ECON4940. UNDERSTANDING AND INTERPRETING CHINESE ECONOMIC REFORM, SPRING 2007

Sheetal K. Chand:

Lecture note 4: China's socialist market economy and its performance relative to India's version.

A central objective of national economic policy is to improve the economic well being of nationals of the country. How do China and India compare in this respect? While there are many aspects to economic welfare, for example its dependence on the freedom to choose, a fundamental element is the per capita level of consumption of basic necessities that contribute to a satisfactory life style. Not only are food, clothing, and shelter important but so are services such as health, education, transport and communication. China appears on the whole to have done better than India in securing for its citizens the basic necessities of life.

Currently, China's real income per capita is about double that of India's, while GDP is some two and one-half times bigger. Even though both are "socialist market economies" why has China experienced faster sustained growth over the past quarter of a century than did India? Recently, India's growth rate has begun to approach that of China's. Why? Is this sustainable? Is China's growth rate sustainable? What lessons can one learn from the disparate experiences of these two giants? This and the next lecture will attempt to clarify some of these issues.

In this lecture we start with some basic comparative facts that relate to economic size, per capita consumption, and some characteristics of the labor force. Drawing on the standard Solow-Swan model a growth accounting framework is presented to help identify the contribution of major proximate factors such as capital accumulation and broadly defined technological progress.

4.1 Introduction

First, we note the initial conditions. The People's Republic of China (PRC) and independent India have been in existence for broadly similar periods. Both had experienced devastating birth pangs, and for both initial conditions were generally unfavorable but with some differences. India had the much touted British legal and governmental system, a well trained bureaucracy, and superior infrastructure such as a more comprehensive railway system. However, the rate of illiteracy in India, at some 75 percent of the population, appears to have been a lot worse than in China. The Indian economy at independence was a colonial legacy: it had been structured to promote British imperial interests rather than those of the natives, and India needed to restructure many of its institutions so as to promote national interests. The Chinese economy, although better insulated from colonial influences, was not in much better shape to cater to its inhabitants owing to external pressures, a history of weak national administrations, and major political disruptions. Broadly speaking, both countries were ill equipped at the outset to

face the challenge of how to improve their national economies and raise living standards. They had to restructure and create new institutions, develop infrastructure, and mobilize their populations in productive directions.

The earlier lectures examined Chinese economic organization in the period largely associated with Mao. Following the disastrous "Great Leap Forward" the Chinese economy for some years deteriorated relative to India's, which in the mean time experienced some modest growth. Real per capita income in India was somewhat higher in 1978 than in China, and their GDP's were comparable. However, since then, China has leapt ahead. This development was initially associated with Deng's reform strategy of looking to the market, while not abandoning state control, i.e. "growing out of the plan". This was followed by successive waves of privatization and encouragement of foreign direct investments. On the face of it the strategy was more successful than that of India's, which has been dubbed that of the "license Raj", which we shall review later.

4.2 Some basic facts

A Chinese motto is *shi shi qiu shi* (実事求是), or "seek truth from the facts". The available data however leave much to be desired and all comparisons should be treated with some pinches of salt, but they do convey a broad impression. Consider first national income basic data. The table shows that China has been growing more than twice as fast as India (until recently), that its population rate of growth is about one-half, while 2003 per capita output is double. China has emphasized industry, which accounts for more than one-half of output, but India emphasized services and has a larger agricultural sector.

	India	China
National Income Statistics		
Nominal GDP (2003, US$bn)	575	1410
Real GDP Growth (1980-1990)	5.8%	9.3%
Real GDP Growth (1991-2003)	5.8%	9.7%
Population (mn, 2002)	1036	1285
Population Growth (CAGR, 1992-2002)	1.9%	0.9%
Per Capita GDP (2003, US$)	545	1087
GDP Per Capita Growth (%, 1991-2003)	4.2%	9.9%
Composition of GDP (As of 2003)		
Agriculture	22.2%	14.6%
Industry	26.8%	52.3%
Services	51.0%	33.1%

Source: Morgan Stanley Research

The next table concretizes some of the differences in per capita consumption levels.

