83	11.48	2.91			
Shandong	83,881	10.10	28.06	41.76	14.42	5.67			
Henan	88,118	7.76	29.51	46.47	11.97	4.30			
Hubei	56,354	12.41	39.25	32.25	12.23	3.86			
Hunan	61,435	7.23	37.26	38.69	12.47	4.35			
Guangdong	71,705	6.41	36.83	37.78	13.84	5.15			
Guangxi	44,120	8.60	39.57	37.03	11.32	3.48			
Hainan	7273	7.88	34.55	39.35	14.62	3.59			
Chongqing	28,823	9.31	42.33	34.63	10.38	3.35			
Sichuan	79,863	12.24	39.58	33.99	10.44	3.75			
Guizhou	34,146	16.21	42.71	30.03	7.54	3.52			
Yunnan	38,413	20.30	46.15	25.19	6.37	1.99			
Tibet	2406	37.99	46.63	11.72	2.87	0.79			
Shaanxi	34,241	13.03	35.43	34.59	12.99	3.95			
Gansu	23,833	18.11	38.36	28.86	11.61	3.05			
Qinghai	4724	22.25	38.02	27.65	8.95	3.15			
Ningxia	5068	14.98	33.82	33.60	11.94	5.66			
Xinjiang	18,220	7.74	35.80	31.73	14.85	9.88			
National total	1,178,951	10.23%	34.96%	37.65%	12.45%	4.71%			

 Table 5

 Percent of population by level of education and region

The data in this table are obtained from the Sample Survey on Population Changes in 2002. The sampling fraction is 0.988%.

Although recent enrollment trends are favorable (see Table 6), there is still a huge gap to close. Fleisher and Chen (1997) analyze the impact of education on total factor productivity in regions in China. They find that the policy of promoting investment in noncoastal areas of China has been thwarted by the low level of education in the noncoastal regions. An imbalanced investment strategy reduces the return on physical capital.

Human capital is also important in agricultural sectors of the economy. Numerous studies of agriculture in China and around the world reveal that education promotes productivity on the farm, and also helps the agricultural sector to adapt to changing

Year	According to provincial	Ages 12-14	Ages 15-17	Ages 18-22	
	entrant age primary school years		Never worked category	Total	
1990	111	66.7	21.9	_	3.4
1991	109.5	69.7	23.9	_	3.5
1992	109.4	71.8	22.6	26	3.9
1993	107.3	73.1	24.1	28.4	5
1994	108.7	73.8	26.2	30.7	6
1995	106.6	78.4	28.8	33.6	7.2
1996	105.7	82.4	31.4	38	8.3
1997	104.9	87.1	33.8	40.6	9.1
1998	104.3	87.3	34.4	40.7	9.8
1999	104.3	88.6	35.8	41	10.5
2000	104.6	88.6	38.2	42.8	12.5
2001	104.5	88.7	38.6	42.8	13.3

Gross enrollment rate in schools by age and level

Source: China Educational Finance Statistical Yearbook 2002.

The gross enrollment rate in schools by level is defined as the total enrollment of a school level divided by the total population within the age range for a given school level, which is then multiplied by 100. Junior secondary schools include secondary schools. It can exceed 100% if the base is underestimated.

markets and technologies. More educated farmers are better able to exploit opportunities in technology and trade. The development process is characterized by emerging technologies, emerging options, and by improved choices both in the rural and urban sectors. Better-educated people are better able to make good choices, both on the farm and in the urban workplace (Yang, 2004).

An appropriate investment strategy for Chinese growth would recognize that optimizing over the full portfolio of investments—both human and physical capital—promotes the highest rate of growth. If China overinvests in one type of capital or underinvests in another, opportunities for improvement in wealth are lost. If it does not equalize returns and opportunities across regions, aggregate income is reduced and inequality is increased. By equalizing returns across assets and across markets in different regions of the country, greater national wealth and long-run social equality will be produced.

Hence, major questions for China's leadership include the following. Should the Chinese investment portfolio be readjusted? Should the portfolio be more balanced across the regions? What is an appropriate migration policy? What is an appropriate tuition policy to maximize economic returns? Should markets for the financing of human capital investment be developed?

