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Higher Education and Economic Development: India, China, and the 21st Century

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ABSTRACT

In this paper, I assess predictions about economic development in four potentially leading economies, Brazil, Russia, India, and China, (known as the BRIC countries), focusing mainly on India and China, in terms of one key element in the growth process—human capital, especially higher-end human capital. I will argue that in the new information economy, university educated labor is crucial to economic development. Although all of these economies have other strengths (cheap labor, large internal markets, high levels of industrialization, and, in the case of Russia, enormous reserves of natural resources), much of their possibilities for sustained growth in the medium and longer run depend on whether they can develop and utilize high level human capital for the organization and innovation required in today’s (and tomorrow’s) global information economy. This does not mean that the quality of education at lower levels of schooling is not also important. At least two of the countries, Brazil and India, still have serious problems with educational quality (and, in India, even quantity) at lower levels of schooling. However, since one of the main features of the new global knowledge economy is the increasingly important role of the quantity and quality of higher educated labor, we focus on these four countries’ university systems and where they are headed.

Economists have focused mainly on the quantitative aspects of higher education—the number of graduates in the labor force—in assessing whether an economy is allocating resources for maximum growth. In these terms, Russia is in a favorable position, with a large stock of highly educated people available for its current and future labor force. China is expanding its higher education system the most rapidly, and India, the least rapidly. Although many analysts believe that India has sufficient absolute numbers of engineers and scientists and has advantages over China in moving towards an information-based advanced service economy, Tilak (2005) and others have pointed out that, proportionately, India (and we might add, Brazil) has very few highly educated technical and service personnel. The paper explores the potentially serious problems in all four countries concerning the quality of university education for all but the small percentage of university graduates who attended elite institutions, specializing in programs that might be considered world class. Although numbers of graduates are important, the issue of critical thinking and innovativeness, which would be fostered by college teachers who know how to develop and nurture such skills in students, and higher education institutions that provide incentives for such teaching, may be even more important in the future.

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“Over the next 50 years, Brazil, Russia, India and China—the BRIC economies—could become a much larger force in the world economy. Using the latest demographic projections and a model of capital accumulation and productivity growth, we map out GDP growth, income per capita and currency movements in the BRICs economies until 2050. The results are startling. If things go right, in less than 40 years, the BRIC economies together could be larger than the G6 in US dollar terms. By 2025 they could account for over half the size of the G6. Currently they are worth less than 15%. Of the current G6, only the US and Japan may be among the six largest economies in US dollar terms in 2050.” (Dominic Wilson and Roopa Purushothaman, “Dreaming with BRICs: The Path to 2050,” Goldman Sachs, Global Economics, Paper No. 99, October 1, 2003).

In the 1960s and 1970s, development economists often compared the future development possibilities for India and China, the world’s most populous economies, and for Brazil, the largest Latin American economy. Under the Communist regime, China had invested heavily in the health and education of its masses, had forcibly limited population growth, and, following the Soviet model, based their economic development on heavy industry protected from international competition. The Soviet model influenced India as well, and India, too, based its economic growth strategy on the development of heavy industry behind high tariff walls. Brazil followed a similar strategy of import substitution industrialization.

In those days, Brazil’s economy was booming. Development prospects looked good, although a repressive military regime suggested political problems. India was undergoing the Green Revolution but was saddled with a highly protected, inefficient industrial economy and a high proportion of low productivity subsistence agriculture. Russia and China had made great strides in eliminating famines and in building infrastructure, but seemed to be more concerned with ideological purity and military superiority than economic growth.

The world has changed radically since 1980, and with it, the BRIC societies. Although India and China were hardly touched by the debt crisis of the early 1980s, they responded to globalization by opening up their economies independent of any IMF pressure. Brazil and the rest of Latin America, lowered tariffs and attempted to compete in the world economy under a cloud of heavy debt repayments and stringent conditions imposed by international financial institutions. The fourth BRIC economy, Russia, went through a startling political and economic transformation after 1989, suffering through a huge economic downturn, and a subsequent shift of wealth to a relatively small number of private individuals mainly connected to former state enterprises and to the exploitation of natural resources.
Given these changes in the world economy and the new involvement of the BRICs in it, what are the prospects for these societies? Are the Goldman Sachs analysts quoted above correct in predicting enormous growth in the BRICs over the next 45 years (Figure 1)?

In this paper, I assess predictions about BRIC countries’ economic development, focusing mainly on India and China, in terms of one key element in the growth process—human capital, especially higher-end human capital. I will argue that in the new information economy, university educated labor is crucial to economic development. Although all of these economies have other strengths (cheap labor, large internal markets, high levels of industrialization, and, in the case of Russia, enormous reserves of natural resources), much of their possibilities for sustained growth in the medium and longer run depend on whether they can develop and utilize high level human capital for the organization and innovation required in today’s (and tomorrow’s) global information economy. This does not mean that the quality of education at lower levels of schooling is not also important. At least two of the countries, Brazil and India, still have serious problems with educational quality (and, in India, even quantity) at lower levels of schooling. However, since one of the main features of the new global knowledge economy is the increasingly important role of the quantity and quality of higher educated labor, we focus on these four countries’ university systems and where they are headed.¹

It is particularly useful to assess economic development prospects comparatively. The four societies we are discussing are very different, even though they share a common characteristic of large geographic size and large populations. The variation allows us to discuss a number of different factors that might contribute positively or negatively to future economic development, so allows us to understand better what is important in the economic development process.

I begin the paper with a discussion of why these societies’ higher education policies are so important for their future. The second section compares the educational investment patterns in the four countries over the past thirty years and their current higher educational policy. The third section focuses on the main problems facing the higher education systems in each country and their implications for future economic development.

