

China's Investment in Human Capital*

James J. Heckman
University of Chicago

China, at all levels of government, currently spends about 2.5% of its gross domestic product (GDP) on investment in schooling.¹ At the same time, roughly 30% of its GDP is devoted to physical capital investment. In comparison, the figures for the United States are 5.4% and 17%, respectively. In South Korea, they are 3.7% and 30%, respectively. Table 1 compares China with other countries in terms of expenditure of GDP on education. China is below average even among its peers in its expenditure on investment in people. Its ratio of annual investment in physical capital to human capital is much higher than that of most countries around the world.

Perhaps this imbalance is warranted. Perhaps the economic rate of return of physical capital is much greater than the economic rate of return to human capital. Below, I summarize evidence indicating that the true rate of return to education and skill formation is very high and that the imbalance revealed in table 1 is symptomatic of a serious distortion in current policy that serves to retard economic development in China. A basic result of economics is that resources should flow to their most productive use. A policy that equalizes returns across all investment types increases economic growth. Current Chinese policy tends to ignore this fundamental rule and thereby retards the economic growth of China.

This article first presents 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. I next consider alternative policy reforms that would foster skill acquisition and enable China to harvest the benefits of investment in human capital.

I. The Benefits of Human Capital Investment

When economists began to measure the sources of economic growth, what previously had been considered an unexplained residual—an unexplained factor—became identified as human capital. Studies of the development of the U.S. economy and the sources of growth of countries throughout the

TABLE 1
PUBLIC EXPENDITURES ON EDUCATION AS PERCENTAGE OF
GROSS NATIONAL PRODUCT, 1995

Geographic Area	(%)
World	5.2
China	2.5
Philippines	3.0
Thailand	4.1
India	3.3
Malaysia	4.7
Singapore	3.0
Pakistan	2.8
Turkey	2.2
South Korea	3.7
Egypt	4.8
Mexico	4.9
Brazil	5.1
Argentina	3.8*
United States	5.4*
Japan	3.6*
Canada	6.9*
Germany	4.8
Russian Federation	3.5
Poland	5.2
Hungary	5.3

SOURCE.—United Nations Statistical Office, *Statistical Yearbook* (New York: United Nations Statistical Office, 1999).

* 1994 gross national product.

world make it evident that human capital—the skill of the population—plays a major role in the productivity of nations.²

It is analytically useful to think of human capital as a distinct and very valuable kind of capital. The term “human capital” sometimes suggests a de-personalization of the individual and is associated in the popular mind with a dehumanizing society that equates humans with machines. In fact, the very opposite is true. The human capital concept recognizes that human beings are as important as, if not more important than, physical capital in creating wealth and generating a successful economy. It is an appropriate concept for a People’s Republic. To understand how human capital affects the economy and why China should promote it, consider how human capital improves productivity.

First of all, human capital is productive because of its immediate effect on raising the skill levels of workers. So, for example, if an individual is trained to be a better accountant, the accounting performance of that individual will rise. If a worker is trained to fix an engine, the worker will be more productive in fixing engines. These are the obvious direct effects of making people more skilled.

But human capital also improves the adaptability and allocative efficiency of resources in society. It allows agents to allocate resources more effectively

across tasks. It enhances the ability of agents to adapt to change and respond to new opportunities.³

China is changing. Its labor markets and capital markets are changing. Indeed, the world economy is changing. An empirical regularity that has emerged in numerous empirical studies is that people with better educations and better skills are better adapted to change. Their ability to benefit from available opportunities and to create new opportunities of their own increases. They enhance productivity in the workplace. Greater skill also facilitates worker mobility across occupations, industries, and regions in response to new opportunities, and it helps people reallocate resources, both human and physical, toward more productive opportunities; it even helps them realize that those opportunities exist. A more educated workforce is a more flexible workforce. People with higher levels of education are better able to absorb new ideas, adapt to foreign technologies, improve local technologies, and understand and apply knowledge from outside China to local situations.

As China enters world markets, it will have access to newer forms of technology and organizational arrangements. The need for a more skilled workforce will increase. The new technology being brought into China by its investment in physical capital requires more skilled workers to operate it. Capital and skill are complementary. Each factor raises the productivity of the other. An investment strategy that emphasizes physical capital to the exclusion of human capital fails to capture the benefits that can arise from a more balanced investment strategy. It takes skilled workers to make the most efficient use of modern technologies.

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 markets and technologies. Educated farmers are better able to exploit opportunities in technology and trade. The development process is characterized by emerging technologies, emerging options, and improved choices. Better-educated people are better able to make good choices.⁴

Since so many studies from around the world demonstrate that education and skills are important determinants of economic growth, an important question for China and for many other countries is whether there is adequate investment in human capital. Is there underinvestment in education or overinvestment in education, relative to other types of investment?