# 3. Underinvestment in human capital? Inefficient geographical distribution of human investment?

There is a low level of public support for education in most provinces of China. Since schooling is mostly funded at the local level, rich provinces tend to produce more

Table 6

human capital per capita than do poor provinces. Resource constraints differentially affect access to schooling of individuals in different parts of China, especially in rural areas and in the West. The place of a person's birth is one of the most important determinants of that person's adult skill level (Knight & Song, 1999). This creates serious regional disparities, is a major source of inefficiency in current policy (Li, undated), and is a powerful source of inequality in Chinese society across people contemporaneously and across generations. This source of inequality is reinforced by the vestiges of *hukou* policy that charges children of interregional immigrants additional fees for schooling that can amount to as much as 10% of total family income just for the right to attend school (Xie, 1999).

Table 7 documents the variation in cross section per pupil expenditure across regions of China. The variation is enormous and the positive relationship with

Region	1998	1999	2000	2001
Beijing	4973	6347	7910	10,098
Tianjin	1936	2163	2530	3042
Hebei	586	658	722	856
Shanxi	675	747	794	996
Inner Mongolia	926	1063	1106	1399
Liaoning	1217	1340	1456	1627
Jilin	1170	1303	1378	1695
Heilongjiang	1052	1265	1348	1688
Shanghai	4557	5331	6333	6805
Jiangsu	1151	1296	1360	1474
Zhejiang	1255	1497	1647	2142
Anhui	554	612	603	705
Fujian	866	1018	1163	1377
Jiangxi	522	567	620	793
Shandong	758	862	984	1155
Henan	476	520	567	678
Hubei	683	756	831	993
Hunan	580	675	722	857
Guangdong	1085	1157	1286	1468
Guangxi	555	618	675	836
Hainan	771	890	885	1046
Chongqing	749	793	855	1033
Sichuan	639	697	751	918
Guizhou	428	500	561	672
Yunnan	960	1044	1101	1281
Tibet	1612	2044	2004	2385
Shaanxi	663	761	808	1040
Gansu	682	801	832	982
Qinghai	1098	1175	1335	1645
Ningxia	853	965	1037	1350
Xinjiang	1225	1319	1412	1859

Table 7 Per pupil expenditure by region (in units of 2001 Yuan)

Source: Author's calculation from China Statistical Yearbook 1999–2003.



Fig. 1. Per pupil expenditure vs. per capita GDP (1998-2001).

provincial GDP per capita is fairly clear and precisely estimated.<sup>4</sup> Fig. 1 plots an estimated regression line showing the relation between provincial schooling expenditure and per-capita GDP.<sup>5</sup> Table 8 illustrates how schooling finances are tied to the level of wealth in a region and that regions and provinces spend different fractions of their GDP on education. Not only is educational expenditure tied to the wealth of a province, but different provinces spend different shares of their GDP on education. Both components are equally important in accounting for inequality across provinces.

Table 9 reveals that there is a substantial subsidy to education at all levels. Yet, at the same time, fees paid by students are a substantial source of funding for education. Growth in these fees partly accounts for the growth of private sector funding for education.<sup>3</sup>

A policy of charging fees for access to education, which is widespread at secondary and higher levels in China, can be justified as a way to ration scarce resources to those who might benefit most from education. It also is a way to raise resources for education without imposing demands on the governmental sector. Yet, these fees operate inequitably between urban and rural households (see Tables 10 and 11, respectively), and they are a substantial fraction of household income in rural areas. Table 12 shows evidence that the fraction of tuition fees per child in household income, which is substantial in urban areas, is twice as high in rural areas. These fees tend to reduce access to education. Table 1 of Appendix A

<sup>&</sup>lt;sup>3</sup> As this paper was going to press, I became aware of the analysis of Chow and Shen (2004), who analyze aspects of private funding in China, but do not discuss the contribution of fees to inequality.

<sup>&</sup>lt;sup>4</sup> The  $R^2$  is .70 and the regression coefficient is statistically significant.

<sup>&</sup>lt;sup>5</sup> The extreme outlier for Beijing reflects in part student in-migration to that region for higher education.