I. Education and Economic Growth

Individuals are interested in taking more schooling partly because they can earn more and get better jobs, on average, with more schooling. For many, more schooling can be a source of social mobility. Similarly, nation-states and regions are interested in

¹ For earlier attempts to draw attention to the increasing importance of higher education in the new information economy, see Castells, 1991. More recently, the World Bank did an about-face, officially recognizing the importance with the publication of Higher Education in Developing Countries: Perils and Promise (World Bank, 2000).
raising the average level of schooling in their population because they think that doing so will improve productivity, increase economic growth, raise the quality of jobs in the economy, and reduce poverty and inequality.

Some of the earliest work in the economics of education argued that a major effect of more education is to improve labor’s capacity to produce. Because more highly educated workers are more literate and numerate, they should be easier to train to do more complex tasks. Further, they should have better work habits, particularly a greater awareness of time and more internalized norms that would make them more dependable.

Nations with more educated labor forces are characterized by higher output per worker, but typically these nations also have more physical capital per worker. Exactly how education increases productivity, how important it is, and it what ways it is important are difficult questions which economists have been unable to answer definitively. Controversy also surrounds the kind of education that contributes most to growth—general schooling, technical formal training, or on-the-job training—or what level of education contributes most to growth—primary, secondary, or higher education, although I will argue that the case for higher education as a key factor in economic growth has grown stronger in recent years.

One of the clues that education does contribute to growth and how much it may contribute is that countries with higher levels of economic growth have labor forces with higher levels of formal schooling. Such a macroeconomic approach to the relation between education and economic growth emphasizes the correlation between the stock of human capital and the increase in economic output per capita. This may just indicate that as individuals earn more income, they purchase more schooling for their children, just as they would buy a refrigerator or a family automobile. In that case schooling would be primarily a consumption good, not an investment good like a machine or a computer system. However, economists have been able to show that, on average, countries that have sustained high levels of economic growth are also those who have higher levels of literacy and have invested steadily in raising the education of their labor force.

With the shift to an information economy, globalization, and flexible organizations of production, economists have taken these arguments about human capital in the production process a step farther. Theories of development now argue that developing nations have a better chance of catching up with the more advanced economies when they have a stock of labor who have the skills to develop new technologies themselves or to adopt and use foreign technology.

The claim that educated workers adjust more effectively to rapid change in opportunities and technology implies that in today’s more rapidly changing and more competitive markets, the payoff to education should rise. The growth of science-based industries—chemicals, biotechnology, telecommunications, information systems—also means that economic development depends increasingly on highly educated and scientifically trained labor. Yet, more than simply increasing the demand for scientifically trained labor, economists argue that the new types of production reward
innovation and learning-by-doing on a broader scale, even among non-scientifically-oriented workers.

In this kind of model, more education in the labor force increases output in two ways: (a) education adds skills to labor, increasing the capacity of labor to produce more output; and (b) education increases the worker’s capacity to innovate (learn new ways of using existing technology and creating new technology) in ways that increase his or her own productivity and the productivity of other workers.

The first of these emphasizes the human capital aspect of education (education improves the quality of labor as a factor of production and permits technological development); the second places human capital at the core of the economic process and assumes that the externalities generated by human capital are the source of self-sustaining economic growth process—human capital not only produces higher productivity for more educated workers but for most other labor as well.

This second model sees innovation and learning-by-doing as endogenous to the production process itself. It assumes that productivity increases are a self-generating process inside firms and economies (Lucas, 1988; Romer, 1990). Such learning-by-doing and innovation as part of the work process are facilitated in firms and societies that foster greater participation and decision-making by workers, since those are the firms and societies in which more educated workers will have the greatest opportunities to express their creative capacity.

The model of endogenous innovation and learning-by-doing has major implications for the economic value of education. The value of higher educated labor, particular highly skilled scientific and management labor—those who are able to create the most valuable innovations—increases relative to other levels and kinds of educated labor. More important, the economic value of education is generated by a much more complex set of relations between the potential of human capacity to produce more economic output and its realization through organizations of work that are both geared to realize that capacity and to innovate using their human capacity. Thus, the value of education is not just a function of the jobs that workers with more education can get in the labor market. Instead, information, ideology, political power, property rights, citizenship rights in the workplace, and the willingness of organizations to innovate all condition the economic value of education.

The fact that individuals with more education have higher earnings is another indication that education contributes to growth. The education-higher earnings connection reflects a microeconomic approach to the relation between education and economic growth. Greater earnings for the more educated in this approach represent higher productivity—hence, an increase in educated labor in the economy is associated with increased economic output and higher growth rates. Higher earnings for the more educated may just represent a political reward that elites give their members—a payoff for being part of the dominant social class. However, it would be difficult to sustain an economic system over the long term if those who actually produced more were not
rewarded for their higher productivity, and those who simply had political power got all the rewards. One of the reasons that state socialist systems in Eastern Europe were unable to sustain economic growth was almost certainly in part due to an unwillingness to reward individuals economically on the basis of their productivity and, instead, to reward the politically powerful with economic privilege. Similarly, China has found that sustained economic growth requires market incentives, including wages that more closely reflect labor productivity differences.

The positive economic payoff to individuals with more education in the form of higher earnings suggests that their economic value to the society is higher than those who have lower education. Economists estimate the payoff to more education relative to the cost of that education just like they would estimate the payoff to any investment. They calculate what the amount invested in education yields in higher earnings over the lifetime of those with more education. This rate of return to the investment in education is generally positive in almost every country. In Europe, rates of return to education are about 7-8 percent, but in many developing countries, they can be much higher. In Brazil, for example, the overall rate of return to the investment in education is more than 12-14 percent. A positive rate of return to education suggests that investing in education contributes to economic growth. The higher the rate of return, the more likely that investment in education contributes to growth. And those levels of education associated with higher rates of return should be the levels in which additional investment produces the greater contribution to economic growth.