(As of 2003)	Per capita consumption			Total market volume		
	Units	India	China	Units	India	China
Cement	'00 kg	1	6	mn Tonnes	108	816
Steel	kg	30	197	mn Tonnes	32	255
Aluminium	kg	0.6	3.7	000 Tonnes	582	4822
Cars	Per 000 Ppl	7	11	0000s	690	1455
TVs	Per 000 Ppl	97	301	mn	103	391
Telephone Lines	Per 000 Ppl	62	420	mn	65	545
Electricity	'00 KWH	5	12	bn KWH	539	1599

Source: Industry Sources, Morgan Stanley Research

Next, the composition of the consumption baskets, geared to the two per capita income levels, suggests that China's is more representative of a higher income level. This is because higher income levels are usually characterized by the share of food being lower, while that of leisure and education is higher.

China and India: Consumption Basket, 2002

(%)	China	India
Food, Beverages & Tobacco	38	52
Leisure & Education	11	4
Clothing & Footwear	11	5
Transport & Communication	7	14
Household Goods & Services	9	3
Housing	6	7
Medical & Health	5	5
Household Fuels	5	3
Miscellaneous	8	7

Source: Euromonitor, Morgan Stanley Research

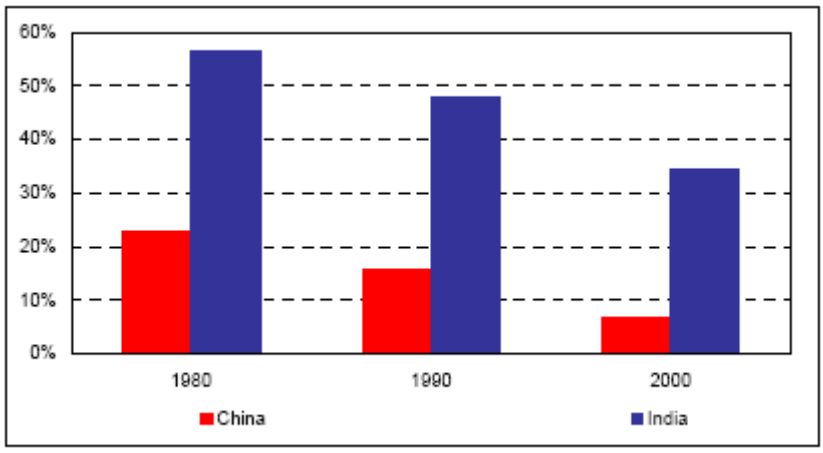
The statistically average Chinese enjoys a higher standard of living than does the average Indian. But are these averages comparable? Do they conceal disparate distributions of income and expenditures? The next table presents some statistics on distribution. They indicate that India (left hand side column) is more egalitarian. This suggests that the poor in India enjoy a higher standard of living than a simple comparison of the averages would suggest, and could even be better off than the poor in China.

Percentage Share of Income/Consumption		
Lowest 20%	8.1	5.9
Second 20%	11.6	10.2
Third 20%	15	15.1
Fourth 20%	19.3	22.2
Highest 20%	46.1	46.6

** Survey Year for India: 1997, Survey Year for China: 1998*
Source: World Bank, Morgan Stanley Research

Regarding illiteracy, the eradication of which is fundamental to ensuring agent access to a modern economy, both countries exhibit declining trends. However, while China is rapidly closing the gap with industrial economies, India lags significantly with some one-third of the population still illiterate.

China and India: Illiteracy Rates



Source: China Statistical Yearbook, CMIE, Morgan Stanley Research

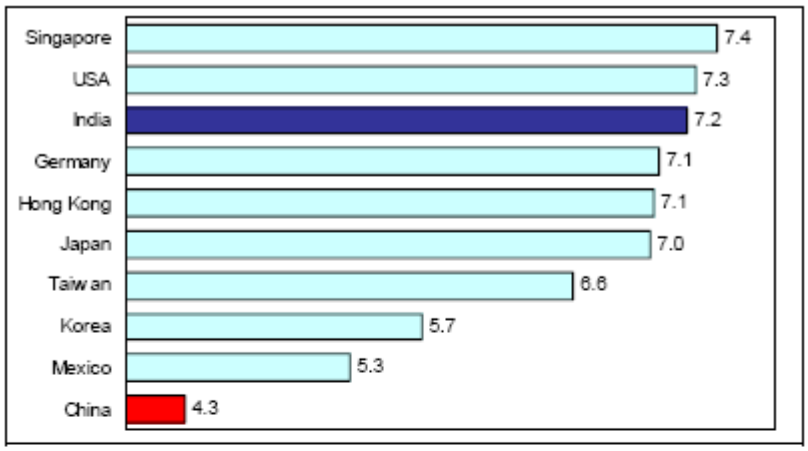
Interestingly, at the tertiary level the number of students undergoing higher education is comparable, on adjusting for population size. However, many more students are enrolled in formal academic degree programs in India than in China, but the latter has many more technical vocational students.