Region	1998	1999	2000	2001
Beijing	5.403	6.213	6.851	7.594
Tianjin	2.576	2.607	2.629	2.907
Hebei	2.074	2.143	2.101	2.173
Shanxi	2.971	3.283	3.332	3.871
Inner Mongolia	3.172	3.350	3.184	3.615
Liaoning	2.203	2.219	2.199	2.247
Jilin	3.638	3.697	3.555	3.683
Heilongjiang	2.416	2.724	2.570	2.818
Shanghai	2.880	3.002	3.157	3.098
Jiangsu	2.115	2.205	2.122	2.091
Zhejiang	1.844	2.073	2.120	2.541
Anhui	2.238	2.418	2.379	2.659
Fujian	1.929	2.072	2.148	2.314
Jiangxi	2.191	2.373	2.430	2.822
Shandong	1.874	1.935	1.980	2.022
Henan	2.181	2.270	2.240	2.387
Hubei	2.154	2.265	2.266	2.446
Hunan	2.282	2.407	2.323	2.504
Guangdong	2.175	2.207	2.233	2.411
Guangxi	2.808	2.951	3.073	3.507
Hainan	2.813	3.033	2.822	3.165
Chongqing	2.501	2.616	2.771	3.091
Sichuan	2.426	2.606	2.702	3.026
Guizhou	3.517	3.820	4.140	4.671
Yunnan	3.799	4.070	4.233	4.705
Tibet	6.412	7.017	6.566	6.916
Shaanxi	3.756	4.073	4.023	4.689
Gansu	3.644	4.133	4.322	4.857
Qinghai	3.858	3.893	4.182	4.649
Ningxia	3.933	4.233	4.356	5.114
Xinjiang	4.174	4.399	4.190	5.182

Table 8 Government education appropriations as a percent of GDP by region

Source: Author's calculation from China Statistical Yearbook 1999-2003.

shows that some of the poorest provinces rely substantially on fees to support education. I discuss the consequences of these fees for inequality, after discussing the economic return to education in China.

# 4. Returns to education in China

In discussing rates of return to education, it is important to recognize that there are benefits to education that are not directly captured by individuals. These spillovers are likely to be quite large in China. For example, a better-educated workforce produces new ideas and knowledge and is better able to adapt to new, imported technology. Such benefits help entire districts. Moreover, even if there are no spillovers, to the extent that wages of the skilled are held down by government policy as they have been in China, individuals

Level of education Higher education		Number of students (thousands)	Total tuition and miscellaneous fees (thousands of Yuan)	Tuition and miscellaneous fees (thousands of Yuan)	Total education expenditure per student (Yuan)	Proportion paid by student (%)	
		6158	13,788,309	2239	12,415	18%	
Secondary education	Specialized secondary schools	5694	7,940,659	1395	4269	33%	
	Technical secondary schools	457	449,120	983	3394	29%	
	Vocational schools	4112	2,287,771	556	2501	22%	
	General secondary schools	63,045	11,806,764	187	1436	13%	
Primary educ	cation (primary schools)	139,715	9,283,666	66	695	9%	

Chinese tuition and miscellaneous fees for education in 1999

Source: Author's calculation according to NBS (2001a,b), Statistical Yearbook on Educational Expenditure of China 2000, China Statistics Press, Beijing.

capture even less of the gains generated by their education. These forces lead to underinvestment in human capital in China and in many other countries around the world. The case for subsidy of education is stronger in China than it is in the developed regions of the world.

What does the empirical evidence on the rate of return to education in the Chinese economy show? It is important to evaluate government activity on a quantitative basis, to screen the bad investments from the good ones, and to conduct policy on a factually informed basis. From cost–benefit analyses grounded in data, we can understand more clearly whether human capital projects or physical capital projects should be favored, and in what proportions. In making judgments using a cost–benefit criterion, society can use its resources most efficiently. In the Chinese context, this is especially important, given that

Level of education Higher education		Tuition and miscellaneous fee per student (Yuan)	Proportion of tuition to household income (%)	
		2239	12.2	
Secondary education	Specialized secondary schools	1395	7.6	
	Technical secondary schools	983	5.3	
	Vocational schools	556	3.0	
	General secondary schools	187	1.0	
Primary education (pri	mary schools)	66	0.4	
Average deposit income per urban resident (Yuan)		5854		
Mean household size		3.14		
Average deposit income per urban household (Yuan)		18,382		

Table 10 Chinese tuition and miscellaneous fee and urban household income in 1999

Source: Author's calculations according to NBS (2001a,b), Statistical Yearbook on Educational Expenditure of China 2000, China Statistics Press, Beijing; and NBS (2000b), China Statistical Yearbook on Price and Urban Household Income and Expenditure Survey 2000, China Statistics Press, Beijing.