In thinking about an appropriate investment strategy for China and the development of its western region, it is very important to understand 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. By equalizing returns across assets and across markets in different regions of the country, greater national wealth will be produced.

Thus a major question for China's leadership is whether there is underinvestment or overinvestment in education in China. Should the Chinese investment portfolio be readjusted?

II. Underinvestment in Human Capital?

Public support for education in most regions of China is minimal. Since schooling is funded mostly at the local level, rich provinces produce more human capital per capita than do poor provinces. The place of a person's birth is one of the most important determinants of that person's skill level. Resource constraints affect individuals' educational access accordingly in different parts of China, especially in western China. Access to education is not uniform across regions. This creates serious regional disparities and is a major source of inefficiency in current policy.⁵

A second reason indicating that there might be underinvestment in human capital is that there are benefits to education that are not directly captured by individuals. These externalities are likely to be quite large in China. For example, a better-educated workforce produces new ideas and knowledge. Individuals may not capture all of the gains produced from their education, especially if the wages of the skilled are held down by policy, as they are in China. Collectively, educated workers produce great gain. So, on the face of it, there is underinvestment in human capital in China and throughout 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. Cost-benefit analyses grounded in data foster greater understanding as to whether human capital projects or physical capital projects should be favored and in what proportions. By making judgments using cost-benefit criteria, society can use its resources most efficiently.

In the Chinese context, this is especially important, given that resources are scarce and the country as a whole is poor. Hence, it is especially important to make wise investment decisions.

Looking at the data on the rate of return to education with a mind to developing a factually informed policy produces surprising results. Estimating the rate of return to education in China, as economists ordinarily do, one finds that the rate of return to education in China in the early 1900s is about 4%.⁶ This is a low rate of return. It is far below the rate of return to physical capital in industry, which is estimated by some to be as high as 20%.⁷ Estimates suggest that this return was 7% in 1997.⁸ More recent estimates are higher yet.⁹ Taken literally, the historical estimates suggest that there might be too much investment in human capital in China. As a benchmark 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%–20%. This evidence suggests that the high ratio of physical capital investment to human capital investment in China might be appropriate.

Looking at how labor markets function in China, one realizes how misleading such a conclusion would be, especially 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 of skilled labor, and there are still many restrictions on the operation of the labor market. The only thing to be concluded from standard rate-of-return to education analysis applied to historical Chinese data is that personal incentives to invest in skills were low. Recent evidence of increases in returns to schooling supports the notions that labor markets are freeing up and that the true marginal product of labor is much higher than the 4% found in the earlier literature.

The low private rate of return 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 collected with support from the Ford Foundation in cooperation with the Chinese Academy of Social Sciences. B. Fleisher and X. Wang analyze these data.¹⁰ An analysis of these data suggests that the social return to human capital is much higher than the private return, at least for the 1990s. Instead of looking directly at market data and seeing what individuals are paid, the authors look at the productivity of education in the workplace in producing output. This is the direct return to education. It is not the full return to education.

Focusing only on the direct return, Fleisher and Wang arguably underestimate the full return to education. They do not measure all the other benefits of education and training mentioned earlier, so their estimate constitutes a lower bound on the return to education. Their econometric studies suggest that the return to education is as high as 30% or 40%.¹¹ The wages paid to skilled workers were only 10% of their marginal productivity in 1992. Unskilled workers were paid their marginal product. This 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 anything found in the United States or Western Europe. And they underestimate the true rate of return to human capital. So the available microeconomic data 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 one compares estimates of the true productivity in education with wages paid, Chinese labor markets did not pay wages commensurate with the skills involved. Estimates by J. Heckman and X. Li suggest that by the year 2000, the market signaled a high rate of return to schooling for recent entrants, comparable with the return estimated by Fleisher and Wang, thus supporting the argument to encourage more investment in human capital.¹²

III. Policies to Foster Human Capital and Promote Economic Growth

The historically low return reduced individuals' incentives for acquiring human capital. Chinese labor-market policy and educational policy caused the

national portfolio of investments to be distorted away from human capital and toward physical capital investment. High rates of social return to investment can be realized by directing funds (even those borrowed from abroad and funds created in the enterprises in China and from the new capital markets being proposed) toward investment in human capital. Such a strategy would create national wealth. Recent evidence suggests that the move to freer markets is starting to create the right incentives. Further movement is to be encouraged.

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, but China is spending far less of its GNP on education and training than many other developing countries.