Higher Education Comparison (Students Enrolled)

(mn)	India 1999-00	China 2000-01
Post Secondary Non-Tertiary	0.38	0.69
Gross Tertiary	9.40	12.14
(a) Bachelor's and Master's Degree	9.27	6.63
(b) Technical Bachelor's Degree/ Non-University Tertiary	0.07	5.43
(c) MPhil/Doctorate	0.05	0.08

Source: UNESCO Institute for Statistics

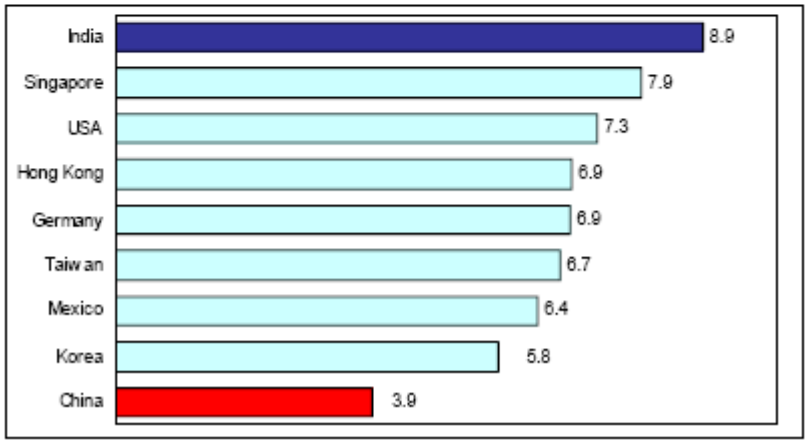
Availability of Skilled Labor, 2003 (1=low; 10=high)



Source: IMD Competitiveness Yearbook, 2003

Exhibit 43

Availability of Qualified Engineers, 2003 (1=low; 10=high)

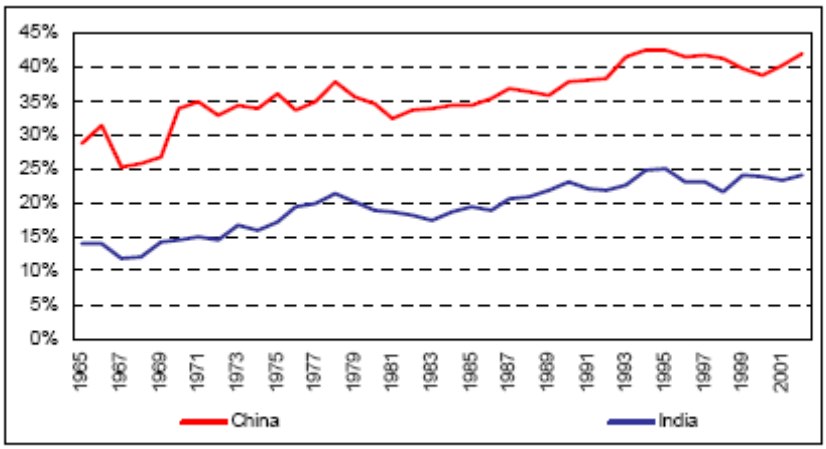


Source: IMD Competitiveness Yearbook, 2003

The difference in the pattern of tertiary education is reflected in the availability of skilled labor indices, with India substantially ahead of China. In particular, the availability of qualified engineers is much higher in India, which is a world leader in this respect.

In addition to the availability and quality of labor, access to capital is very important. Here China clearly outscores India with its much higher domestic savings rates and foreign direct investment (FDI) inflows. The chart below shows a difference of about 15 percentage points in the savings ratio in favor of China.

China and India: Gross Savings Rate



Source: CSO, CEIC, Morgan Stanley Research

4.3 Growth accounting

To get a handle on divergent growth experiences it is useful to begin with the workhorse Solow-Swan model.