Table 9

Level of education Higher education		Tuition and miscellaneous fee per student (Yuan)	Proportion of tuition to household income (%)	
		2239	23.8	
Secondary education	Specialized secondary schools	1395	14.8	
	Technical secondary schools	983	10.5	
	Vocational schools	556	5.9	
	General secondary schools	187	2.0	
Primary education (pri	mary schools)	66	0.7	
Average pure income per rural resident (Yuan)		2210		
Mean household size		4.25		
Average pure income per rural household (Yuan)		9393		

Table 11									
Chinese tuition	and	miscellaneous	fee	and	rural	household	income	in	1999

Source: Author's calculation according to NBS (2001a,b), Statistical Yearbook on Educational Expenditure of China 2000, China Statistics Press, Beijing; and NBS (2000a), China Rural Household Survey Yearbook 2000, China Statistics Press, Beijing.

the country as a whole is poor. So it is especially important to make wise investment decisions in the country.

Estimating the rate of return to education in China in the way economists do in Western economies—relating market wages to levels of schooling—one finds that the rate of return to education in China in the early 1990s was about 4% (Chow, 2002). This is a low rate of return. Heckman and Li (2004) note that the rate of return has risen to 7% in recent years. It is far below the rate of return to physical capital in industry that is estimated by some to be as high as 20% (Chow, 1993). Taken at face value, these estimated returns suggest that there might be too much investment in human capital in China. To give you a benchmark

Table 12

Chinese tuition fee for higher education and rural and urban household income for the five provinces with the lowest resident income in 1999 (in Yuan)

Five provinces w resident incom	rith lowest e	Average resident income	Mean household size	Average household income	Tuition fees for higher education	Proportion of tuition to household income (%)		
Urban areas	Henan	4532	3.21	14,548	2239	15.4		
	Jilin	4480	3.09	13,843	2239	16.2		
	Gansu	4475	3.1	13,873	2239	16.1		
	Ningxia	4473	3.13	14,000	2239	16.0		
	Shaanxi	4343	3.17	13,767	2239	16.3		
Rural areas	Shaanxi	1456	4.41	6421	2239	34.9		
	Yunnan	1438	4.59	6600	2239	33.9		
	Guizhou	1363	4.5	6134	2239	36.5		
	Gansu	1357	4.86	6595	2239	33.9		
	Tibet	1309	6.84	8954	2239	25.0		

Source: Author's calculation according to NBS (2001a,b), Statistical Yearbook on Educational Expenditure of China 2000, China Statistics Press, Beijing; NBS (2000b), China Statistical Yearbook on Price and Urban Household Income and Expenditure Survey 2000, China Statistics Press, Beijing; and NBS (2000a), China Rural Household Survey Yearbook 2000, China Statistics Press, Beijing.

figure, in the United States and many other countries, there are estimates that the rate of return to human capital is as high as 15% to 20%. This evidence suggests that the relatively high ratio of physical capital investment to human capital investment in China might be appropriate.

If one understands how labor markets function in China, one realizes how misleading such a conclusion would be, even for a historical analysis of educational policy. Labor markets are the markets that price human capital services and reward people for their skills. Wage policy in China historically guaranteed a low rate of return to skilled labor. There are still many restrictions on wage setting in the labor market. So the only thing one can conclude from standard rate of return to education analysis applied to historical Chinese data is that personal incentives to invest in skills are low, although this is changing (Cai, Wang, & Du, 2002).

The low private rate of return to education does not reflect the true rate of return in the late 1980s or early 1990s. Labor markets were so distorted in China that wages did not reflect the true marginal contribution of educated labor to the economy. To show this, I draw on an analysis of data whose collection was supported by the Ford Foundation working in cooperation with the Chinese Academy of Social Sciences and analyzed by Fleisher and Wang (2004). Their analysis suggests that the social return to human capital is much higher than the private return. Instead of looking directly at market data and seeing what individuals are paid, they look at the productivity of education in the workplace in producing output. This is a production-based return to education rather than a compensation-based measure of the type that is widely used.