Another way to foster human capital that entails less direct cost to government is to free up labor markets for human capital. This process is under way, but it is gradual and should be encouraged to proceed more rapidly. A free labor market that allows the same kind of incentives to operate as those which increasingly govern capital markets and product markets in China would go a long way toward promoting skill formation and would have a powerful effect on promoting human capital. If persons can get a 30%–40% return on human capital investments, they would willingly pay the costs of schooling. A 4% rate is not that profitable. Freeing up the labor market for skills would allow the forces of private incentives to operate without resistance. Giving individuals the fruits of their skilled labor would motivate people to acquire skills without costing the government anything. Allowing private incentives to operate in this manner would create the investment pools for human capital. Unleashing the forces of individual incentives to create human capital would create wealth for China and pools of finance for physical capital from the savings of its educated workers. China would enhance its revenue from taxation.

Another policy to promote growth is the equalization of regional rates of return to human and physical capital. Historically, Chinese policy has favored certain regions over other regions. It has also allowed local governments to play a dominant role in the financing of education. Richer regions have more funds for education than do poorer regions. Eliminating regional disparity in wages and further opening markets to allow freedom of migration and the pursuit of opportunities throughout China would enhance economic development. So would a centralized educational finance policy that serves 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, low support for education but a very high return to it. National income would be increased by allocating more resources for education and training to poorer regions.

Many Chinese officials and academics fear inequality as a consequence of freeing up labor-market incentives. Opening the labor market might increase the risk of inequality in wages in the current generation. However, this policy produces the right incentives for people to acquire skills. Given the right

reward and access to capital markets to finance education, people will gladly pay tuition for schooling, which would produce higher salaries. China could rely on personal incentives to encourage schools to perform well as students shop among them, and schools would gain resources directly from the students they educate.

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, only prospective students from wealthy families can pay tuition charges, which currently are as high as 50% of mean income.¹³ Inequality will be increased across the generations if only the rich can send their children to school.

A lesson learned from many recent studies in the United States, Europe, and other countries around the world is the value of competition among schools in improving the performance of educational institutions.¹⁴ If China allows more private organizations—such as private business schools, technological institutes, and the like—to operate, it can create an efficient educational infrastructure for promoting the formation of human capital in China. Again, this process is under way, but there is great scope for expansion of the private sector in education.

Another potentially important policy goal includes promoting ties between industry and universities. Some universities have entered into these productive arrangements, but there is much room for growth. Such partnerships allow universities to respond to practical problems and, therefore, to help local industry solve some of the problems that accompany the introduction and improvement of technology. This will improve the efficiency of the region and will provide a source of financing by private industry for the educational enterprise. Although steps are now being taken in the suggested direction, much room for improvement remains.

The United States has very successful firm-school relationships with educational institutions of all quality levels and not just those of distinguished universities with high-tech computer firms. Many community colleges have formed valuable partnerships by working closely with companies such as General Motors Corporation and BASF that need workforce training. Creating incentives and allowing individuals and organizations to trade and to bargain in human capital and physical capital markets improves the educational infrastructure at no cost to government.

Creating incentives and developing capital markets 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 the acquisition of skills by fostering the training of individual workers by firms, or by encouraging individuals to train themselves in the workplace to be better farmers, better factory workers, and better managers. If freeing up labor markets is not a possible policy option, educational expenditures could be increased and equalized across regions.

One of the best established empirical findings from around the world is that human capital is extremely valuable in working with high-technology physical capital. The two complement each other. The current unbalanced investment strategy of China emphasizes physical capital over human capital. Ironically, this policy undermines the strategy for promoting physical capital investment. There are too few skilled workers to effectively operate the new technology that is being rapidly introduced into China.

IV. Inequality

In the short run, open labor markets might lead to greater inequality in wages, especially among the young and more able. Those persons are better able to benefit from the new economy. In the long run, there will be less inequality as the population becomes more skilled.

Even in the short run, however, fostering human capital might reduce inequality. Most of the income inequality in China is reflected in the disparity between rural and urban incomes, a situation attributable to current policies of the Chinese government.¹⁵ Restrictions on labor migration from rural to urban areas produce this disparity between urban and rural workers, which, in relative terms, is among the highest in the world. These barriers have been diminished in the recent past, but regional wage equalization is far from complete. This historical factor is compounded by the current disparity of educational funding between rural and urban areas. On average, the rural labor force has 4 years less schooling than the urban labor force. Finally, investment in physical capital has been disproportionately directed toward urban areas at the expense of investment in rural areas. Open labor markets, open capital markets, and geographical equity in spending on education will likely reduce inequality rather than promote it.