Assume a Cobb-Douglas production function with standard properties (Inada), where Y=output, K= capital, A= technological progress, and L= labor

$$Y = F(K, AL) = K^{\alpha}(AL)^{1-\alpha} \quad 0<\alpha<1 \qquad (1)$$

Expressing output in terms of labor efficiency units shows that it is a decreasing function of the similarly expressed capital intensity *k*

$$\frac{Y}{AL} \equiv y = \left(\frac{K}{AL}\right)^{\alpha} = k^{\alpha} \qquad (2)$$

Assume that Labor and technological progress are growing at the following exogenously given rates

$$\begin{aligned} \dot{L}(t) &= nL(t) \quad \text{from} \quad L(t) = L(0)e^{nt} \\ \dot{A}(t) &= gA(t) \quad \text{from} \quad A(t) = A(0)e^{gt} \end{aligned} \qquad (3)$$

Capital accumulation is assumed to be endogenous. It is determined by reference to an exogenously given savings process, based on the standard simplifying assumption that savings is a constant proportion s of income

$$\dot{K} = sY(t) - \delta K(t) \qquad (4)$$

where δ is the rate at which capital depreciates. The dynamics of the system are readily described by the evolution of capital intensity in per capita efficiency units. Time differentiating *k* gives

$$\dot{k} = \frac{\dot{K}}{AL} - (n+g)k \qquad (5)$$

Using (4) to make the relevant substitutions and suppressing *t*

$$\dot{k} = \frac{sY - \delta K}{AL} - (n+g)k \qquad (6)$$

Re-expressing (6), the Cobb-Douglas formulation yields

$$\dot{k} = sk^{\alpha} - (n+g+\delta)k \qquad (7)$$

Solving for equilibrium k* (i.e. set $\dot{k}$ equal to zero)

$$k^* = \left(\frac{s}{n+g+\delta}\right)^{\frac{1}{1-\alpha}} \qquad (8)$$

This is readily shown to be dynamically stable.

An increase in the savings ratio raises steady state *k*, while an increase in the rate of technological progress *g* lowers it.

If steady state k* is constant then time differentiating it indicates that $\frac{\dot{K}}{K} = g + n$. Since steady state y* is also constant $\frac{\dot{Y}}{Y} = g + n$. In other words per capita income grows at the exogenous rate of technological progress i.e. $\frac{\dot{Y}}{Y} - n = g$. Thus the only source of long-term growth in the system is from technological progress.

How do we find *g* from the data? We may not be at steady state so it is not simply a matter of calculating per capita income growth and calling it *g*. Actual output growth rates reflect divergent rates of capital accumulation, changes in the amount and quality of labor use, and varying technological progress. The standard approach is to estimate *g* or total factor productivity (TFP) growth as a residual applying so-called "growth accounting". This is an important residual, frequently referred to as the Solow residual, which capture the effects of all productivity enhancing contributions. This would include not only new technical inventions, but also reforms in areas such as institutions, organizational forms, and managerial practices.

Taking logs of equation (1),

$$\log Y = \alpha \log K + (1-\alpha)\log A + (1-\alpha)\log L \qquad (9)$$

Time differentiating

$$\frac{\dot{Y}}{Y} = \alpha\frac{\dot{K}}{K} + (1-\alpha)\frac{\dot{A}}{A} + (1-\alpha)\frac{\dot{L}}{L} \qquad (10)$$

Hence, re-arranging

$$g = \frac{1}{1-\alpha}\left(\frac{\dot{Y}}{Y} - \frac{\dot{L}}{L}\right) - \frac{\alpha}{1-\alpha}\left(\frac{\dot{K}}{K} - \frac{\dot{L}}{L}\right) \qquad (11)$$

When capital accumulation is rapid relative to labor growth, e.g. if it exceeds the steady state rate of growth of $g+n$, the estimate of TFP would be reduced below the observed per capita growth rate of output.

4.4 Estimating TFP growth

This is a statistical exercise where the purpose is to distribute or partition the observed growth in per capita GDP growth between capital accumulation and TFP growth. It is heavily data intensive and subject to all the limitations that affect data, as a consequence of which different interpretations are possible as borne out by the many different studies done. For example, Allwyn Young focused on alleged limitations of Chinese data, which he felt overstated TFP, since it far exceeded "normal" rates. He generated an alternative series that enabled him to show that TFP was much lower, on attributing the bulk of the high per capita income growth in China to capital accumulation. Since this is a transitional effect, the fillip to income growth is temporary. As noted above, in steady state per capita income growth would be g.