*Macroeconomic Approaches to the Education-Economic Growth Relation*

The first macroeconomic analyses of growth appeared at the end of the 1980s, within a convergence model framework. Traditional convergence analysis did not do a very good job of explaining wealth disparities between countries, so economists were interested in the initial conditions that could determine the long-term level towards which economies converge. At the same time, they wanted to explain why the variations in wealth were maintained when countries did not have similar initial economic conditions. The level of education of the labor force appeared to be one aspect of this conditional convergence.

Barro (1990) was the first to show that for a given level of wealth, the economic growth rate was positively related to the initial human capital level of a country, whereas for a given level of human capital, the growth rate was negatively related to the initial level of GDP per capita. Macroeconomic convergence, therefore, appears to be strongly conditioned by the initial level of education.

Azariadis and Drazen (1990) followed Barro’s analysis by assuming that economic development is not a linear process, but goes through successive stages, in which the stock of physical and human capital enable a country to reach a given growth level. Their results showed that initial literacy rate plays a different role in predicting growth rates at different levels of development. Literacy is correlated with the variations of growth in the least advanced countries, but it does not seem to be related to most developed countries’ growth.
Mankiw, Romer and Weil (1992), put a new spin on the analysis of education and growth by using Solow’s aggregated production function with physical and human capital. The specific assumption of this study is that countries are taken to be close to their stationary state, as determined by their level of saving, their demographic growth and their investment in human capital. These different stationary states seem to explain the maintenance of development disparities.

Using the same model as Barro (1990), Barro and Lee (1994) argue that the countries where the labor force had one year of secondary level or more experienced a higher annual growth rate (around 1.34 points more). The coefficient is robust even with the introduction of additional variables (black market, political instability, and openness of the economy).

These different studies show that the variations of growth rates among countries can be explained partly by the initial level of human capital. But does a higher level of investment in education affect the growth path?

Besides their findings on the relation between a higher stock of human capital, Barro and Lee (1994) show that the increase in the number of workers who had attended secondary school in 1965-85, had a positive effect on growth. But estimates by others do not confirm this result. Using an aggregated production function, Benhabib and Spiegel (1994) and Pritchett (1996) also measure the impact of human capital investment on the economic growth rate. They use various measurements of human capital, including the number of years of education as calculated by Kyriacou (1991,) or as in Barro and Lee (1994), the literacy rate and the secondary enrolment rate. Whatever the education variable chosen, the associated coefficients appear either to be insignificant, or to have a negative sign.

In short, the initial level of education (especially if it is relatively high) may be a strong correlate of later economic development (the countries which had a higher level of education in 1960 experienced stronger growth rates). However, it is much more uncertain that investment in education is followed by an increase in the economic growth rate.

In the 1990s, new econometric tools integrated a temporal dimension into cross-country estimates. These allowed for better control of omitted variables and helped modify estimates of the role of education in growth. These panel analyses start with the results obtained by Mankiw, Romer and Weil (1992) (MRW) and show how the integration of a temporal dimension modifies the results. Knight, Loayza and Villanueva (1993) came to the following conclusion: the level of democratization (massification) of access to secondary school is positively related to economic growth but the increase in enrolment rates during the same period is negatively related to the increase of GDP. Between 1960 and 1985, access to secondary education was strongly democratized in

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many developing countries, without any impact on their level of wealth. However the impact is not homogeneous and the investment in human capital seems to be more efficient in open economies and where public infrastructures are relatively well developed.

Islam (1995) also tested the MRW’s model with a temporal dimension. He showed that the coefficient associated with education was negative, and this occurred whatever the sample of countries considered. Berthélemy, Dessus and Varoudakis (1997) confirm this result: whenever human capital is put in the model as either stock or flow data, its impact on economic growth is negative.

Although most of the panel data analyses show that the investment in education does not have a positive effect on growth, Judson (1995) finds a positive relation, even when she estimates her model with various panel data. McMahon (1998) also obtains significant positive links between expenditure on education, enrolment rates, and economic growth when he estimates the model on a sample of Asian countries that are known to have a strong relation between education and growth (Lau, Jamison and Louat (1991)).

Despite these somewhat conflicting results, it appears that the contribution of higher levels of education to growth is consistently positive. For example, in addition to the studies cited above, in her review of a number of econometric models that test the impact of average education levels in the population on economic growth for a sample of developing countries in the Middle East and Asia, Boutrolle (2003) finds that only the number of graduates of tertiary education seems to have a positive and significant relation to growth.

She also finds that the effect of different levels of education varies according to the economy’s level of development. Increases in the number of primary school graduates are only correlated with the growth of GDP in the least developed countries. This result confirms many analyses which show how the acquisition of literacy, numeracy, and other, higher level basic skills can have a positive effect on productivity in the agricultural sector, and on the reduction of mortality and fertility rates. The generalization of primary education seems to be an important condition for transition from the agricultural to the industrial economy.

At a more advanced stage of development, characterized by a decline in the agricultural population, migration from rural to urban areas, and rapid industrialization, it appears that the proportion of secondary school graduates in the labor force is the main human capital indicator correlated with economic growth (Avakov, 1987; McMahon, 1998). For example, South Korea’s government has always adjusted the number of secondary level graduates with the needs of the industrial sector. In the same way, in Indonesia, the industrial policy developed by Suharto was connected to increasing the number of vocational secondary graduates. Similarly, Chile’s economic development policy in the 1980s and 1990s included a rapid expansion of secondary education, with particular emphasis on vocational secondary.
An increased fraction of tertiary level graduates in the labor force seems to have a different relationship to growth at different stages of economic development. At low levels of development, those economies with a relatively high fraction of university-trained people in the population or labor force appear to have lower economic growth. According to Pritchett (1996), the absence of a positive relation between the higher education graduates and economic growth is explained as a rent-seeking phenomenon, where educated people look for jobs that are not directly productive. But when the economy enters its second, industrialization stage of development, these graduates take part in the productive dynamics of the country.

