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# Anatomy of the Recent Growth and Transformation of the Economies of China and India

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# **Anatomy of the Recent Growth and Transformation of the Economies of China and India**

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## **ABSTRACT**

The rapid growth of the Chinese and the Indian economies over the last quarter-century has transformed them into dominant growth engines for the global economy. The two economies have different institutional structures, and they have been following different growth strategies. This study examines the factors and forces behind the two countries' economic transformation over recent years with a view to identifying their strengths and weaknesses, and assessing how they are likely to fare in the years ahead. In particular, the contributions of supply-side factors, such as factor accumulation and factor productivities, to the two countries' growth processes are analysed, as are the influence of demand-side factors such as the shares of domestic demand and net international trade in the observed growth. How the two giants measure up in terms of the wellbeing of their peoples – the crucial test of a country's development – is also discussed in the study.<sup>2</sup>

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<sup>2</sup> Over a relatively long gestation, this research has been presented at various gatherings including those at the China Europe International Business School in Shanghai, Vietnam Economics University in Hanoi, Vietnam National University in Ho Chi Minh City, Postgraduate Commerce Faculty, University of Calcutta, India, Charles Sturt University in New South Wales, Australia and the New Zealand Asian Studies Society Conference at the University of Otago, Dunedin, New Zealand. Comments and criticisms received at these presentations have been taken into consideration in this revised and extended version. Responsibility for any remaining blemish, however, is solely my own.

I wish to place on record my appreciation of Subrata Ghatak of Kingston University, Surrey for his constructive criticism and suggestions which have helped improve the final version. Special thanks are due to my colleague Jim Alvey for checking through the text with the eagle eye of a scholar-editor and making it more readable and free from many blemishes. I also thank Shrabani Saha, a doctoral student in the department, for her skilful and prompt research assistance.

## 1. INTRODUCTION AND OBJECTIVES

After several decades of slow growth since the 1950s, the economies of the two most populous countries in the world – the People’s Republic of China (PRC) and India – started growing at much faster rates since the decades of 1980s and 1990s respectively. This, in turn, has begun to change the living conditions of millions of people living in these countries, many of whom are desperately poor. It has also been creating a large and growing body of ‘middle class’ people in these countries, with incomes comparable with their counterparts in the more affluent countries. The resulting changes in the lifestyles and consumption patterns of these people have already started to influence the availabilities and prices of many products and services globally. The growing affluence of these countries therefore is a phenomenon that has implications not just for their own peoples but also for others living in both the developed and the developing world. This paper examines some aspects of the growth and the changes resulting from it with a view to understanding the phenomenon and assessing some of its implications from the perspectives of the countries themselves, and of the world as a whole

The major motivation behind the study is to lay bare the factors and forces that have shaped the rapid economic transformation of the two large but poor economies, in a relatively short period of time. After several decades of policy-induced relative isolation from the world economy, both China and India initiated market-oriented reform programmes in the late 1970s and early 1990s respectively. The changes that have come in their train have begun to change the world economy in a major way. Understanding the underlying forces that have contributed to this remarkable transformation is, therefore, a worthwhile exercise in itself; it may also have lessons that other developing economies could learn from or avoid in their quest for faster growth with its attendant benefits.

I have endeavoured to write the article in a style that, I hope, would make it accessible to the non-specialists. I have done this out of the conviction that the topic is one that is likely also to attract many a non-specialist reader with an interest in international economic events and developments. I believe they would be better served by the particular style of presentation.

After a brief introduction to the subject with some relevant factual information, the essay goes on to examine the nature and sources of the two economies’ observed growth performance, and to identify the strengths and weaknesses implied in these findings. The question as to whether the two economies can continue along their recent fast growth paths is addressed next and, again, the influences, both domestic and external, that are likely to affect the growth outcomes are identified. How the countries are responding to the United Nations (UN) Millennium Development Goals (MDG) is examined briefly next. The article concludes with references to some wider issues of a global nature, both optimistic and otherwise, in a political-economic framework.

## 2. ASPECTS OF THE GROWTH PERFORMANCE OF CHINA AND INDIA: A BROAD-BRUSH VIEW

### 2a. Selected Indicators of Growth Performance

In the financial year 2006, India achieved a GDP growth rate of 9.2%, just short of China's 10.4%. In 2007, India's growth rate fell slightly to just under 9%, while China's grew at just over 11%. Between them, these two countries account for over a third of the world's population and, since the 1980s, they have both achieved high rates of economic growth. India's per capita real GDP has more than doubled, and China's has increased nearly seven-fold over the last two decades (Srinivasan 2006, p.1). These changes have enormous significance not just for the 2.4 billion people living in those two countries, but for the rest of the world as well. Table 1 presents information on some broad indicators of how the two economies have performed in recent years.

**Table 1: The Two Asian Giants: A Broad Profile**

	China	India
Population (2006)	1.3 b	1.1 b
Pop. growth rate (2004-2006)	0.59	1.38
GDP PPP (2006)	US\$10 trillion	\$4.04 trillion
GDP per capita PPP	US\$7593	\$3,700
GDP share by sector (%)		
Agriculture	12	17
Industry	47	28
Service	41	55
Labour force size	798 m.	509 m.
Sector share of employment		
Agriculture	45%	60%
Industry	24%	12%
Service	31%	28%
Trade share of GDP (2006)	65%	45%
Adult Literacy	91%	61%
Percent of population living on < US\$1 a day	8 (2006)	31 (2003)
Income share of top decile to bottom	18.4	7.3

Sources: *World Development Indicators 2007*, World Bank

Basu, K. 'India's economic report card'

retrieved from <[http://news.bbc.co.uk/1/hi/world/south\\_asia/51165956.stm](http://news.bbc.co.uk/1/hi/world/south_asia/51165956.stm)>

A few quick comments on the Table are pertinent: China's per capita income is over twice that of India's in price-adjusted (PPP) terms; India's population growth rate is over twice that of China's - a reflection mainly of China's one-child policy. Industry is a significantly bigger contributor to China's GDP than India's, while the service sector contributes more to India's GDP. Income inequality in (socialist) China is a lot higher than in India, but poverty is a lot lower in China. The proportion of literate persons in the adult population is a lot higher in China. China's economy is lot more open than India's, as measured by their trade, i.e. exports plus imports, as a proportion of GDP.

One feature of India's growth experience noted above is worth paying particular attention to: it is the predominance of the service sector ahead of the more usual industrial sector. A low-income developing country tends to be dominated by agriculture and primary activity; the development process helps to enlarge the industrial sector which attracts both labour and other resources away from agriculture and primary activities. It is only at a much later stage of development that the tertiary sector typically becomes the leading one. This is what one observes in the evolution of the Chinese economy too. India, however, with a larger agricultural sector than China's, but lower per capita income and adult literacy rate, has a significantly larger service sector share of its GDP. Some possible reasons for this unusual aspect of the Indian economy are investigated later in the article.