Their econometric studies suggest that the return to education was as high as 30% or 40% (Fleisher and Wang, 2004). The wages paid to skilled workers are only 10% of their marginal productivity in 1992. Unskilled workers' wages are much closer to their marginal products. This evidence demonstrates the extreme consequences of wage setting policies that fail to pay for productivity. Since workers get only a small fraction of their payment for skill, they have weak incentives to acquire skills.

The rate of return to education in production estimated by Fleisher and Wang is higher than any estimate reported in the United States or Western Europe. And arguably, they underestimate the true rate of return to human capital because there are many further benefits of education not captured by their output measure. Thus, the available microeconomic data from China suggest that there is in fact substantial underinvestment in human capital. Labor markets in China gave the wrong incentives to workers in the late 1980s and early 1990s and likely do so today. If we compare estimates of the true productivity in education with wages paid, Chinese labor markets did not pay skill what it is worth and likely do not do so today. Fleisher and Chen (1997) show that returns to education exceed the returns to investment in public infrastructure in all provinces of China except Beijing, Tianjin, and Shanghai-regions with high levels of education investment. They further estimate that the lower levels of education in noncoastal China reduce the productivity of all forms of capital in those regions by half. An imbalanced policy that seeks to improve productivity in noncoastal China by encouraging investment in physical capital alone is much less effective than a policy that invests in a more balanced fashion in both human capital and physical capital.

#### 5. Policies to foster human capital and promote economic growth

The low level of compensation accorded to education relative to its large direct effect on measured output is evidence of distortions in overall policy. Current policy reduces the incentives of individuals to acquire the appropriate amount of human capital. Chinese labor market policy and educational policy cause the national portfolio of investments to be distorted away from human capital toward physical capital investment, to be distorted away from human capital investment in the interior and toward the coast, and to be distorted against human capital investments in rural people. High rates of social return to investment can be realized by taking funds, even those borrowed from abroad, and those created in the enterprises in China, to invest in human capital and distribute the investment more equitably. Such a strategy would foster the creation of national wealth.

One way to encourage education and job training is to subsidize it. That approach entails a substantial increase in government expenditure and may not be feasible. Further increases in direct governmental support for education may be difficult, given the large demands on governments for many projects and benefits.

Another way to foster human capital that entails less direct cost to governments is to free up labor markets for human capital. A free labor market that allows the same kind of incentives to operate as those that increasingly govern capital markets and product markets in China would go a long way toward promoting skill formation. This would have a powerful effect on promoting human capital. If persons receive a 30–40% return on human capital investments, they would willingly pay the costs of schooling. A 4% or even a 7% rate of return is not that profitable.

Freeing up the labor market for skills would allow the forces of private incentives to operate. Giving individuals the fruits of their skills would motivate people to acquire skills without necessarily costing the government anything. It would allow private incentives to operate to create the investment pools for human capital and to open private schools to obtain schooling. This process has begun in China (see Tables 3 and 4), but it should be accelerated. By unleashing the forces of individual incentives to create human capital, China will create wealth and create pools of finance for physical capital from the savings of its educated workers. It will expand its tax base and enhance its revenue from taxation. However, to promote efficiency and equality of opportunity for education, it will be necessary to develop markets to finance education, as I discuss below.

Another policy that would promote growth is equalization of regional and urban-rural rates of return to human and physical capital by permitting free capital and labor mobility. For decades, Chinese policy has favored certain regions over others (see Fleisher & Yang, 2003). Eliminating regional disparity in wages and opening up markets to allow freedom of migration and pursuit of opportunities throughout China would enhance economic development of the country as a whole; so would a centralized educational finance policy that served to allocate governmental funds from the center more evenly across the regions and between rural and urban areas. Western China and rural areas currently have low incomes and hence poor support for education but a very high return to it. National income will be increased by allocating more resources for education and training to poorer regions.

Many Chinese object to freeing up incentives in labor markets. The *hukou* policy protects urban residents against the competition of migrants and protects the wages of the unskilled in urban areas more than those of the skilled who require no protection. Opening the labor market would likely increase inequality in wages between skilled and unskilled workers, at least in the short run as the wages of skilled workers would be bid up as they become relatively scarce. However, this policy would produce the right incentives for people to acquire skills. Given the right rewards and access to capital markets to finance education, people will be willing to pay tuition for schooling, which leads to higher salaries in unregulated markets. As education is increased, and returns across regions are equalized, inequality across people and over generations will be reduced.