The positive role of very educated workers on GDP is greatest in the developed countries. Indeed, according to models developed by Sorensen (1999) and Funke and Strulik (2000), when a country reaches an advanced development level, the role of human capital on economic growth moves from a direct impact on labor productivity to an indirect impact through increasing the capacity of the labor force as a whole to manage innovation and technical progress.

A number of studies in India and China support the notion that education plays a key role in economic development, but these studies are mostly based on production function estimates of education’s contribution to economic productivity rather than growth models. Even so, studies in the early 1970s suggested that the contribution of education to economic growth increased from 5 percent of the growth rate in the 1950s to 10 percent in the 1960s, and that later studies found these estimates much too low, raising them to 27-30 percent (Tilak, 2005, p. 37).

Similarly, research on China “report[s] evidence of a significant, positive relationship between higher levels of education and GDP and GDP growth using aggregate data at the national and provincial level” (Fleischer, 2002, p. 6). Estimates by Démurger (2001) and Chen and Feng (2000) both show that the stock of higher educated population has had a statistically significant, positive, and robust relation to economic growth across provinces in the 1980s and 1990s. Wang and Yao (2002) show that in 1978-99 investment in human capital contributed somewhat more than 10 percent to overall per capita growth (Fleisher, 2002, p. 7).

To summarize, education appears to contribute to long-term growth. Countries with higher stocks of education in the past seemed to have had higher rates of economic growth twenty and thirty years later. At the same time, the research suggests that higher levels of education in the labor force were most likely to contribute to growth, especially as economies reached higher levels of development.

Microeconomic Approaches to the Education-Economic Growth Relation

Microeconomic research on the relation between earnings and education provides a second lens through which to view the education-growth issue. We would expect that the higher the rate of return to a level of education, the more likely the investment in that level would contribute to economic growth. For many years, the World Bank
promulgated the view that the highest rates of return were to primary education and the lowest to university (and that this pattern was invariant over time), so nations should focus their investment on expanding and improving elementary schooling to maximize economic growth (Psacharopoulos, 1973, 1993). If that were the case, investing public funds in higher education would be a low yield strategy.

But this is not the case. Although rates of return to education vary among countries, a dominant tendency worldwide in the past thirty years is for rates of return to investment in lower levels of schooling to fall, and for rates of return to investment in higher levels of schooling to rise (Carnoy, 1972; Carnoy, 1995). By the 1990s, in many developing countries and most developed countries, rates of return to higher education were greater than to secondary and to primary. Table 1 shows some examples of changing rates of return in developing countries. The private rates represent the return to individuals investing in various levels of education (however, they are generally not corrected for the increased income taxes that individuals pay when they earn higher incomes); the social rates represent the private returns but include both private and public costs—the latter are not borne by private individuals. The general tendency has been for rates of return to investment in higher education to rise relative to rates of return to lower levels of schooling. Rates in the Middle East tend to be the lowest, and rates in East Asia and Latin America tend to be higher.

In addition, as we shall discuss later, social rates of return should include estimates of externalities associated with investment in individuals, externalities that result in benefits to the population as a whole not captured by higher wages accruing to individuals receiving the education. For example, Bloom, Canning, and Chan argue that investing in higher education can enhance economic development through technological catch-up. “In a knowledge economy,” they argue, “tertiary education can help economies gain ground on more technologically advanced societies, as graduates are likely to be more aware of and better able to use new technologies” (Bloom, Canning, and Chan, 2006, p. iii)

The payoff to higher education in Brazil in the 1980s conformed to this pattern. Given the increased openness of Brazil’s economy and increased emphasis on high value exports since the late 1980s, there is no reason to believe that the rates to higher education have declined since.

Rates of return to education have also been estimated for China and India. These vary considerably from study to study. Hossain’s estimates for the World Bank show lower rates of return to higher education than to primary. The 1993 private rates are estimated as 18 percent to primary school, 13 percent to secondary, and 15 percent to higher education. The social rates are 14, 13, and 11, respectively (Hossain, 1997). A second estimate of private rates of return, by Li, is based on urban hourly wages across China using data from the China Household Income Project in 1995. It shows that the private rates of return to investing in secondary plus college education increased from 5.8 percent for the cohort who got their first job before 1980, to 9.2 percent to those who got
their first job in 1980-87, and 9.5 percent for the cohort with a first job in 1988-95 (Li, 2001, summarized in Fleisicher, 2002, Table 3).\(^3\) Li also reports that the rate of return to investment in secondary education plus college degree in Gansu province is much higher (9.9 percent) than in Guangdong (3.6 percent). The proportion of the age cohort in Guangdong taking secondary and higher education in the 1990s was much higher than in Gansu, but, as Fleisicher points out, Guangdong was a “hotbed of economic development” in the 1990s, so these results are quite surprising (Fleisicher, 2002, p.11). Yet, in a more recent paper, Yang (2006) finds similar results: estimated Mincer rates of return for urban workers increased between the household surveys of 1988 and 1995, from 4 to 7 percent per year of schooling, and the rate of return per year of schooling in a particular city in each of those years were negatively correlated with the log wage in the city (Yang, 2006, Figure 2). So the payoff to schooling was higher, on average, in lower wage cities.

The problem with estimating the payoff to education in China using earnings or wages as a measure of the benefits of education—at least in the past—was that although wages or monthly earnings may have represented fairly what an individual can realize as a return to his or her investment in education, they probably under estimated the productivity increases associated with higher levels of education. According to work by Fleischer and Chen (1997) that estimates the contribution to total factor productivity of the annual flow of new university graduates into the population and other variables, the mean estimated rate of return to higher education in the coastal provinces is 34 percent, and in the non-coastal provinces, 40 percent. From these results, Fleischer (2002) concludes that “[P]rovinces with higher proportions of college graduates (and higher GDP per capita) tend to have lower marginal returns (although still high in the absolute sense) than lower-income provinces with lower proportions of college graduates in their populations” (p. 6). The question is whether these rates derived from total factor productivity are “truer” estimates of the payoff to higher education than those based on income estimates. In China in the 1990s, given that most workers were still employed by the State, this may have well been the case.