## **2b. The Institutional Structures for Development: a brief note**

It would also be useful to note briefly in passing the institutional structure under which the two economies have functioned since the start of their independent development process. From the early 1950s to the late 1970s, both China and India used central planning as their major development strategy, although India had a large and thriving private sector, and an established culture of private entrepreneurship. Both countries used inward looking policies over this period in an effort to promote 'self-sufficiency' as a primary national economic goal, and both achieved only modest economic growth. Under Deng Xiaoping's leadership, China embarked on a largely market-oriented reform of its economy in 1978. While neither country has abandoned planning as an instrument of development – China is into its 11<sup>th</sup> Five Year Programme, and India its 11<sup>th</sup> Five Year Plan - both have systematically increased the role of the market. Indeed, China now calls itself a *socialist market economy*. Two major government departments – the State Planning Commission and the State Economic Commission – no longer exist in China; they have been re-constituted into organisations that would facilitate the process of market-oriented growth and integration into the global economy. India too has drastically removed much of the protective structure around its domestic economy and its international trading and investment links since the early 1990s. Thus, both economies have a mixed structure, with an enhanced emphasis on the private sector, especially in China which is in transition to 'market socialism'.

The political institutions of the two countries too are very different: China continues to be a one-party, authoritarian state, while India is a federal, multi-party democracy with many freedoms that permit democratic checks and balances to operate, if only in an imperfect manner. Their existence also makes popular participation in the governmental processes possible. Whether and how these differences have influenced the two countries' economic performance and their recent transition, however, is not above controversy. Useful insights into some of the complexities of the issue can be gained from the recent works of Bardhan (2006), and Desai (2005).

### **3. FACTORS INFLUENCING ECONOMIC GROWTH**

#### **3a. Demand, Supply and Growth: The China, India Contrasts**

Both demand- and supply-side factors influence a country's growth performance as do its political and societal institutions and practices. Domestically, the demand factors are consumption and investment spending by the private and the public sectors, while external demand is reflected in the size of the net export earnings, i.e. exports less imports. The supply-side influences are availability and the quality of factors of production such as labour and capital; capital formation, i.e. productive investment in physical and human capital, and what is known as total or multi-factor productivity, i.e. enhanced output per unit of a composite of inputs used in the production of goods and services.

China's growth has been driven more by investment and net exports than domestic consumption, particularly since the late 1990s, as detailed later in the article. China's savings rate has grown from around 35% in the early 1980s to about a half of its GDP in recent years. This, together with large and steady overseas investment flows, has enabled China to raise investment also to over 40% of its GDP (Bosworth and Collins 2007, p.19). Much of China's domestic investment has been in infrastructure and industrial development which, while improving its industrial growth rate and export performance, has kept the consumption growth rate decidedly modest. It has also led to the phenomenal growth in the size of China's foreign exchange reserves which currently stands at US\$1.33 trillion. This puts pressure on the yuan, and to avoid its appreciation, China has been lending much of its external surplus to deficit countries like the US by acquiring dollar-denominated assets. While this may have helped the process of China's export-led growth, it is potentially a highly risky strategy too. A decline in the value of a currency such as the US dollar could involve substantial capital loss for China. Likewise, the strategy of export-oriented industrial growth has made about 70% of the Chinese economy dependent on the world economy.

China is currently facing a unique quandary. While its export-led growth strategy would benefit from a low exchange rate, its rapidly accelerating inflation rate, currently standing at 8.7%, up 6 percentage points from only a year ago (*The Economist*, March 29<sup>th</sup> – April 4<sup>th</sup> 2008, p.119) would benefit from an appreciating currency. Indeed, the yuan has appreciated by just over 7% in the year to January 2008. It is worth recalling too that, over the initial period of China's economic transition, the US dollar/RMB exchange rate had steadily declined from 1:1.5 in 1980 to 1:8.62 in 1994. This, combined with China's large supply of cheap labour and high rate of capital formation, helped China increase its share of world export trade significantly which, in turn, helped it raise its economic growth rate. Any attempt to encourage domestic consumption in the current phase of the Chinese economic growth could exacerbate the inflation problem.

India's GDP growth has been mainly driven by domestic (consumption) demand. India's savings and investment rates have been much lower than China's and its share of world exports in 2006, at around 1 percent, contrasted sharply with China's 8 percent. Strong and sustained growth in private consumption, and the public sector deficits, both at the central and state government levels, have been the features of India's economic transition over the decade since the mid 1990s. This has started to change in India in recent years, as we detail below.

### **3b. A Structural Break in India's Growth? Some Recent Changes in Perspective**

India's annual GDP growth figures alluded to earlier do not quite bring out a trend increase in India's growth performance since the middle of 2003<sup>3</sup>. If one breaks down the period 2000-2007 into two sub-periods, and examines GDP growth figures in quarterly terms, it emerges that the quarter-on-quarter growth rate crossed the 9 percent mark for the first time in quarter two of 2003/04, and has remained above that level in 10 out of the 16 subsequent quarters. In the 13 quarters, starting in quarter one of 2000/01, GDP growth rate was never above 6.7 percent, and was below 5 percent on five occasions. Using the current national income statistics with 1999/2000 as the base year, it would appear that the Indian GDP growth rate has achieved a trend increase from an average of around 4.8 percent to around 8.8 percent between the second quarter of 2003/04 and the second quarter of 2007/08, an increase of some 80 percent on the quarter-on-quarter growth rate. This is in the 80 – 90 percent range of China's growth rate.

While that may be reason for optimism amongst India's policymakers, the period may be too short for one to judge just yet whether this is a cyclical upturn or a genuine structural break which can sustain itself into the future. It is worth recalling that something similar in respect of the GDP growth rate was observed over the period 1994/95 – 1996/97, only to be followed by a prolonged downturn in the growth rate (Jha and Negre 2007, p.7).

Turning now to the observed changes to the way income in India has come to be disposed of, we note that over the period 2001-07, India's accelerating GDP growth rate has been accompanied by a significant increase in savings from around 23 percent in 2000/01 to over 32 percent in 2005/06 (Jha 2007, p.8)). A less well known fact about India's generally poor savings performance is that the saving rate of India's household sector, at 30% of GDP in 2005, is even higher than China's 25% (Bottelier 2007, p.124). India's much lower national savings rate has historically been due largely to the corporate and public sector's low savings culture. This has started to change lately with the corporate sector doubling its savings rate from under 4 percent

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<sup>3</sup> Much of the statistical information used in this subsection and the next is taken from various issues of *The Economic Survey* of the Ministry of Finance, Govt. of India; and *The Handbook of Statistics of the Indian Economy*, published by the Reserve Bank of India.

of GDP in 2001 to over 8 percent in 2005. More encouragingly perhaps, India's public sector, generally known for its profligacy, has now emerged as a small net saver of some 2 percent of GDP. Several reform measures aimed at improving fiscal responsibility adopted by the federal government in 2004, plus the reform of indirect taxation, including the introduction of a value-added tax at the state level, have seemingly helped improve the public sector finances. The combined debt of the central and state governments, as a proportion of GDP, has also fallen by 4 percentage points over the period 2003-07.