For this system to operate effectively, credit markets for schooling should be developed to allow students to borrow against their future earnings. In the absence of such markets, it is only the young people from wealthy families that can pay tuition charges that currently are as high as 30–40% of mean income in rural areas (see Tables 10 and 11). Inequality would increase across the generations since only the rich could send their children to school.

There are many inequality-generating mechanisms in place. Current practices restrict mobility of labor across regions. Migrants face many costs that native residents do not. Of course, there has been a dramatic improvement in freedom of mobility compared to the policies of the 1960s and 1970s. However, the 10% increase in the cost of schooling as a fraction of household income for the children of migrants currently reduces social mobility and perpetuates intergenerational poverty. Access to education for the children of immigrant workers promotes the migration of their parents, promotes social mobility and equality, and raises productivity.

A lesson that has been learned from recent studies in the United States, Europe, and other countries around the world is the value of competition among schools and incentives in education in improving the performance of educational institutions (Heckman, 2000). If China encourages even more private organizations, such as private business schools, technological institutes, and the like to operate, it can create an efficient educational infrastructure to promote the formation of human capital. This trend, well underway, should be accelerated. Restrictions on entry of foreign and domestic institutions into the market for education should be eliminated.

China should rely on personal incentives to encourage schools to perform well as students shop among them. Schools would gain resources directly from the students they educate, and the resources available to educate Chinese people would increase.

Another important policy goal is to promote further ties between industry and universities. Many universities have begun such partnerships, but there is room for much more growth in these productive arrangements. Such partnerships allow the universities to respond to practical problems and therefore help local industry meet some of the challenges that accompany the introduction and improvement of technology. This will provide a source of finance by private industry for the educational enterprise.

In the United States, there are very successful firm–school relationships with schools at all quality levels, not just those between distinguished universities and high-tech firms.

Many lesser schools have formed valuable partnerships working closely with companies that need workforce training. By creating incentives and allowing individuals and organizations to trade and to bargain in human capital and in physical capital markets, the effectiveness of the educational infrastructure would be improved at no cost to governments.

Creating incentives and developing capital markets to finance education would promote investment in human capital. It is not necessary to use funds from the center or to presume that education and skill formation should be governmentally supplied. Freeing up the labor market and the market for education would harness the forces that promote acquisition of skills by fostering the training of individual workers by firms, or encouraging individuals to train themselves in the workplace to be better farmers, better factory workers, and better managers.

By whatever mechanism, educational expenditures should be increased and, at any level, equalized across regions to maximize the return on human capital investment. One of the best-established empirical findings from around the world is that human capital enhances the productivity of high-technology physical capital. The two complement each other strongly. The current unbalanced investment strategy of China emphasizes physical capital over human capital. As previously noted, this strategy undermines policies to promote physical capital investment in rural areas and in noncoastal provinces. Returns to capital are low when the level of education of the workforce is low. There are too few skilled workers to effectively operate the new technology rapidly being introduced into China and to train and manage the influx of unskilled workers into the modern sector. Furthermore, the skills being produced by the educational system are not always the ones needed by industry. I next discuss the issue of income inequality, a topic of great concern in modern China.

# 6. Inequality

In the short run, open labor markets and large-scale investment in new technologies lead to greater inequality in wages. The young and most able benefit. The process of opening labor markets and investing in new methods of production is well underway in China and has contributed to greater wage inequality, which is a source of much public concern. More educated and more able persons benefit more from the new economy.

This problem is a transient one. In the long run, there will be less inequality as the population becomes more skilled and as opportunities for education and skill investment are spread more widely throughout Chinese society. Inequality across the generations will be reduced.

A policy fostering interregional migration would serve to offset the rise in inequality produced by more open wage setting and, even in the short run, would serve to reduce a basic source of wage inequality. A major source of income inequality in China is the difference between rural and urban incomes. These differences are due to policies of the Chinese government that increase inequality (Cai, Wang, & Du, 2002; Fleisher & Yang, 2004; Johnson, 2000, 2002; Yang, 1999). Restrictions on labor migration from

rural to urban areas have produced disparity between urban and rural workers that in relative terms is among the highest in the world (see Yang & Cai, 2003; Lin, Wang & Zhao, 2003).