Table 2 shows estimated private rates of return to education in India since the 1960s. These are much higher than in China. As in most countries, payoffs to higher education in India appear to be rising over time relative to the payoffs to lower levels of schooling, although the overall rates to college do not appear to be as high as to lower secondary school. A recent study by Asaoka (2006) suggests that private rates of return to university completion for men in urban areas in 16 states in 1993 were \textit{positively} and significantly correlated with the state’s GDP per capita. Thus, rates of return to university completion are higher in states that are more developed, the opposite relationship from what Fleisher and Yang found in China in the 1990s. Asaoka also finds that in 1993, Mincer rates of return were higher than secondary, middle and primary school rates in all but a few Indian states (Asaoka, 2006, Table 39).

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\(^3\) Li made his estimates by taking the tenth root of the ratio of wages of college graduates to primary graduates.
Tilak (2003) has recently re-estimated private (Mincer) rates of return to various levels of education in India as a whole in 1983, 1993, and 1999, for both regular wage workers and casual wage workers. These show rates falling over time to primary, middle, and secondary school, and rising to investment in university. The rate is consistently higher to university in each of the three years (Tilak, 2003, Table 3). Tilak estimates the private rate to higher education as 10 percent per year in 1999.

Although we were unable to find any rates of return estimates to investment in education in Russia, data show that income inequality increased sharply between 1987-89 and 1997-99 from a Gini of 0.25 to 0.43, one of the largest jumps in the transition economies (Rimashevskaia and Kislitsyna, 2004, Figure 1). This suggests that workers with higher education, who tend to have more access to high-income jobs have seen their income rise relative to those with lower levels of schooling.

Thus, the transition to the market economy in Russia has apparently created a major shift in the wages paid to workers with different capacities to take advantage of the new labor market conditions. Similar shifts have taken place in China, and with those shifts, rapidly increasingly inequality of income distribution, with the Gini coefficient increasing from 0.32 in 1985-89 to 0.40 in 1996-2000 (World Bank Indicators). If this trend continues, we should expect to rising rates of return to higher education. On the other hand, the income distributions in India and Brazil appear to have been fairly stable over the past twenty years, Brazil at a very high level of inequality (Gini equal to 0.60), and India at a relatively lower level of inequality (Gini equal to about 0.33 based on household expenditure data and about 0.43 based on household income data). Thus, rising rates of return to higher education in those countries appears to be driven by increasing relative demand for higher educated labor relative to the supply.

How Is Higher Education Changing in the BRIC Economies?

The data we have just reviewed on the potential contribution of higher education to economic growth would suggest that higher education should be expanding, that individuals should be increasingly willing to invest in higher education, and that governments should be increasingly willing to support the higher education sector to insure that university faculties whose graduates are likely to create social externalities would have adequate resources to train students into those fields. Is this the case?

If we observed higher education in these four countries in the 1990s, we would find that three of them—Brazil, China, and India—had low rates of enrollment as a proportion of the age cohort, and Russia had very high rates of enrollment. In 1990, only about 12 percent of the age cohort in Brazil attended higher education institutions, and in India, the proportion was less than 10 percent. China was an extreme case, with only 3-4 percent enrolled in higher education institutions, a legacy of Mao’s antipathy to Chinese intellectuals, as manifested in the Cultural Revolution and reinforced in the post-Maoist leadership by the events at Tiananmen Square. At the other end of the spectrum, Russia inherited the massive investment in post-secondary education by the Soviet leadership, which had more than 40 percent of the age cohort enrolled in higher education in 1989.
The Expansion of Enrollment

In order to expand higher education enrollment significantly, countries first have had to invest in secondary education. A major difference between India and Brazil, on the one hand, and the Soviet Union and China, on the other, was the two communist societies’ early investment in mass education. At the time of their revolutions, they inherited large and illiterate peasant populations. Yet, within a generation, a high fraction of the peasantry in each country—particularly the younger peasantry—had attained literacy and/or primary schooling. By the 1980s, more than 80 percent of Russian youth and 40 percent of Chinese youth were in secondary school. Brazil and India lagged behind—Brazil despite a much higher income per capita. In the 1990s, Brazil greatly expanded access to secondary schooling as part of its push for increased equity, yet as Table 3 shows in 2003, India has a gross enrollment rate of only about 50 percent (only 40 percent for girls).

In the past fifteen years, higher education has expanded in the BRIC economies, especially in China. Brazilian higher education now includes about 20 percent of the age cohort, up from 11 percent in the mid 1980s. The number of students in Russian higher education institutions fell between 1989 to 1993-94 from about 3 million to 2.6 million, then rose rapidly to 4.7 million by the year 2000 (Drougov, 2001, Figure 1). Since the size of the age cohort did not change significantly in that period, this represents a very large increase in gross enrollment. China’s gross enrollment ratio has jumped even more, from 4 to 16 percent in about eight years. India has made more modest gains in gross enrollment. It only increased from about 8 percent in 1990 to 12 percent in 2003, even though this represents 4.2 million more students attending higher education institutions (Kapur and Mehta, 2004).4

Given our discussion of the relation between the stock of higher educated labor and economic growth, it is interesting that China, with very small stocks of high level human capital, were able to manage very rapid growth rates throughout the 1990s. Brazil also has had rapid economic growth in the 1970s, the late 1980s, and in the 1990s, with relatively low stocks of higher educated labor. Russia, on the other had, with its highly educated labor force, was unable to sustain economic growth in the 1970s and 1980s, and today, Russia’s economic growth is almost totally explained by the fact that it is hugely rich in natural resources at a time in history when commodity prices are soaring, and unlike many resource rich states, it has enormous human resources developed over many years of investing heavily in education.