Investment too has risen from 24 percent to 34 percent of GDP over the same period, making the growth process more broad based than in the previous years. One consequence of the increased investment and the continuing high consumption however has been an increased trade and current account deficits. In 2005/06, despite strong export growth, increased imports helped widen the trade deficit to over 6 percent of GDP; the deficit in the current account is smaller, at 1.5 percent of GDP. The external imbalance is being met by (autonomous) capital inflows which have also been rising. Relative to China, foreign direct investment (FDI) flows to India have been meagre over the years. The inward FDI flows have started to rise in recent years, but increased outward investment by the Indian corporate sector has tended to offset the inflows to some extent. The observed increase in capital flows has been dominated by portfolio funds and external commercial borrowings. The total amount of private equity flows has increased over three times from US\$2.2 billion in 2003/04 to around US\$7 billion in 2006, and US\$10 billion in 2007, making India the largest recipient of private equity investment among developing economies. With this surge in total investment funds, India has started making the much needed investment in infrastructure such as airports, railways, ports and roads; but real estate and manufacturing sectors too have attracted increased investment in the last few years.

India's overall export performance in the years since 2000 has been on an upward trend. The average annual growth rate over the period 2004-07 has been around 26%. As a proportion of GDP too exports accounted for over 23% in 2007, which is over 50% higher than the average for the preceding five years.

While India has been experiencing these changes, the Chinese GDP growth rate has remained above the 9 percent mark, on average, over the period 2000-05, declining somewhat between 2004 and 2005, but rising again in the first half of 2007 to 11.5 percent, a rate not seen since 1994. Taking a longer time view however, China's GDP growth has experienced quite sharp volatilities, despite the upward trend. The rapid growth of the mid-1990s ended in a recession in 1988/89, returning to around 15 percent growth in the early 1990s, followed by another slow down latter in that decade. Part of the reason for such fluctuations may be China's heavy dependence on exports which is more subject to shocks arising outside the Chinese economy, as observed earlier.

## 4. THE DEMAND-SIDE INFLUENCES: A CLOSER LOOK

### 4a. The Strategy of Export-led Growth

Let us now have a closer look at the demand-side influences on the observed GDP growth of the two countries. Conventional wisdom in the development economics literature has favoured the strategy of what has come to be termed “export-led growth” (ELG) strategy. This is characterised by the achievement of a high rate of net export growth that accompanies a high GDP and income growth rate. With income growth will usually come, via the marginal propensity to import, import growth, which is a negative influence on income. The extent to which *net* export can still make a positive contribution to GDP growth will of course depend on the relative strength of export *vis-a-vis* import growth. The issue will be examined in detail below.

By contrast, growth will be termed domestic demand-led if the growth of domestic demand influences the growth of income the most, with net export playing a weaker, if any, role. The components of total demand as observed earlier are: consumption and investment spending of the private and the public sectors, which are of domestic origin, and net exports which comes from the external sector.

The support for the strategy of export-led growth, as opposed to domestic demand-led growth which is a variant of the import-substitution strategy, has a long history. Insights from the early works of scholars such as Chenery and Strout 1966, and Balassa 1971, to the more recent research, including research based on endogenous growth theory (for example Helpman 1989; Romer 1990; Lucas 1988, and Barro 1991), provide ample theoretical support for outward (export) orientation as a condition for rapid and sustained income growth. The development experience of a number of East Asian countries since the late 1960s is often cited in the literature as evidence of success of this development strategy (see for example Westphal 1990; and World Bank 1993).

The Asian Financial Crisis of the late 1990s, that saw a number of the so-called miracle economies of East Asia suffer sudden and dramatic economic downturn, made scholars and policymakers question many aspects of the growth strategy used by these economies, including the ELG. In particular, scholars now question whether the ELG strategy is equally well-suited to all developing countries (see for example Blecker 2002; Palley 2002; Kaplinsky 2000, and Ertuk 2001). It is also of relevance that, at the current stage of development of the global economy, when competition for a share of the world market is much stronger than say in the 1960s and 1970s, a strategy of ELG for most developing economies is likely to be more difficult to pursue.

#### 4b. Decomposing the Demand-side Influences

The Asian Development Bank (*The Asian Development Outlook 2005*) has analysed the demand-side influences on the income growth process of five developing Asian economies, including the People's Republic of China (PRC) and India, over three decades starting in 1973. Their conclusions based on their numerical computations of the relative contributions of domestic demand (DD) and net export (NE) to the income growth of China and India, are summarised in Table 2.

**Table 2**

<b>Period</b>	<b>PRC</b>	<b>India</b>
1973 – 83	DD increasing, NE negative and deteriorating	DD increasing, NE negative and deteriorating
1983 – 93	DD increasing, NE negative and deteriorating	DD increasing, NE negative and deteriorating
1993-2003	DD increasing, NE positive and increasing	DD increasing, NE negative and improving

Source: Asian Development Outlook 2005, retrieved from  
ADB:<http://www.adb.org/Documents/Books/ADO/2005/par010204.asp>

Only the last few years of the decade of 1973-83 experienced the new phase that initiated China's transition to market economy under Deng Xiaoping's leadership. Changes to India's established economic thinking and policies too did not really begin until the latter half of the 1980s under Prime Minister Rajiv Gandhi's leadership. It is not surprising, therefore, that in both countries domestic demand was the prime mover of growth over this period, and the contribution of net exports was negative and deteriorating. This latter result reflected the economic self-sufficiency objective pursued by both countries over the first several decades of their planned economic development referred to earlier.

Over the next decade, China had advanced significantly in the direction of a market-oriented economy, with emphasis on the external sector. This resulted in exports and imports growing at high rates; but even so, domestic demand was still the only positive contributor to income growth, and net exports were negative, and deteriorating.

India's transition in this decade was still somewhat tentative and sporadic, and the economy was yet to open up. The observed dominance of domestic demand in the growth process, therefore, was not unexpected.

In the most recent decade analysed by the ADB, the decade of 1993-2003, China had emerged as an economy that had established strong links with the rest of the world, both in its trade and investment. Its net export had become not only positive, but an increasing contributor to its income growth.

India took major policy reform initiatives in 1991, including opening up its economy, following a short-lived economic crisis, and the improving - although still negative – net-export situation noted in Table 2 is a reflection of these policies. The period since 2003 has seen India's savings, investment and exports rise at faster rates than in the preceding periods, as observed earlier. India's income growth, while still domestic-demand dominated, has been undergoing two significant changes in recent years: domestic expenditure becoming more broad-based, with investment accounting for a larger share than before, and exports rising at faster rates. However, with India's trade and current account balances in a state of perpetual deficit, and imports rising at faster rates than exports, any positive contribution from the external sector is yet to materialise.