Even if these policies raise inequality in the short run, inequality is not to be feared. Many Chinese officials fear inequality as a potential source of instability; however, greater inequality plays an important role in stimulating people to acquire skills. Inducing people to gain skills is not socially harmful. Enhancing skills raises the productivity of the nation and makes more resources available to society at large.

It is now accepted in China that open physical capital markets favor the better trader and the better investor. Human capital markets operate in the same way, but human capital is the asset that ultimately will determine the wealth of China. Fostering human capital would likely reduce inequality in the long run, and freeing up human capital markets would create opportunities for everyone. The potential of the Chinese nation will be realized if its workers become educated and better able to use modern skills to cope with the technology of the twenty-first century.

Current policy promotes a different kind of inequality because region of birth adversely affects a person's chances of becoming skilled and the amount of capital with which they can work. Current tuition policies for secondary students discriminate against the children of the poor. In comparing policies,

it is important to consider which inequality is less acceptable rather than to assume that inequality is only associated with free labor markets. Indeed, much evidence points out that opening up labor markets and capital markets would reduce inequality, even in the short run, and would contribute to overall political stability.

V. Concluding Remarks

The true rate of return to education in China might be as high as 30% or 40%. Our current knowledge of the true return to education is 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, investment projects for dams, or investment projects for roads, bridges, or factories—they will make better investment decisions. Project evaluations play an important role in keeping good investments, promoting good projects, and eliminating bad projects. The value of factually informed cost-benefit econometrics is extraordinarily high. Cost-benefit studies produce value for local governments, provincial governments, and the central government. Research that creates and collects much richer data on the returns to all kinds of human and physical capital will guide policy formation and improve policy making.

Despite the weak database in China, the indications are clear. Economic performance will be enhanced by producing more human capital and by creating a more educated workforce. Economic performance will be enhanced by equalizing returns across all types of investments, both physical and human. Policies that foster human capital are entirely in keeping with the Chinese philosophy of government that emphasizes the dignity of the human being and the value of the individual in promoting it. Human capital has a high rate of return, as the recent evidence from a more open labor market indicates. It is promoted by freeing up labor markets, eliminating regional disparities in wages and access to education, and opening human capital markets to finance the formation of human capital. It would also be promoted by increasing government spending on education and by equalizing expenditure across regions. However obtained, a more educated workforce would produce greater payoffs to capital and will produce greater national wealth.

Notes

* This work was supported by the American Bar Foundation. I thank Gregory Chow, D. Gale Johnson, Xuesong Li, and two anonymous referees for their comments.

1. See United Nations Statistical Office, *Statistical Yearbook* (New York: United Nations Statistical Office, 1999).

2. Theodore W. Schultz, *Investing in People* (Berkeley: University of California Press, 1981).

3. Theodore W. Schultz, "The Value of the Ability to Deal with Disequilibria," *Journal of Economic Literature* 13 (September 1975): 827–46.

4. Dennis Yang, "Education and Allocative Efficiency: Household Income Growth

during Rural Reforms in China,” Duke Economics Working Paper no. 00-17 (Duke University, Department of Economics, 2000).

5. Wensheng Li, “Financing of Higher Education in China,” Working Paper no. W0020 (Peking University, Department of Economics, 2003), available at <http://iee.hedu.pku.edu.cn/jjllw/jjllw0020/jjllw0020.asp>.

6. Gregory Chow, *China’s Economic Transformation* (Malden, Mass.: Blackwell, 2002).

7. Gregory Chow, “Capital Formation and Economic Growth in China,” *Quarterly Journal of Economics* 108 (August 1993): 809–42.

8. See International Centre for the Advancement of Science and Technology, *China Statistical Yearbook* (Beijing: International Centre for the Advancement of Science and Technology, 1997–98).

9. James J. Heckman and Xuesong Li, “Selection Bias, Comparative Advantage, and Heterogeneous Returns to Education: Evidence from China in 2000,” *Pacific Economic Review* (2003), in press.

10. Belton Fleisher and Xiaojun Wang, “Skill Differentials, Return to Schooling and Market Segmentation in a Transition Economy: The Case of Mainland China,” working paper (Ohio State University, Department of Economics, Columbus, Ohio, 2001).

11. *Ibid.*

12. Heckman and Li; Fleisher and Wang.

13. Li.

14. James Heckman, “Policies to Foster Human Capital” (with discussion), *Research in Economics* 54 (March 2000): 3–82.

15. D. Gale Johnson, “Reducing the Urban-Rural Income Disparity in China,” Working Paper no. 00-07 (University of Chicago, Office of Agricultural Economics Research, 2000); Cai Fang, Denon Wang, and Yang Du, “Regional Disparity and Economic Growth in China: The Impact of Labor Market Distortions,” *China Economic Review* 13 (Spring 2002): 197–212.