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4 According to Kapur and Mehta (2004), the proportion of the age cohort in India’s higher education institutions in 2002-2003 was only 7 percent. Tiluk (2005) also place the proportion of the age cohort in higher education at about 8 percent in 2003. The World Bank data shown in Table 3 are therefore probably overestimated.
As Belton Fleischer has suggested (Fleischer, 2002), the lesson to be learned from China’s experience is not that economic growth is independent of high level human capital, but rather that China could have probably achieved even higher economic growth with a better educated labor force, and that now that China is expanding higher education, it should actually experience higher growth than in the past. Similarly, Brazil has long underinvested in higher educated human capital, and so has India. Both macro and microeconomic approaches suggest that expanding Brazilian higher education should contribute positively to economic growth. In India’s case, however, it is unclear whether low investment in higher education had a negative impact on economic growth, because until the past 10 years, there were relatively few opportunities for employment of higher educated Indians in high productivity sectors—most waited for jobs as government bureaucrats.

In any case, the proportion of Indians in tertiary education is now by far the lowest among the BRIC economies. Despite the huge numbers (9 million students) and the very large absolute number of scientists and engineers being trained every year, as Tilak (2005) points out:

India has a huge stock of science and technology manpower, consisting of scientists and engineers. But the myth of the third largest stock of scientific and technical manpower in the world stands exploded if one carefully examines the quality of the manpower and their utilization. The stock is not so huge to match the requirements of the economy. Any standardised international comparisons of the stock of science and technology manpower would not make any tall claims tenable. For example, for every one million people, there were only about 130 scientists/engineers in India in 1990s, while in many other countries the corresponding figure is 10-30 times higher… The share of the scientific and technical manpower in the volume of the educated unemployed is high (Tilak, 2005, p. 28).

The Changing Financing of Higher Education

All four of the BRIC economies at one time financed higher education almost totally with public funds, either from the central government or from state governments. In other words, almost every student who was accepted at a higher education institution was, other than his or her earnings foregone and direct private expenses, fully subsidized by the State to attend post-secondary education. In many cases, the student also received a stipend to offset part of his or her earnings foregone.

In that financing model, higher education was defined as a pure public good, implicitly yielding high externalities (for a summary of this argument, see Bloom and Sevilla, 2004). In addition, it was argued that, like in primary and secondary education, charging fees to cover the costs of (much more expensive) higher education would produce underinvestment due to imperfect capital markets. These arguments aside, since higher education was generally accessible only to middle class families already able to invest time and money to provide their children with high quality primary and secondary
education, free higher education was a measure to assuage a relatively powerful and vocal political group, the professional class/government bureaucracy that wanted to assure the social mobility of their children. Eventually, everybody (meaning lower income urban and even rural classes) bought into the model, on the assumption that ultimately their children would also benefit from this “free” good.

Today, however, all four countries have, in one way or another, either implemented cost share financing (tuition fees) in public universities, or allowed higher education to become “privatized.” The way each country has made this shift or allowed it to happen has important implications for the efficiency (providing the right incentives to students in terms of their course of study, for example) and equity aspects of the higher education system.

Chinese higher education has been transformed since 1997. To accomplish this transformation, China shifted to cost sharing. Wenli Li, a researcher at Beijing University’s Economics of Education Institute shows that the financing of higher education in China changed drastically since 1990, from a system that was paid for mainly by direct government contributions (83 percent of funding) and the revenues from industries affiliated with universities (about 10 percent of total funding) to a system in which almost 30 percent of funding in 2002 came from tuition and only 50 percent of funding from direct government contributions (Figure 1). 5

The Economics of Education Institute surveyed about 15 thousand students in 18 higher education institutions (10 national and 8 local) mostly in eastern China shows that tuition and other “necessary” private expenditures vary little across different social class students. The students from the lowest quintile families spent about 8600 yuan in 2004 on these necessary expenditures (about 4800 yuan on tuition) whereas students from the upper quintile of families spend only 2600 yuan more (1100 more on tuition and about 1100 yuan more on food, 300 more on transportation, plus another one hundred yuan more on housing).

Since higher social class students are likely to be in Beijing and Shanghai and attend more expensive institutions, and enroll in higher cost faculties, this small variation in the private share of spending on tuition suggests that tuition differences between high cost and lower cost institutions and faculties are small. This implies that the public share of spending in higher cost institutions and faculties is higher, and therefore the public subsidies for higher-income students may be considerably higher than for lower income students.

[Figure 2 about here]

5 There are some private universities springing up to absorb the demand by families whose children do not get accepted to public universities, but for the moment, these often low quality institutions are only a small element in the total higher education picture.
This strategy makes sense in terms of economic growth optimization if higher income students from eastern Chinese cities and provinces are academically more able and are likely to contribute more in social benefits (externalities) than lower income, lower-scoring students entering less elite, lower cost universities. A plan of public subsidies that favors enrollment of the best and the brightest in faculties and universities that produce high externalities should contribute to greater innovation and higher economic growth. It is generally assumed that externalities to investing in very smart students in certain fields of study—such as research science or teaching—are large because the activities that these students engage in once they are working great social benefits greater than the additional earnings they realize.

As shown in Figure 3, this may or may not be the case. If the higher income students tend to study in faculties and universities that have high private rates of return but low externalities, a student loan program would be the more cost-effective policy in terms of maximizing economic growth. A scheme of market rate education loans would help overcome barriers of entry resulting from undeveloped capital markets for educational investment but would leave students and their families responsible for paying a substantial share of the costs of high private payoff education.