## 5. SECTORAL GROWTH AND THE SUPPLY-SIDE INFLUENCES

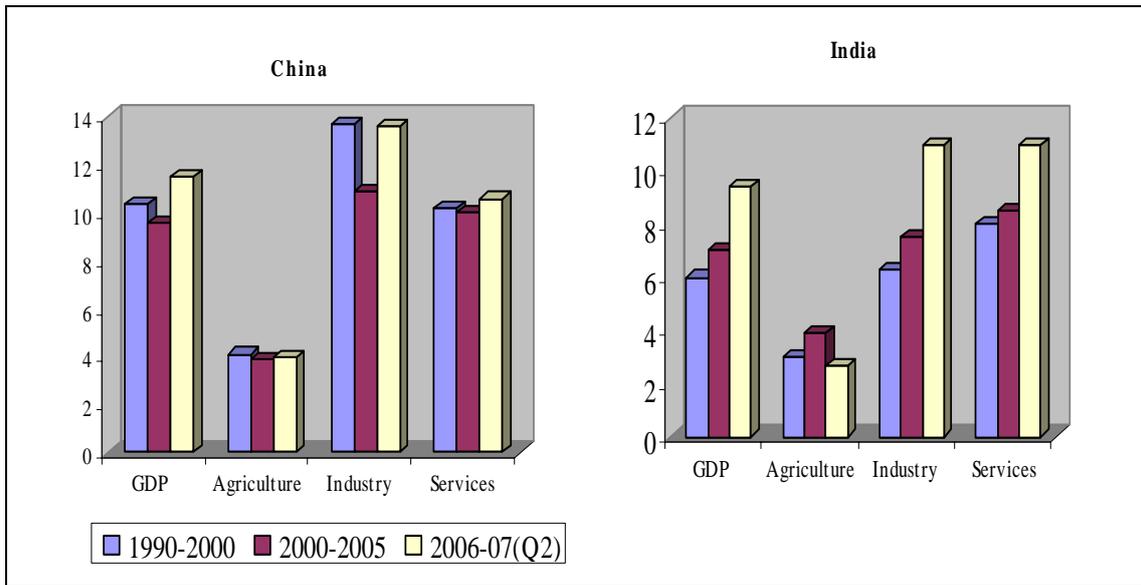
An extensive literature exists on the relative shares and growth patterns of the major sectors, viz. agriculture, industry and services, of China and India (see for example Srinivasan 2002, 2005 and 2006; Jha 2007; Virmani 2004 and Bosworth and Collins 2007). In what follows therefore, we cover this aspect only briefly, and then decompose the observed growth of GDP, and of the three major sectors of the two economies to identify the sources of the observed growth.

**Table 3: The Growth Experience of the China and India:  
The Broad Sectors and Real GDP**

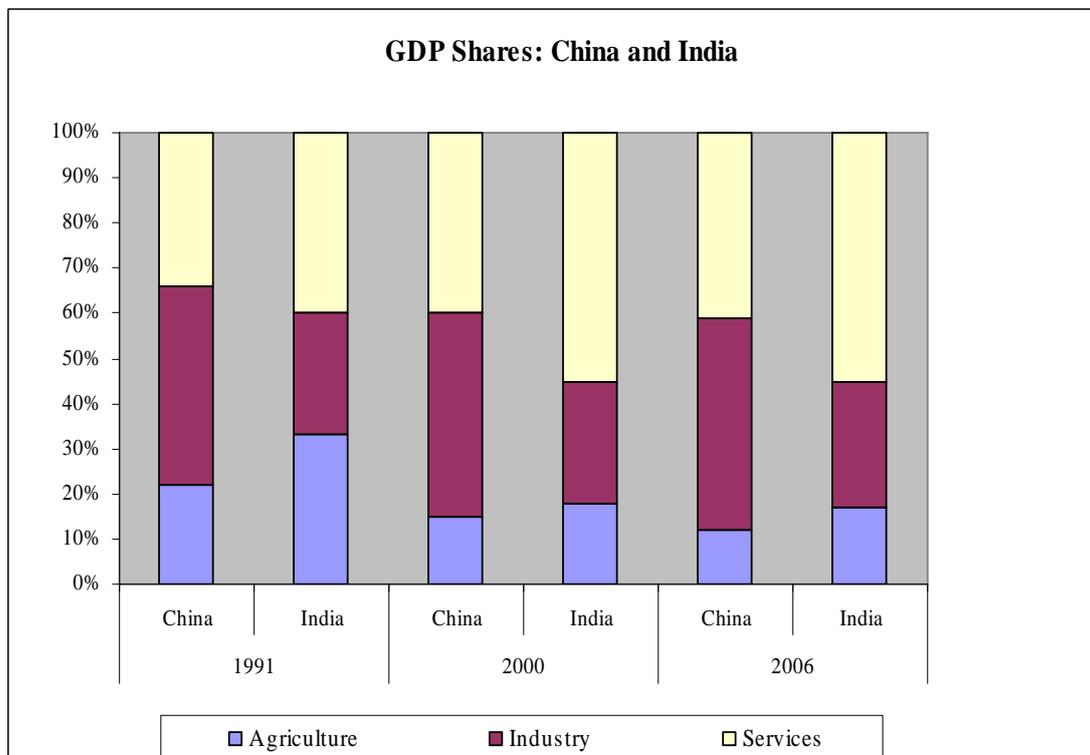
Average Annual Growth %								
China				India				
	GDP	Agriculture	Industry	Services	GDP	Agriculture	Industry	Services
1990-2000	10.4	4.1	13.7	10.2	6	3	6.3	8
2000-2005	9.6	3.9	10.9	10	7	3.9	7.5	8.5
2006-07(Q2)	11.5	4	13.6	10.6	9.4	2.7	11	11
GDP Shares (Value added as % of GDP)								
China				India				
	GDP	Agriculture	Industry	Services	GDP	Agriculture	Industry	Services
1991	100	22	44	34	100	33	27	40
2000	100	15	45	40	100	18	27	55
2006	100	12	47	41	100	17	28	55

**Source:** Handbook of Statistics of the Indian Economy (various years), Reserve Bank of India.  
World Development Indicators (various years), World Bank  
(Author's calculations)

**Figure 1a: Average Annual GDP and Sectoral Growth %**



**Figure1b: GDP Shares**



As Table 2 above reports, and Figures 1a and 1b depict, the shares and the growth rates of the three major sectors of the Chinese and the Indian economies have been very different over the period covered, viz. 1990–2006. As observed earlier, the usual pattern of evolution of an economy as it develops is to experience a decline in the output share of its primary sector, and an increase in that of the industrial sector, and then, as it becomes more affluent, in its service sector. Employment in the three sectors also usually follows a similar pattern. Several studies in the area (Inman 1985, Kongsamut, et al 2001) however have found that, with growing affluence, it is the share of services that increases more in terms of output and employment, with a decline in agriculture's share and modest increases in the share of industry. The experience of India and China over the period of their faster economic growth has been different in several ways. First, while the output share of agriculture has declined in both countries, the fall has been faster in China; second, the employment share of agriculture in India is much higher, at around 57% of the labour force, than China's 47% (Bosworth and Collins 2007). While the performance of India's service sector in many ways has been quite spectacular, it has not contributed much to employment growth. This aspect of the Indian service sector is elaborated on a bit more, later in the article.

