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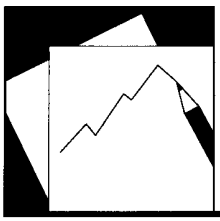

IMF Working Paper

Wild or Tamed?
India's Potential Growth

Hiroko Oura

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Asia and Pacific Department

Wild or Tamed?: India's Potential Growth

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Authorized for distribution by Charles Kramer

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Abstract

With India's GDP expanding at a rate above 8 percent in recent years, the debate about whether India is overheating revolves mainly about whether growth is above potential—that is, whether the economy is exceeding its "speed limit." This paper attempts to shed light on this debate by providing up-to-date projections of India's potential growth, including by clarifying differences in underlying assumptions used by various researchers that lead to a range of estimates. Estimates of potential growth on this basis range from 7.4 percent to 8.1 percent for 2006/07, and about 8 percent for the medium term. The medium-term potential estimates have risks on both sides: productivity gains and investment could be volatile, but determined reforms could sustain strong productivity growth.

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Keywords: India, potential growth, economic growth

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I. INTRODUCTION

Uncertainties over India's potential growth have increasingly become a prime policy issue recently. On one hand, real GDP growth has been over 8 percent[2] for the past four fiscal years, up from an average of just below 6 percent in the decade up to 2002/03, and growth has further accelerated to over 9 percent in the last two years. This surge in growth has fostered much optimism: for instance, Oxus Investment (2007) suggests that India has entered to a new growth trajectory of about 9 percent underscored by strong upticks in investment, and the Planning Commission of India has announced a target GDP growth of 8−10 percent for the next five years in its Approach Paper for the 11th Plan. On the other hand, signs of rising demand pressures—including inflation, higher capacity utilization, and strong non-oil imports—suggest that the current growth rate is above potential[3] and require policy measures to cool down the economy.

Assessing potential growth of an economy that is going through extensive structural changes (as India is) is inevitably accompanied by significant uncertainties, requiring careful investigation of underlying assumptions. Because the pickup in growth has occurred only recently, there is not enough data on it to detect statistically any recent structural break. Thus, assessments of potential growth must rely heavily on judgment. This fact partly explains the widely ranging estimates of potential growth found in the literature. This paper compares different estimates in detail and examines the sources of disparities, with a view to deepening our overall understanding of India's current growth performance and its sustainability in the future.

This paper attempts to clarify the sources of different estimates of India's potential growth, and provide a medium-term potential growth projection building upon existing exercises. A standard growth accounting framework and estimates from existing studies are drawn upon to provide a range of estimates for current and medium-term potential growth. Among the studies drawn on, Rodrik and Subramanian (2004a) and Goldman Sachs (2007) make growth projections for India based on historical growth patterns. World Economic Outlook (WEO) (2006) and Bosworth and Collins (2006) conduct up-to-date growth accounting exercises for selected economies including India, but do not explicitly project India's potential growth. The historical estimates in these studies are extended and updated using the latest data to project medium-term potential growth.

The rest of the paper is structured as follows. Section II discusses the results from recent potential growth/growth accounting exercises on India and provides baseline projections for each component in the future. Section III discusses risks to the projections, and Section IV concludes.

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[2] At market prices. Fiscal year starts in April.

[3] IMF Country Report, No. 07/63, *India—Staff Report for the 2006 Article IV Consultation*.

II. Sources of Growth and Their Future Prospects

A. Framework

The four aforementioned papers serve as the basis for our discussion (Rodrik and Subramanian (2004a), Poddar and Yi (2007), WEO (2006), and Bosworth and Collins (2006)).[4] Parameter estimates and projections from these papers are summarized in Table 1. They commonly adopt a standard growth accounting framework with a Cobb-Douglas production function:

$$y(t) = a(t) + \alpha k(t-1) + (1-\alpha)(n(t) + h(t)) \qquad (1)$$

where y: real GDP growth rate; a: total factor productivity (TFP) growth rate; k: physical capital stock growth rate,[5] n: labor force growth rate; h: human capital growth rate; α: capital share.