Can we have different g's for different countries? Not if you follow the logic of the neoclassical Solow-Swan model: in the long-run all knowledge should be accessible to everybody, as a result of which their per capita income growth would all converge to the same common rate of technological progress g. Consumption preferences do matter but this is taken into account through differences in savings ratios.

A thorough application of the growth accounting framework to the China-India case is in Bosworth and Collins (2007). The following tables and chart are reproduced from

Accounting for Growth: Comparing China and India
Barry Bosworth and Susan M. Collins
NBER Working Paper No. 12943
February 2007

They indicate that TFP growth in China since 1978 has been extraordinary, running at more than double the Indian rate over the period 1978-04. They divide this period into

two at 1993, and find a sharp acceleration in India's TFP growth, well above the East Asian averages, but still distinctly below that of China's, where the growth has been remarkably steady.

The year1993 (see also Delong), during which the effects of the major liberalizing reforms undertaken in India in 1991 in the context of an IMF program began to manifest themselves more fully, represents a distinct trend change in TFP growth.

Table 1. Sources of Growth: China, India, and East Asia 1978-2004

Annual percentage rate of change

Period		Output	Employment	Output per Worker	Contribution of: Physical Capital	Land	Education	Factor Productivity
Total Economy								
1978-04	China	9.3	2.0	7.3	3.2	0.0	0.2	3.8
	India	5.4	2.0	3.3	1.3	0.0	0.4	1.6
1978-93	China	8.9	2.5	6.4	2.5	-0.1	0.2	3.6
	India	4.5	2.1	2.4	1.0	-0.1	0.3	1.1
1993-04	China	9.7	1.2	8.5	4.2	0.0	0.2	4.0
	India	6.5	1.9	4.6	1.8	0.0	0.4	2.3
East Asia Excluding China								
1960-80		7.0	3.0	4.0	2.2		0.5	1.2
1980-03		6.1	2.4	3.7	2.2		0.5	0.9
1980-93		7.3	2.7	4.6	2.6		0.6	1.4
1993-03		4.5	2.0	2.5	1.8		0.5	0.3

Source: Authors' estimates as described in text; Bosworth and Collins (2003). The employment series is a census comparable concept for both China and India.

The next table provides a breakdown of TFP growth by sectors. China shows both in agriculture and especially industry much higher rates of TFP growth than India, even taking account of the liberalizing reforms in India during the second period. TFP growth for the industrial sector in China, which was already very high, accelerated further during the second period. However, in services the table indicates a higher rate of TFP growth for India than China, which appears to have accelerated in the second period. These findings are consistent with observed tendency of China becoming the world's manufacturing hub, while India is becoming the world center for software and related services.