Turning to the relative shares of industry in the two countries, China has been significantly ahead of India with 47% of GDP, in value added terms, against India's 28% in 2005/06. Employment in India's organised industrial sector is low at around 7 percent of the labour force, and has been in steady decline since the early 1990s. (Jha and Negre 2006, p.10). The employment share of non-agricultural manufacturing in India is around 22%, which contrasts with around 44% in China ((Bottelier 2007, Table A4, p.134). Industrial growth too has been slow in India. More seriously perhaps, the absolute number of workers employed in the organised manufacturing sectors had declined from its peak of 6.79 million in 1995 to 6 million by 2003 (World Bank, World Development Indicators 2006, p.216)

The shares of the service sector of China and India have also changed in different ways. The growth rate of the service sector over the decade 1990-2000 was 10.2% for China and 8.0% for India; over the next five years, 2000-2005, the rates changed to 10% and 8.5% respectively. Because of the decline in the share of the agricultural sector in both countries, GDP growth has come to be sourced more from the other two sectors. In the Indian case, however, the industry share of GDP had remained stagnant at under 30%. There has been a surge in industrial growth in 2006-07, but this seems to have slowed by the end of 2007 (*The Times of India*, 12 February 2008). China, on the other hand, has had a larger industrial sector, and it has grown steadily, even spectacularly, over the period 1991-2006. The share of China's service sector too has grown over the period, and its growth rate has been faster than India's, except in the year 2006-2007 (reported for part of the year in Table 3). The GDP share of the sector, however, is significantly smaller for China.

## 6. ANALYSING AGGREGATE AND SECTORAL GROWTH PERFORMANCE

### 6a. Factor-use and Factor Productivities

So, where has the observed economic growth come from? An economy grows by employing more factors like capital and labour, and by achieving efficiency gains, captured as total factor productivity<sup>4</sup>. Therefore, by using growth in labour employment and output per worker it is possible to decompose observed growth. Let us proceed then to compute how much of the observed growth in output per worker came from the use of physical capital per worker, and how much of it from factor productivity. This would help quantify the relative contributions of the two major components of GDP growth.

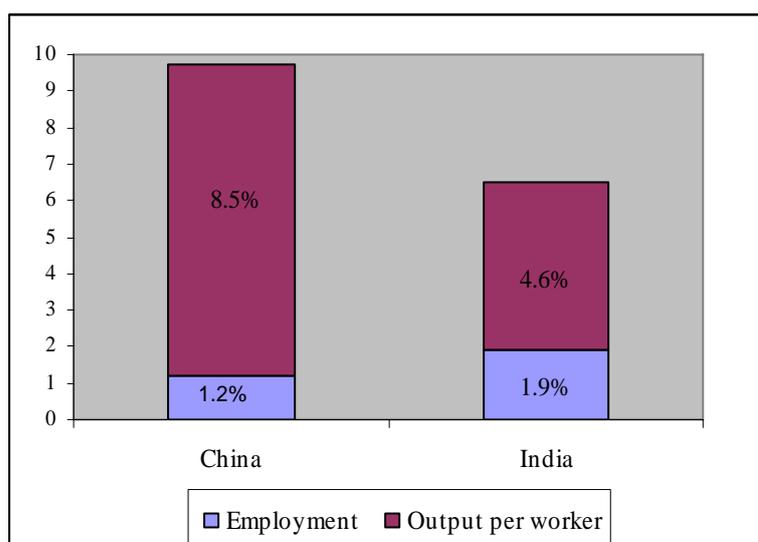
**Table 4: Decomposition of Observed GDP Growth 1993 -2004 (%points)**

	Output	Employment	Output per worker
China	9.7	1.2	8.5
India	6.5	1.9	4.6
<b>Sources of Output Growth per Worker 1993 -2004 (% points)</b>			
	Physical capital	Factor productivity	
China	4.2	4.0	
India	1.8	2.3	

Source: Bosworth and Collins 2007, Tables 1 and 2.

<sup>4</sup> Total or multifactor productivity is a composite of both labour and capital; it measures part of the output growth that cannot be attributed to the growth in labour and capital input in the production process. It reflects growth due to improvement in the efficiency of a firm's operation which may come from technological advance, innovation in management systems and so forth that enable producing more output with identical labour and physical capital inputs.

**Figure 2a:**



**Figure 2b:**

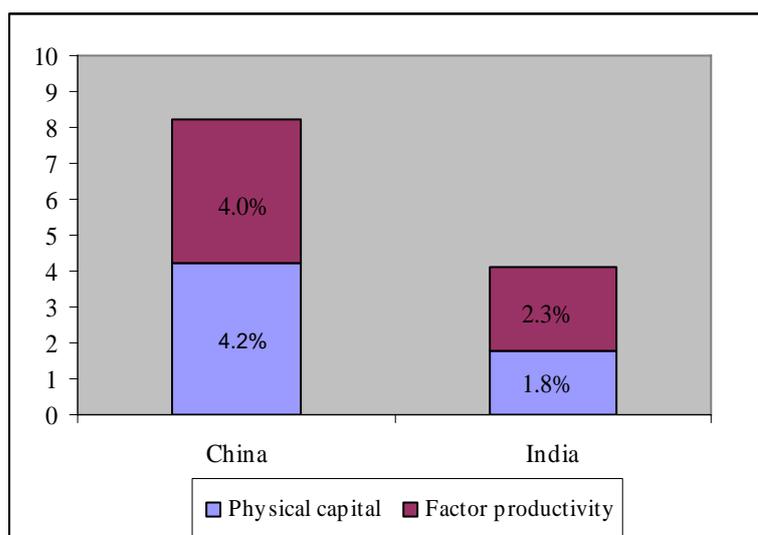


Table 4 presents the information on these statistics for the total output of the two countries for the period 1993-2004. Although several studies (See Virmani 2002; Srinivasan 2005; Jorgenson and Vu 2005, for example) have examined the performance of the two economies over earlier periods, the main reason for choosing this period here is that it was in the 1990s that India launched its major reform programme, following the “economic crisis” of 1991, while China continued with its own reforms begun earlier. The impact of these reforms on a major macroeconomic aggregate, viz. the GDP of the two economies, over the period chosen is therefore of particular relevance.

The results, based on the recent and revised estimates of Bosworth and Collins, cited under the Table, show that labour employment growth contributed more to India's GDP growth than it did to China's; while it was the opposite with output per worker, its contribution being higher for China. The next logical step, of course, is to decompose the labour productivity growth by quantifying the contributions of physical capital and total factor productivity (TFP), i.e. improved efficiency, to output growth. The results, reported in bottom part of Table 4, clearly show that the contributions of both physical capital and TFP growth are higher for China and than they are for India.

India's greater reliance on labour employment relative to China's appears to be in line with the demographic trends of the two countries. India's working age population, at 60% of the total population in 2005, is projected to rise to 61% by 2050, and the dependency ratio (ratio of working to non-working populations) to fall from 67% to 64% (UN 2006). China's working-age population, at 67% of total population, by contrast, is projected to fall to 53.3% by 2050 (UN, 2006, Table VI.10), and the dependency ratio to rise sharply from 57% to 88% (Srinivasan 2006, p.10) These trends would suggest that China will need to learn to rely less on increasing labour employment than would India to contribute to its growth process. The evidence cited in Table 4 would indicate that this is already happening.