B. Factor Share

The studies employ similar values for the capital share parameter, varying from 0.3 to 0.4, a range similar to that often observed in industrial countries. This would be an appropriate approximation as indicated by Gollin (2002), who finds that the labor share is fairly constant across space (rich and poor countries) and time once labor earnings for small firms and the self-employed are properly accounted for. While a rough calculation based on national account data gives a labor share ranging from 0.05 to 0.8 across countries, he shows that proper adjustment for income of the self-employed, which is often (inappropriately) classified as capital income, stabilizes the labor share in a range of 0.65−0.80. All that said, Bosworth, Collins, and Virmani (BCV hereafter) (2007) pointed out that relatively small differences between the growth rates of capital and labor in the past made growth accounting results for India relatively insensitive to the choice of factor share parameters.

[4] BCV provide additional angles on India's growth performance, their estimates per se are very similar to those of Bosworth and Collins (2006).

[5] Capital stock is measured at end-period. Therefore, the capital stock as of end t-1 is used for production at time t, implying one lag for the capital stock growth rate in the growth accounting formula.

Table 1. India: Potential Growth Accounting 1/

	Rodrik-Subramanian (a)	Poddar-Yi 2/	WEO	Bosworth-Collins
Publication year	2004	2007	2006, fall	2006
Capital share (α)	0.35 (Bosworth-Collins, 2003)	0.33 (0.3-0.4)	0.35 (literature standard)	0.4
TFP projection/estimation	(Underestimated) projection of 2.5 percent (same rate as past two decades)	3.3 percent for 2006–20 (based on estimate of 3.5 for 2003–05, 1.3 for 1990–99, 1.4 for 1980–89, and –2.2 for 1971–90)	Estimate: 3.2 percent for 2002–05, up from 1.5 percent during 1982–2001	2.3 (1993–04), up from 1.1 during 1978–93
Capital stock growth	Recent 6 percent will increase to 8.3 percent reflecting favorable demography that increases saving rate by 14 percent of GDP between 2000–2025.	8.3 percent for 2010–20 (constant ICOR with 8 percent GDP growth), up from 5.6 percent for 2003–05	8.1 percent for 2005 (6.8 percent for 1996–05), extended estimate based on Nehru-Dhareshwar using 4 percent depreciation. +2.3 percent with improved demography (Rodrik&Subramanian)	6.4 percent for 1993–04
Labor projections	UN working age (1.9 percent)	UN working age (1.9 percent)	(Assume UN working age (1.9 percent))	National household survey for historical estimate 1.9 percent for 1993–04. (Assume U.N. 1.9 percent growth for projection)
Human capital projections	...	2.0 percent average education attainment for population above 15 based on Barro and Lee (2003) Raw growth rate of average schooling year.	0.83 percent estimate since 1982 takeoff based on Jorgenson Vu (2005) model for labor quality (reflecting education attainment and institutional variables)	0.67percent (1993–04) Human capital index[3/] based on household survey data on schooling
Potential growth, 2006/07 4/	6.8	8.8	8.1	7.4
Potential growth, long run 5/	7.3-7.6	9.5-9.8	8.7-9.0	8.0-8.4

1/ Based on basic growth accounting formula: $y(t) = a(t) + \alpha k(t-1) + (1-\alpha)(l(t)+h(t))$, where y: growth rate of real GDP; k: growth rate of real capital stock; l: growth rate of labor; h: growth rate of human capital; a growth rate of TFP; t time horizon indicator.

2/ Estimates in this table are higher than Poddar and Yi's original estimates reflecting the upward revision with capital stock growth data from CSO between 2006/07 and 2005/06 edition.

3/ Bosworth and Collins (2003) constructed human capital index assuming 7 percent return to schooling, i.e., H=(1+7%)^average schooling years.

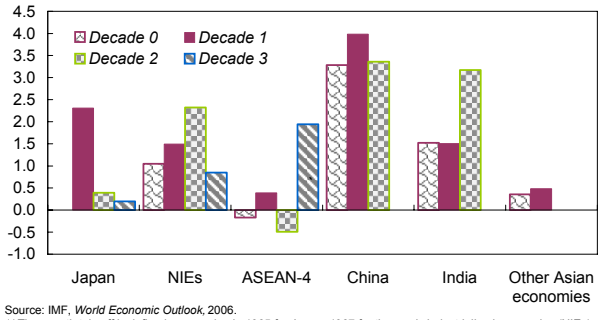
4/ Author's estimate based on each underlying study's TFP estimate for the latest year, capital share, and population/human capital assumption. CSO data for capital stock growth in 2005/06 (8.8%) is fed into as a historical input.