Table 2. Sources of Growth by Major Sector, 1978-2004

Annual percentage rate of change

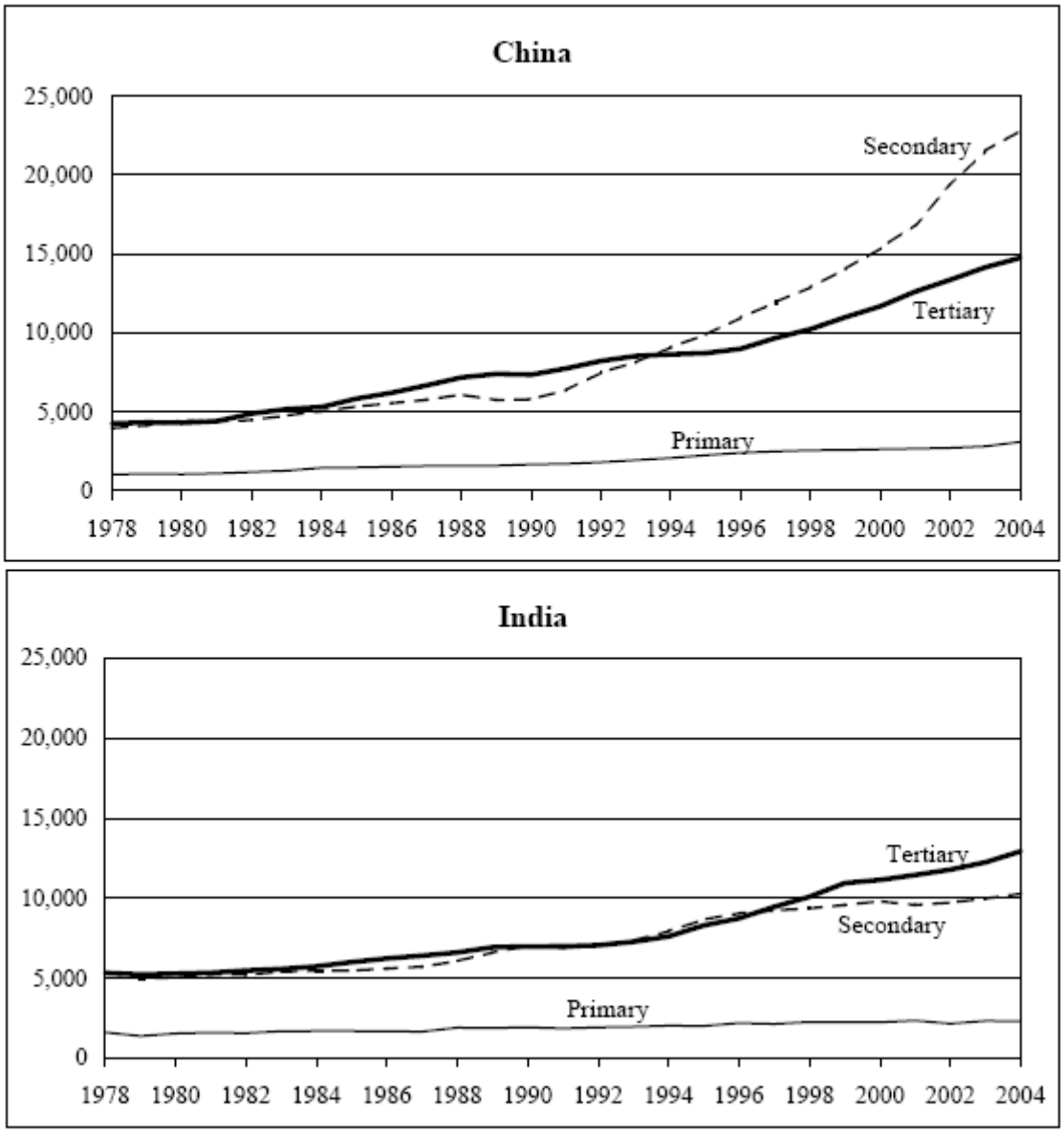
Period		Output	Employment	Output per Worker	Contribution of: Physical Capital	Land	Education	Factor Productivity
Agriculture								
1978-04	China	4.6	0.3	4.3	2.3	0.0	0.2	1.8
	India	2.5	1.1	1.4	0.4	-0.1	0.3	0.8
1978-93	China	5.2	0.9	4.3	2.5	-0.2	0.2	1.8
	India	2.7	1.4	1.3	0.2	-0.1	0.2	1.0
1993-04	China	3.7	-0.6	4.3	2.1	0.2	0.1	1.8
	India	2.2	0.7	1.5	0.7	-0.1	0.3	0.5
Industry								
1978-04	China	10.0	3.1	7.0	2.2		0.2	4.4
	India	5.9	3.4	2.5	1.5		0.3	0.6
1978-93	China	9.3	4.4	4.9	1.5		0.2	3.1
	India	5.4	3.3	2.1	1.4		0.4	0.3
1993-04	China	11.0	1.2	9.8	3.2		0.2	6.2
	India	6.7	3.6	3.1	1.7		0.3	1.1
Services								
1978-04	China	10.7	5.8	4.9	2.7		0.2	1.9
	India	7.2	3.8	3.5	0.6		0.4	2.4
1978-93	China	11.3	6.5	4.7	1.8		0.2	2.7
	India	5.9	3.8	2.1	0.3		0.4	1.4
1993-04	China	9.8	4.7	5.1	3.9		0.2	0.9
	India	9.1	3.7	5.4	1.1		0.4	3.9

Source: Authors' estimates as described in text. For China, the output data are the official series of the the national accounts for agriculture and services, and the series for industry is based on the alternative price deflator discussed in the text.

The extraordinary growth in TFP in the secondary (industrial) sector for China is reflected in the higher output per worker compared to the other sectors (Chart), whereas for India, it is the tertiary sector that generates the highest output per worker.

Figure 1. Output per Worker by Sector, China and India, 1978-2004

International dollars of 2004



Source: China Data Center and CSY; India National Accounts; India NSSO.