Let us turn now to the decomposition of the observed growth of the three broad sectors viz. agriculture, industry and services, the following observations based on the findings reported in Table 5 are pertinent: first, China achieved faster output growth in all three sectors than did India. Second, its growth was sourced more from improved labour productivity, and less from labour employment in both agriculture and industry. Labour employment of China's service sector however was higher, and TFP significantly lower than India's. India's performance in agriculture was particularly poor in all respects relative to China's. The contributions of labour productivity and TFP to India's agricultural output growth rates were less than one-third of China's. It is only in the service sector that India's performance compares favourably with China's. India achieved high growth in this sector with less additional labour and less capital per worker than did China.

**Table 5: Decomposition of Growth by Major Sectors 1993- 2004  
(Annual percentage change)**

	Output	Employment	Output per worker
Agriculture			
China	3.7	-0.6	4.3
India	2.2	0.7	1.5
Industry			
China	11.0	1.2	9.8
India	6.7	3.6	3.1
Services			
China	9.8	4.7	5.1
India	9.1	3.7	5.4
<b>Sources of Output Growth per Worker 1993 -2004*</b>			
	Physical Capital	Factor Productivity	
Agriculture			
China	2.1	1.8	
India	0.7	0.5	
Industry			
China	3.2	6.2	
India	1.7	1.1	
Services			
China	3.9	0.9	
India	1.1	3.9	

Source: Adapted from Barry Bosworth and Susan Collins, 'Accounting for Growth: Comparing China and India', January 2007. *NBER Working Paper No 12943*, Cambridge, Massachusetts

Note: \*Contributions of other factors such as land etc, have been left out.

### **5b. India's Service Sector Performance: A Closer Look**

There is considerable interest in the contemporary development literature in the role of the service sector in the development process (Bhagwati 1984; Echevarria 1997; Hansda (2002) and Kongsamut et al 2001, for example), and also in India's notable success in this sector. We discuss briefly some of the issues and factors in the debate about the service sector generally, but relating it to India's performance in the sector.

One explanation for the observed spurt in India's service sector growth is that, as per capita income and the level of affluence grows with economic development, the demand for services grows faster than the demand for commodities because the income elasticity of demand for services is greater than one. Hansda (2002) estimates for example that the share of services in India's private final consumption has grown

nearly three times between 1950/51 and 1999/2000. This is a demand-side influence on the growth of services. A second, supply-side, explanation runs in terms of what Bhagwati called “splintering”. This refers to the observed tendency on the part of industrial firms, as an economy grows and becomes more sophisticated, to outsource many specialised services, such as legal, accounting and security services, to specialist suppliers outside the firms. A frequently used external-sector-based explanation is that increased integration with the world economy tends to attract offshore service providers to locate themselves in low-cost developing economies. The call-centre and data processing activities that have come to locate in many developing countries, including India, appear to lend support to this explanation.

One rather curious aspect of India’s success in the service-oriented activities is its limited impact on employment generation, and also its limited dependence on gross capital formation. Despite its rapid growth over the decade of the 1990s, the service sector employed proportionately fewer workers - 23.5% of the workforce, down from 24.4, and less capital - gross capital formation was 39.6%, down from 41.2%. The growth, as observed earlier, came largely from improved labour and total factor productivity. One possible reason for this could be that growth in this sector has been concentrated in the areas of service that are more skill-intensive, and less capital- or unskilled-labour intensive (Gordon and Gupta 2003, p.10).

## **6. WHERE ARE THE TWO GIANTS HEADED?**

### **6a. The Growth Ingredients and their Future**

Given the rapid growth and significant transformation of China and India in a relatively short period, the question naturally arises as to the future prospects of these economies. Can they continue along the fast-growth path, and transform themselves into high-income economies, or will their growth slow down? We examine briefly some factors and forces that might help us understand the issues that the two countries must address.

The importance of labour supply, capital formation and technological progress in the growth process is well understood. This article has examined in detail what the role of these factors has been in the evolution of the two economies in recent years. It was observed in this connection that China faces the prospect of declining labour supply and a rising demographic dependency ratio. China's growth has been underpinned by high industrial growth and high net export growth. To sustain the former against the backdrop of a declining active population, China will need to transfer labour from the other sectors such as the primary (including agriculture) and the service sectors. Since almost a half of China's labour force is still in agriculture, and the GDP share of it is declining, such a scenario would seem at least feasible. However, such transfers are neither costless nor instantaneous. Re-training agricultural labour and fitting them into industrial, usually urban, jobs would involve investment. In any case, a scenario of labour shortage always involves rising real wages which, in turn, could adversely affect industrial competitiveness.

India's demographic prospects are more favourable as its population will continue to grow in a manner that will keep the economically active labour force rising even around 2050. This has sometimes been referred to as India's "population dividend". Around 60% of India's labour force is employed in agriculture and related activities, as observed earlier. The industrial sector of the Indian economy is smaller, and has grown at a slower rate, than China's. Therefore, it has not absorbed India's growing labour supply; neither has the large and faster growing service sector of the Indian economy. Both of these sectors would need to grow in a manner that uses labour, but it is not easy to prescribe how that can be achieved. The much talked-about greening of India's population, therefore, is a major policy challenge facing India in the years to come.

Turning to the prospects of capital availability in the two countries, it has already been observed that China has been more successful than India both in generating domestic savings, and attracting foreign direct investment. Indeed, China's growth has been sustained largely by domestic investment and net export growth. With rising affluence levels, marginal domestic consumption is likely to rise, for a while at least, putting pressure on savings and therefore domestic-sourced investment. Especially, with an ageing population - the median age of the Chinese population is about 33

years, 24 years in India (Bardhan 2006, p.6), it would be more difficult to encourage postponing consumption to generate additional savings. China's heavy reliance on inward FDI has been a notable feature of its fast growth process. Much of such investment however has been from China's large diaspora who have been investing in foreign-investment Enterprise (FIE) type businesses that are unable to raise finance domestically. These investments have financed 'contract production' on behalf of the foreign investors. There is also increasing international competition for available FDI, and the prospects of risk-adjusted return in destinations other than China would determine how much of such investments, including those from Chinese expatriates, continue heading China's way.

India's performance in respect of both domestic savings and investment has been a lot poorer relative to China's, as observed earlier. Of late, however, there have been marked improvements in both of these, as has also been reported earlier. To sustain GDP growth rates of 8 -10%, as talked about by policymakers, is likely to require the national investment rate to be higher than the current rate of 34% which itself might prove difficult to sustain. As a capital scarce country, India has been in an unusual position of being a net capital exporter in the years 2003/04 and 2004/05, as Indian businesses take up offshore investment opportunities. From the point of view of employment generation, the major drawback of the India's development process, it may be argued, has been the stagnation of India's organised manufacturing sector discussed earlier. It is only this sector that has the potential to absorb the rising number of relatively unskilled workers that characterises the economy. Without significant investment in this sector, faster growth won't materialise. The Bosworth and Collins study observes (p.20) that current rates of capital accumulation can support a GDP growth rate of near 7%.