Labor reallocation is a major source of Chinese growth and is a force, even in the short run, toward reducing inequality (Lin et al., 2003). Adding to the effects of restrictions on labor mobility is the disparity in the funding of education between rural and urban areas. On average, the rural labor force has four years less schooling than the urban labor force. Open labor markets, open capital markets, and geographical equity in spending on education will reduce inequality, both in the long run and the short run, as wages equalize across regions and migrants move to regions that invest more in the education of the children. However, one cannot look to migration alone to reduce inequality in wages across regions. The important recent work of Lin et al. (2003) demonstrates that migration would have to quadruple to reduce inequality. Migration must be supplemented by human capital investment.

Inequality is not to be feared. Many Chinese fear inequality as a potential source of social instability. However, greater inequality plays an important role in stimulating people to acquire skills. Making people more skilled is not socially harmful. Enhancing skills raises the productivity of the nation and makes more resources available to society at large. Greater access to schooling raises productivity and reduces a major source of inequality in society.

Human capital is the asset that ultimately determines the wealth of China. Fostering access to education will reduce inequality in the long run. Promoting human capital creates opportunities for everyone and is a major force for promoting social equality. The potential of the Chinese nation will be realized if its workers become educated and able to use modern skills to cope with the technology of the 21st century.

Current educational policy promotes inequality. Place of birth currently determines a person's chances to become skilled and the amount of capital with which they can work. Current tuition policies for secondary-school students discriminate against the children of the poor and the children of migrants. High tuition fees not matched by access to markets to borrow for education discriminate against children from poor regions and poor backgrounds. In comparing alternative policies, it is important to consider the inequality produced by educational policy across regions. Inequality in Chinese labor markets does not arise solely from competitive wage setting, although the recent rise in inequality is due to it. The fundamental sources of inequality in Chinese society arise from opportunities for migration and education. There is a role for letting market forces work to stimulate the production of skills and at the same time to reduce overall inequality, even in the short run, in China.

#### 7. Concluding remarks

The true rate of return to education in China may be as high as 30% or 40%. Our knowledge of the true return to education is currently very limited, as is our knowledge of the true rate of return to physical capital. More studies based on rigorous data are warranted. A more factually informed knowledge base will improve

government decision making. If governments evaluate projects, whether they are human capital projects, or investment projects for dams, roads, bridges, or factories, they will make better investment decisions. Project evaluations play an important role in keeping good investments and promoting good projects and eliminating the bad ones. The value of factually informed cost–benefit econometrics is very high. Cost– benefit studies produce value for local governments, for provincial governments and for the central government. Research that creates and collects much richer data sets on the returns to all kinds of human and physical capital to guide policy formation will improve policymaking.

Despite the weak data base on China, some policy recommendations seem justified. China's economic performance will be enhanced by producing an educated workforce. Economic performance will be enhanced by equalizing returns across all types of investments—physical and human—and by reducing regional inequalities in access to education and dependence of educational decisions on the income of parents. Human capital has a high rate of return. Its formation would be promoted by freeing up labor markets, eliminating regional disparities in wages and access to education, and by opening human capital markets to finance the formation of human capital.

These policies reduce economic inequality in the long run. Policies that promote migration will reduce a major source of inequality, even in the short run. Human capital would also be promoted by expanding the government budget on education and by equalizing expenditure across regions and improving mobility. However obtained, a more educated workforce based on equality of opportunity for all will produce greater payoffs to people and capital and will produce greater national wealth.

### Acknowledgements

This paper was presented in December 2003 at the Great Hall of the People in Beijing at the Renmin University Conference celebrating the 20th anniversary of their Industrial Relations Institute, at the Chinese Economics Society, Atlanta, July 2004, and at Asian Education Forum, Beijing, and Harbin Institute of Technology, August 2004. It is a substantial revision of Heckman (2003). I thank Hanna Lee for helpful research assistance. I thank Gregory Chow, Belton Fleisher, D. Gale Johnson, Xuesong Li, Xin Meng, Thomas Rawski, and Dennis Yang for their helpful comments and useful supplementary data.