[Figure 3 about here]

Brazil has followed a completely different strategy. Rather than charging fees to the overwhelmingly middle and upper middle class students who attend the high cost public universities, the Brazilian military put in place a higher education policy in the late 1960s that promoted the expansion of private proprietary universities to absorb a growing demand for higher education among those whose entrance examination scores did not qualify them for admission to the free public universities. By 2004, 72 percent of all Brazilian higher education students attended this type of university, most paying high tuition fees. On average, the students attending private universities come from lower income families than those attending public universities. In effect, then, Brazil provides incentives to higher social class students (more than 50 percent of students in (free) public universities attended private, fee-charging primary and secondary schools) to enter any field they choose (depending on their test scores and high school grades) in fully subsidized public universities, whether or not those fields are characterized by externalities. Meanwhile, other students are pushed mainly into what they perceive to be high private rate of return fields of study, since those students have to pay fees to attend a higher education institution.

Since public spending on education in Russia went through a major decline in the early 1990s, and has not recovered, both cost sharing in public universities and the growth of enrollment in private universities has necessarily increased. Cost sharing in private universities, however, is not the same as in China, since most public universities in Russia continue to admit fully funded students based on their entrance test scores and high school grades, and then admit a second tier of students who are willing to pay. Obviously, the fields of study that attract the most paying students are those perceived by
students to have higher private returns, so students who study in fields with lower private returns but possibly higher externalities are more likely to be subsidized. Private universities have grown from zero enrolment in the mid-1990s to about 10 percent of total enrolment in 2000 (Drougov, 2001, Figure 1). Again, they tend to specialize in fields associated with higher private rates of return for which students are willing to pay.

In India, the situation is different again. The Indian government has steadily reduced the emphasis it places on higher education in its central government budget (Tilak, 2005; Kapur and Mehta, 2004). According to Kapur and Mehta, the proportion of expenditure on higher education to total expenditure on education “...ironically declined from an average of 15 percent during the 1980s to an average of 10 percent in the 1990s” (p. 9). This, he contends, has provoked a flight by the middle class to private education.

According to NSS data, the government’s share in overall education expenditure has been declining steadily, from 80 percent in 1983 to 67 percent in 1999. For states like Kerala, the decline is steep, from 75 to 48 percent, while for Madhya Pradesh it is from 84 percent to 68 percent. Indeed, while private expenditure on education has risen 10.8 times in the last 16 years, that for the poor rose even faster, by 12.4 times. Many students, who formally enroll in publicly funded colleges and universities, barely attend classes there. Instead, they pay considerable sums to the burgeoning private sector vocational IT training firms such as NIIT and the Aptech (Kapur and Mehta, 2004, p. 5).

Besides this unusual trend to enroll in public colleges and simultaneously in private vocational training programs (financed by government backed student loans), professional education, namely engineering, business, and medicine has been marked by a major increase in private providers. Kapur and Mehta (2004, pp. 5-6) used data from 19 important states in India to estimate the percentage of student places in engineering and medicine in private versus public universities. He finds that private engineering colleges accounted for 15 percent of seats in 1960 and accounted for 86 percent of seats in 2003. In medicine, the increase was from 6.8 percent in 1960 to 41 percent in 2003. He also estimates that about 90 percent of the seats in business schools are private. Although the percentage of privatized places varies from state to state, with more in the South and less in Bihar and West Bengal, the general trend even in West Bengal is to cut down support for teachers in private institutions, thus reducing overall spending on higher education.

Thus, in contrast to Brazil, which allowed the expansion of private education to absorb the “overflow” from relatively well-supported and free public institutions that serve largely middle and upper middle class students, India has allowed the public (free) higher education system to deteriorate financially after a period in which it pushed through affirmative action for scheduled castes and “democratized” the university. This, according to Kapur and Mehta, has pushed the Indian middle class, and many lower class Indians, to invest in private higher education, particularly in fields of study with relatively high private rates of return. So the public university is increasingly a place where arts and social science majors take their training. There still exist a number of elite
public universities that train high quality professionals. But the public university as such is no longer a place of elite formation.

Which of these financial patterns makes most sense? Without much further study, it is difficult to say. Critics of the Chinese higher educational reform argue that the government is oversubsidizing universities in rich provinces, since the payoff to higher education appears to be higher in provinces with fewer university graduates. It could be argued that the government is also oversubsidizing faculties whose graduates earn high private rates of return and undersubsidizing universities and faculties whose graduates produce greater externalities but lower private rates of return. The issue is complicated because China is still in transition to a labor market where wage differentials reflect productivity differentials. The transition in some provinces and some professions is more pronounced than in others.

Critics of the Indian system argue that privatization is driven more by government financial “exhaustion” and lack of a concrete strategy for the education sector than by any systematic reliance on market valuation of professions or a financing scheme that attempts to maximize growth. In many ways, the Russian system could be subject to the same criticism.\(^6\)

The Brazilian higher education system seems to be stuck in a political tradition that forces it to subsidize the middle class as such rather than subsidizing higher education for those that are likely to generate high economic and social externalities. Most Brazilians attending universities pay for their studies but the quality of their education is extremely low. It would be interesting to know what the private rate of return is for the 72 percent of students who attend private higher education versus the 28 percent who attend public universities.

The Russian system would seem to be at least partially efficient, subsidizing the “right” fields (those that have low private returns and higher externalities for which students are not willing to pay high tuition). Yet, the system may also be inefficient because it subsidizes many students who gain entrance (high test scores) to free public universities and who study in fields with low externalities and high private rates of return. While it is true that very bright students may generate externalities in high private rate of return occupations, which is not necessarily the case, particularly in a society such as present day Russia’s.