Technological progress has always been a major ingredient of economic growth. The nexus between growth and technological progress is a two-way one. Both India and China have experienced an improved contribution from technology, as reflected in their labour productivity and TFP performance records reported earlier. China's achievement, however, has been more in the industrial sector, while India's in the service sector. Over the period 1993-2004, China achieved nearly a 10% increase in industrial output per worker by significantly improving the contributions of both increased capital per worker and TFP. India's notable success in the service sector was achieved with a modest increase in the contribution of capital per worker, and a significant improvement in TFP, as detailed Table 5. A somewhat broad measure of the efficiency of capital use in production processes at the aggregate level is the incremental capital-output ratio, i.e. the ratio of additional capital investment to the increase in GDP. This ratio is currently 4 for China and 3 for India (Bardhan 2006, p.9), indicating a more efficient use of capital by India. Both economies would need to enhance their technological capabilities to sustain their growth at high rates.

Among the other factors that affect a country's growth performance are the extent and quality of its physical infrastructure, such as roads, transport and communication, power supply and so forth; and societal infrastructure such as education, health and

the legal and administrative institutions. India's physical infrastructure is significantly behind China's in every respect (Bardhan 2006, pp.6-8; Bottelier, p.127). In education and health too China has achieved better outcomes than India. Bosworth and Collins investigation (2007, p.10) into returns to different levels of education in India found low returns to primary education, and a rising return to tertiary, possibly suggesting an increasing shortage of workers with higher education.

India's democratic political system may make its legal framework somewhat more transparent than China's and that, in turn, might make for better protection of property rights in India than in China, although China too is beginning to permit private property rights in a gradual manner. However, as revealed in the various reports of the corruption monitoring body Transparency International ([www.transparency.org/publications](http://www.transparency.org/publications)), entrenched corruption at all levels continues to characterise both Chinese and Indian economic, social and political institutions. The inefficiency and wasteful use of resources that corruption and other rent-seeking activities engender must affect the growth process adversely in both countries.

#### **6b. Can India Ever Catch up with China?**

An interesting question in regard to the recent growth of these two most populous countries must be whether their per capita GDPs can converge in the foreseeable future? By its very nature, of course, the answer to the question must largely be speculative. China has the advantage of its early start (1978) in respect of economic reform, and was already at a higher level of per capita income when India embarked on its major reform programme in 1991. This higher base has then progressed with higher annual growth rates; so the compounding mechanism has made China gain even more ground in the "race". Where each country will be at any particular point in the future will depend on many variables, among them would be the growth rates of inputs like labour and capital, TFP growth and catch-up, and the diffusion patterns of technology from developed to the developing countries. One study that has attempted this projection, with various assumed scenarios with regard to the factors just mentioned, projects China's GDP to overtake North America's in 2022 and Europe's in 2027, and India's in 2042 and 2043 respectively (Guest and McDonald 2007, p.15). With India's population projected to rise well into this century, it looks distinctly unlikely that India will catch up with, let alone surpass, China in the foreseeable future.

## 7. HOW DO THE GIANTS MEASURE UP IN TERMS OF THE WELLBEING OF THEIR PEOPLES?

The ultimate aim of economic development is to improve the living standards and the general wellbeing of people. So, with the rapid growth that China and India have achieved over recent years – China longer than India – how have the wellbeing of their respective populations been affected?

This issue of wellbeing is, of course, multidimensional. To gain some idea of the state of wellbeing of the peoples of these two countries, therefore, we examine some selected aspects of their lives in line with the ideas of the Millennium Development Goals (MDG) set out in the UN Millennium Declaration of 2000. The MDG set includes 8 goals, 18 targets and 40 indicators, which are to be used to assess progress in world development over the period 2000-2015 (UN 2000, 2005)

The Asian Development Bank ([www.adb.org/india](http://www.adb.org/india); [www.adb.org/prc](http://www.adb.org/prc)) has used four of the goals as indicators of where China and India currently are. The four goals are: (i) percent of population living on less than \$1 a day; (ii) percent of population living below the national poverty line; (iii) under-5 mortality rate per 1000 live births, and (iv) percent of population with access to safe water.

China's score in three out of the four areas are better than India's. Only 8% of the Chinese population live on less than \$1 a day (2006), as against 30% of Indians (2003); the figures for indicator (ii) are 2.3% (2006) for China, and 28.5% for India (2005); for indicator (iii) China's 27 compares with India's 74 (both 2005), and for indicator (iv) China's 77 compares with India's 86 (both 2004).

China and India are both poor developing countries, as indicated by their GDP per capita figures cited earlier; they have both been seeking to achieve reduction in their poverty levels. China's success in this respect has been significantly more than India's. If the poverty level is set at (ppp adjusted) \$1 a day, the number of poor people in China has dropped steadily from 634 million in 1981 to 308 million in 1987 and 212 million in 2001; India's figures for the same years are 382 million, 370 million and 359 million respectively (Chen and Ravallion 2004).

If the poverty line is set at \$2 dollars a day, the number of poor in China has fallen again from 876 million to 731 million and 594 million in the three selected years; the comparable figures for India are 631 million, 697 million, and 826 million in the three selected years – a large *increase* in the number! Indians are seemingly getting out of abject poverty, but only into slightly less abject poverty.

Indian policymakers have long used calorie deficiency as a measure of 'deprivation', or poverty, amongst its population. The inability to achieve a minimum per capita daily calorie intake of 2,400 in the rural areas, and 2,100 in the urban is considered as deprivation. Using this norm, the World Bank (2004) estimated that 62% of the Indian population suffered deprivation in 1990, 53% in 2000, and expected that this figure

will fall to 31% by 2015. Other studies (Chatterjee et al 2007; Patnaik, cited in Jha and Negre 2007, p.22), however, suggest a much higher, and rising, level of deprivation.

It is sobering to accept that, with all the encouraging signs of India's improved economic performance over recent years, as elaborated in this article, India continues to be the largest single source of dire poverty in the world. The benefits of economic development are clearly yet to reach the vast number of very poor people in India, and a smaller, but significant number, of poor people in China.

The UN Development Programme has, since 1990, been using the Human Development Index to rank countries according to their performance in three key indicators of development, viz. health, education and average income, each measured in a consistent manner. The latest figures (2007) show India's rank, out of the 177 countries, pretty low at 128, two positions lower than a year ago. China, on the other hand, is placed much higher, at 81. This difference signifies that the Chinese, on average, are healthier, with better educational opportunities and higher living standard than the Indians, on average.

## **8. CONCLUDING OBSERVATIONS**

The article has examined a large number of issues relating to the growth and development patterns of the world's two most populous nations in recent times. The findings help explain the factors and forces that have shaped the two countries' economic performance. There are some obvious lessons to be learnt from the experiences of China and India, both by the two countries themselves, and by other developing countries.

There are many issues the article has not addressed such as for example the impact on the world's resources, particularly non-renewable resources, as the two large economies keep absorbing larger proportions of them. Likewise, what are the likely consequences of these two giant economies' rapid development on the world's physical, social and cultural environments? The present geo-political configuration of the world must also alter to accommodate the two Asian countries in the interest of world peace and harmony.