	III 2001 0J										
Region Beijing	Total 319.2	Government appropriation for education		Organization and citizens running schools		Donations and fundraising for running schools		Tuition and miscellaneous fees		Other educational funds	
		216.1	67.7%	5.9	1.8%	7.6	2.4%	32.0	10.0%	60.5	19.0%
Tianjin	85.9	53.5	62.3%	2.8	3.3%	0.6	0.7%	11.3	13.2%	16.3	19.0%
Hebei	177.9	121.2	68.1%	0.7	0.4%	3.5	2.0%	34.5	19.4%	12.9	7.2%
Shanxi	97.9	68.9	70.4%	4.7	4.8%	2.9	2.9%	15.4	15.7%	7.9	8.1%
Inner Mongolia	71.9	55.9	77.7%	1.3	1.8%	0.4	0.6%	10.1	14.0%	4.9	6.8%
Liaoning	170.4	113.1	66.4%	2.6	1.5%	0.5	0.3%	29.4	17.3%	22.6	13.3%
Jilin	105.2	74.8	71.2%	7.9	7.5%	2.8	2.7%	16.9	16.0%	9.4	8.9%
Heilongjiang	142.7	100.4	70.3%	10.8	7.6%	0.6	0.4%	20.9	14.7%	18.3	12.8%
Shanghai	232.0	153.4	66.1%	19.3	8.3%	3.9	1.7%	32.8	14.1%	34.0	14.6%
Jiangsu	337.1	198.9	59.0%	1.6	0.5%	18.9	5.6%	52.4	15.5%	56.1	16.6%
Zhejiang	283.0	171.5	60.6%	4.5	1.6%	13.3	4.7%	36.0	12.7%	42.8	15.1%
Anhui	134.2	87.5	65.2%	4.0	3.0%	1.8	1.4%	28.5	21.2%	14.7	11.0%
Fujian	145.1	98.4	67.8%	8.4	5.8%	4.7	3.2%	20.5	14.1%	17.0	11.7%
Jiangxi	98.7	61.4	62.2%	4.1	4.2%	1.2	1.2%	18.7	19.0%	13.4	13.6%
Shandong	288.1	190.9	66.3%	1.7	0.6%	7.7	2.7%	51.5	17.9%	29.7	10.3%

Educational funds in 2001 by region (in 100 millions of Yuan)

Appendix A. Table 1 (continued)											
Henan	195.9	134.7	68.7%	3.6	1.8%	4.5	2.3%	33.8	17.3%	18.8	9.6%
Hubei	199.1	114.0	57.3%	20.2	10.1%	5.9	3.0%	40.0	20.1%	37.4	18.8%
Hunan	177.2	99.7	56.3%	1.6	0.9%	4.0	2.3%	45.2	25.5%	24.7	13.9%
Guangdong	421.3	256.7	60.9%	0.9	0.2%	11.5	2.7%	84.3	20.0%	48.7	11.6%
Guangxi	112.3	78.3	69.7%	1.4	1.2%	1.2	1.0%	18.3	16.3%	13.0	11.6%
Hainan	25.7	17.3	67.3%	2.7	10.4%	0.8	3.2%	4.1	15.9%	2.5	9.9%
Chongqing	86.8	54.1	62.3%	0.7	0.9%	3.4	3.9%	11.3	13.1%	16.6	19.1%
Sichuan	202.9	133.8	66.0%	1.4	0.7%	4.1	2.0%	28.6	14.1%	33.7	16.6%
Guizhou	67.3	50.7	75.3%	6.2	9.2%	0.7	1.0%	9.9	14.7%	5.3	7.9%
Yunnan	115.8	97.6	84.3%	0.4	0.4%	2.1	1.8%	8.2	7.1%	6.5	5.6%
Tibet	10.3	9.6	93.1%	0.1	0.6%	0.1	1.3%	0.3	3.2%	0.3	2.5%
Shaanxi	135.4	86.5	63.9%	0.1	0.0%	2.8	2.0%	26.9	19.9%	13.1	9.7%
Gansu	68.7	52.1	75.9%	1.4	2.0%	0.7	1.1%	10.4	15.1%	5.0	7.3%
Qinghai	16.5	14.0	85.0%	0.1	0.4%	0.1	0.6%	1.5	9.1%	0.8	4.9%
Ningxia	19.5	15.3	78.2%	0.1	0.3%	0.1	0.7%	2.2	11.1%	1.9	9.7%
Xinjiang	93.8	77.0	82.1%	1.4	1.5%	0.3	0.4%	9.8	10.4%	5.3	5.7%

Source: China Statistical Yearbook, 2003. Observe that percentages down the rows do not necessarily add to 100%. This is due to independent estimates reported in the China Statistical Yearbook.

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