The Quality of Higher Education

The last issue I would like to introduce is that of “quality” in the higher educational system. One way to measure quality change over time is to estimate the

\(^6\) Seema Jayachandran, in commenting on this paper, pointed out that there is a severe shortage of qualified university professors to teach in the public universities because of the relatively rapid absolute growth in student enrollment, and the low salaries of university professors compared to the wages of professionals, particularly in sciences and engineering, in the private sector. Private universities often get around this problem by hiring employed professionals to teach part time.
amount spent per student in higher education. If we only deal with government budgets, this can be misleading if a higher fraction of students attend private universities or pay tuition to public universities, since their spending would not be counted in the public budget allocated to higher education. In Brazil, public spending per university student increased between 1980 and 2000 from about $4,000 to $5,500 PPP US dollars (WB Indicators). It appears that spending per student has gone up in China as well, from 13,000 Yuan in 1999 to 20,000 Yuan in 2002, with tuition fees rising from 17 percent to 27 percent of that amount (author’s estimates based on Wenli Li’s research (2005). It also appears that India increased public spending per student from about 1,000 PPP dollars in 1990 and 1995 to 1,300 PPP dollars in 2000-2001. We have no estimates for the Russian Federation. So, three of the countries seem to be investing more public funds per student in higher education. At least in those terms, the quality of higher education may be increasing there, or at least not declining.

In all four countries (as in the United States and Europe), the quality of education taken by higher education students varies enormously among institutions. There are two important questions to ask: how high is the quality of training in the top 10-20 percent of higher education institutions in each country, and how much below that level is the quality of training in the bottom quarter (or even bottom half) of the institutions in each country.

The reason it is important to know the quality level at the high end is that this benchmark tells us whether such institutions are producing leaders and innovators with the critical thinking skills needed to continue to achieve rapid growth once these countries move out of the industrial and lower level services phase of their development process. We have all read about the Indian Institutes of Technology, with their incredibly difficult admission process and high-level curriculum. Are these representative of the top flight of Indian university training across fields? How deep is such high quality training? Does China have similar high-level training in science and engineering? What about Brazil and Russia? If so, how deep does it go?

The reason it is important to know about the quality at the bottom one-fourth and the bottom one-half is that a high fraction of professionals in each country get their training in such institutions. These staff engineering and management jobs in production, many jobs in government, work in financial and medical services, and in teaching. If they have very poor training, they will likely produce low levels of externalities despite, in at least three of the countries, being partly to heavily subsidized by government funding of their education. One reason that rates of return to higher education may begin to decline as enrollment expands is that the quality of higher education drops off quickly as the system expands, and that it drops of quickly from levels at the bottom half that are already quite low.

What kind of changes are taking place in each country that might make us believe that quality will increase? If one believes that privatization of the higher education system tends to improve quality, then we would expect that the quality of education in Brazil is higher today than it would have been had the government strategy been to
expand public universities and to charge fees to pay for the expansion. This is not a very convincing argument given the low quality of most of Brazil’s private universities. Similarly, the gradual decline in government support in India and Russia for public universities could be leading to improved quality of higher education. This needs to be investigated. Much depends on how the private tier develops. Will the present trend produce elite private research universities, or merely proprietary schools whose claim to excellence is that they cater to higher social class students?

Some of the best Chinese universities are “importing” faculty from abroad to serve as examples for local faculty in how and what to teach in various subjects. Is this practice widespread, and does it work? Open access to courseware on the MIT model is another way of influencing the quality of teaching in universities? Is that having a positive effect? Are universities changing their organization to reflect this need to improve the quality of university faculty and courses? If so, how? University governance and departmental leadership could be crucial factors in pushing at least some universities to improve their quality.

Conclusions

What are the chances for these countries to achieve the growth predicted for them given their higher education policies? Obviously, many factors will affect growth rates, including how well they are governed and the strength of their organizational structures (including their juridical systems) that develop as their economies grow. Yet, higher education is also key to realizing sustained high rates of economic growth.

As we have shown, economists have focused mainly on the quantitative aspects of higher education—the number of graduates in the labor force—in assessing whether an economy is allocating resources for maximum growth. In these terms, Russia is in a favorable position, with a large stock of highly educated people available for its current and future labor force. China is expanding its higher education system the most rapidly, and India, the least rapidly. Although many analysts believe that India has sufficient absolute numbers of engineers and scientists and has advantages over China in moving towards an information-based advanced service economy, Tilak (2005) and others have pointed out that proportionately, India (and we might add, Brazil) has proportionately very few highly educated technical and service personnel.

There are potentially serious problems in all four countries concerning the quality of university education for all but the small percentage of university graduates who attended elite institutions, specializing in programs that might be considered world class. Large numbers of graduates with university first degrees from these elite institutions get into graduate programs in the developed countries, and many never go back, especially from India and China.

Although numbers of graduates are important, the issue of critical thinking and innovativeness, which would be fostered by college teachers who know how to develop and nurture such skills in students, and higher education institutions that provide
incentives for such teaching, may be even more important in the future. Are institutions moving in this direction?

Policy makers may believe that privatization speaks to this issue, providing higher quality university education and also reducing the need for increased public funding. However, private universities and professional school are just as likely as public universities not to develop the higher order thinking skills needed for the information economy.
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### Table 1. Private and Social Rates of Return to Education, Various Years, 1970s-1990s, by Country and Level of Education (percent annually per year of schooling within level)

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Table 2: Summary of Private Rates of Return Studies in India

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Note: γ: over illiterates; β: Agricultural college only; δ: Unadjusted estimate; ε: Adjusted estimate


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Note: a. Imputed by author. B. Net enrollment rate = 75 percent (Bloom, 2006, Appendix A, Table 1)
Figure 1: Projected GDP/capita, BRICs, Japan, and the United States, 2000-2050 (U.S. 2000 $)

Figure 2. China: Revenue Structure of Regular Chinese Universities, by Category, 1990-2002 (percent)

Source: Li (2005)
Figure 3. Optimal Finance Policies for Promoting Enrolment Increases in Various Faculties and Universities to Increase Economic Growth

Course of study/university with high private rate of return, low externalities

Policy: Low tuition, high rate of direct subsidies

Increased enrollment at private expense

Increased economic growth

Course of study/university with low private rate of return, high externalities

Policy: Government Student loan program
High tuition, low direct subsidies

Increased enrollment at public expense

Increased economic growth