## REFERENCES

- Asian Development Bank (2005), *Asian Development Outlook 2005: I. Developing Asia and the World*,  
([www.adb.org/documents/books/ado/2005/part010208.asp](http://www.adb.org/documents/books/ado/2005/part010208.asp)).
- Balassa, B. and Associates (1971), *The Structure of Protection in Developing Countries*. Baltimore: Johns Hopkins University Press.
- Bardhan, P. (2006), 'Awakening Giants, Feet of Clay: A Comparative Assessment of the Rise of China and India', *Journal of South Asian Development* 1:1, 1-17.
- Barro, R. (1990), 'Economic Growth in a Cross-section of Countries', *Quarterly Journal of Economics* 106: 407-443.
- Bhagwati, J. (1984), 'Splintering and Disembodiment of Services and Developing Nations', *World Economy* 7: 133-143.
- Blecker, R. (2002), 'The Balance-of-Payments-Constrained Growth Model and the Limits to Export-led Growth', in *A Post Keynesian Perspective on Twenty-first Century Economic Problems*, edited by Paul Davidson, pp. 69-88, Northampton, MA: Edward Elgar.
- Bottelier, P. (2007), 'India's Growth from China's Perspective', *Journal of Applied Economic Research* 1:119-138.
- Bosworth, B. and Collins, S.M. (2007), 'Accounting for Growth: Comparing China and India', National Bureau of Economic Research *Working paper no. 12943*, Cambridge Massachusetts.
- Chatterjee, S., Rae, A. and Ray, R. (2007), 'Food Consumption and Calorie Intake in Contemporary India', *eSocial Sciences Working Paper*, September: 1-14.
- Chen, S. and Ravallion, M. (2004), 'How Have the World's Poorest Fared since the Early 1980's?' *World Bank Research Observer*, 19(2):141-70.
- Chenery, H. and Strout, A. (1966), 'Foreign Assistance and Economic development', *American Economic Review* 56:680-733.
- Desai, M. (2005), 'India and China: An Essay in Comparative Political Economy', In Tseng, W. and Cowen, D. (eds.), *India and China's Recent Experience with Reform and Growth*, Chapter 1. Washington DC: International Monetary Fund.
- Echevarria, C. (1997), 'Changing Sectoral Composition Associated with Economic Growth', *International Economic Review* 38:431-52.
- Erturk, K. (2001), 'Overcapacity and the East Asian Crisis', *Journal of Post Keynesian Economics* 24(2):253-276.

- Gordon, J. and Gupta, P. (2003), 'Understanding India's Service Revolution', Paper prepared for the IMF-NCAER Conference, *A Tale of Two Giants: India's and China's experience with Reform, November 14-16, 2003*, New Delhi, India.
- Government of India (various years), *The Economic Survey*, Ministry of Finance, New Delhi.
- Guest, R. and McDonald, M. (2007), 'Global GDP Shares in the 21st century – An Equilibrium Approach', *Economic Modelling* 24(6): 859-877.
- Hansda, S. (2002), 'Service Sector in the Indian Economy: A Status Report', *Reserve Bank of India Staff Studies*, Department of Economic Analysis and Policy, Reserve Bank of India, Mumbai.
- Helpman, E. (1989), 'The Simple Analytics of Debt-equity Swaps', *American Economic Review* 79:440-51.
- Inman, R. (1985), Introduction and Overview, in *Managing the Service Economy: Prospects and Problems*, Cambridge University Press, Cambridge, U.K.
- Jha, P. and Negre, M. (undated), 'Indian Economy in the Era of Contemporary Globalisation: Some Core Elements of the Balance Sheet', Centre for Economic Studies and Planning, Jawaharlal Nehru University, New Delhi, India.
- Jha, R. (2007), 'The Indian Economy: Current Performance and Short-term Prospects', *Working Paper 2007/04*, Australia South Asia Research Centre, Australian National University, Canberra, Australia.
- Jorgenson, D. and Vu, K. (2005), 'Information Technology and World Economy', *Scandinavian Journal of Economics* 107(4): 631 -650.
- Kaplinsky, R. (2000), 'If You want to get Somewhere Else, You Must Run at least Twice as fast as that: The Roots of the Asian Crisis', *Competition and Change: The Journal of Global Business and Political Economy* 4(1): 1-30.
- | Kongsamut, P., Rebelo, S. and Xie, D. (2001), 'Beyond Balanced Growth', *IMF Working Paper*, WP/01/85.
- Lucas, R. (1988), 'On the Mechanics of Economic Development', *Journal of Monetary Economics* 22: 3-42.
- Palley, T. (2002), 'A New Development Paradigm: Domestic Demand-led Growth', FPIF Discussion Paper ([www.fpif.org/papers/development\\_body.html](http://www.fpif.org/papers/development_body.html)).
- Patnaik, U. (2006), 'Poverty and Neoliberalism in India', Centre for Economic Studies and Planning, Jawaharlal Nehru University, New Delhi.
- Reserve Bank of India (various issues), *The Handbook of Statistics of the Indian Economy*. Mumbai, India.

- Romer, P. (1990), 'Endogenous Technological Change', *Journal of Political Economy* 98: S71-S102.
- Srinivasan, T.N. (2002), 'China and India: Growth and Poverty 1980-2000', mimeo, Yale University.
- \_\_\_\_\_ (2005), 'Productivity and Economic Growth in South Asia and China', paper presented at the Annual Conference of the Pakistan Society Development Economics, Islamabad, Pakistan, December 19-21, 2005.
- \_\_\_\_\_ (2006), 'China, India and the World Economy', unpublished.
- United Nations (2000), 'UN Millennium Declaration': UN General Assembly Resolution 55/2, New York: United Nations
- \_\_\_\_\_ (2004), [www.millenniumindicators.un.org](http://www.millenniumindicators.un.org) Data for 2004.
- United Nations Economic and Social Affairs (2006), *World Population Prospects: The 2006 Revision*, New York: United Nations.
- U.N. Development Programme (2007), *Human Development Report*. New York: United Nations.
- Virmani, A. (2004), 'Sources of India's Economic Growth: Trends in Total Factor Productivity', *Working Paper* No. 131, Indian Council for Research on International Economic Relations, New Delhi (Website: [www.icrier.org](http://www.icrier.org)).
- Westphal, L. (1990), 'Industrial Policy in Export-propelled Economy: Lessons from South Korea's Experience', *Journal of Economic Perspectives* 4(3): 41-59.
- World Bank (1993), *The East Asian Miracle: Economic Growth and Public Policy*. New York: Oxford University Press.
- World Bank (various years), *World Development Indicators*, Washington D.C.: World Bank.
- World Bank (2004), 'Attaining the MDGs in India: How Likely and What will it take to Reduce Infant Mortality, Child Malnutrition, Gender Disparities and Hunger-Poverty, and to Increase School Enrolment and Completion'. Human Development Unit, South Asia Region, New Delhi.

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