5/ Medium-term (2007/08–2012/13) average based on simulation results assuming each underlining study's TFP estimate for the latest year, capital share, and popullation/human capital assumption. Low end assumes the same constant investment ratio as 2006/07. High end assumes demographic gains for saving and investment ratio (10 percentage points increase in 20 years, translated into 0.5 percentage points per year increase in the medium term) in addition to fiscal consolidation effects projected by IMF staff as of 2007 April WEO. The estimates are built upon actual growth for 2006/07 of 9.4 percent.

C. Total Factor Productivity

Growth accounting analyses for India tend to produce TFP growth rates on the order of 3.2–3.5 percent for recent years (Poddar and Yi (2007) and WEO (2007) in Table 1). This rate is much higher than in India's own long-term history as well as international experience (Figure 1). The obvious question is whether such a pickup will be sustained.

Figure 1. TFP Growth in Asia, By Post-Growth Takeoff Decade 1/



Source: IMF, *World Economic Outlook*, 2006.
1/ The growth takeoff is defined as occuring in 1965 for Japan, 1967 for the newly industrialized economies (NIEs), 1973 for the ASEAN-4 (Indonesia, Malaysia, the Philippines, and Thailand), 1979 for China, 1982 for India, and 1990 for other Asian economies. Each decade corresponds to 10-year preriods following the takeoff years stated above.

The experiences of other Asian countries (excluding China) seem to suggest that even a pickup in TFP growth for a decade does not automatically imply a permanent shift in the TFP growth rate. On the contrary, TFP growth can sometimes drop sharply. What we see from Asian experience is that TFP growth can be quite volatile in the long run, and it is reasonable to think that at least a portion of the recent hike in Indian TFP reflects cyclical factors, rather than permanent structural changes. Of course, if one takes the Chinese experience as a base, even a very optimistic scenario with multiple decades of 3.5 percent TFP growth cannot be ruled out. Nevertheless, it would not seem reasonable to base judgment on one outlier, especially as the estimate for China is subject to serious statistical issues (Bosworth and Collins, 2003 and WEO, 2006). Future sustainability of high TFP growth should be discussed by looking at sources for productivity growth in general, sources that have contributed to India's TFP growth in the recent past, and their potentials in the future.

Cross-country experiences, especially in Asia, seem to suggest that policies and institutional aspects of an economy do account for productivity growth differentials. Aggregate productivity growth for an economy is explained by either cross-sector resource reallocation (shift of labor from low-productivity agriculture to the nonagricultural sector) or within-sector productivity growth. Both factors played significant roles in explaining Asia's labor productivity catch-up vis-à-vis the United States in the past three decades (WEO, 2006), and both can be enhanced by institutional factors of an economy (Table 2). For instance, estimates in WEO (2006) show that trade openness and financial sector development significantly explain the labor shift from agriculture, in addition to the initial employment share of agriculture. It also shows that productivity growth correlates with factors such as trade openness, business environment, and institutional quality. In particular, trade openness and business environment are areas that governments can take proactive measures to strengthen, implying a potentially large role for governments to sustain productivity growth.

Table 2. Determinants of Productivity Growth 1/

Variable	Aggregate Labor Productivity Growth	TFP Growth	Industry Labor Productivity Growth	Services Labor Productivity Growth	Labor Shifts from Agriculture 2/
			Policy variables and initial conditions		
Initial productivity gap (ln)	-1.9 ***	-0.8 ***	-1.9 ***	-1.2 ***	…
Initial employment share in agiculture (in percent)	-1.0 ***	-0.4 ***	…	…	0.28 ***
Intial average years of education	0.2	0.1	1.1 ***	0.7 ***	…
Trade openness	0.8 ***	0.9 ***	0.7 **	0.5 *	0.12 ***
Initial financial sector development (ln)	0.5 ***	0.2	0.5 *	0.3	0.06 **
Growth in average schooling years	…	…	…	…	0.04
Growth in capital-to-labor ration	…	…	…	…	0.04 *
R-squared	0.67	0.62	0.55	0.36	0.79
Observations/countries	77	67	58	58	55
			Adding institutional quality and the cost of starting a business		
Initial productivity gap (ln)	-1.8	-0.7 ***	-2.0 ***	-1.5 ***	…
Initial employment share in agriculture (in percent)	-0.8 ***	-0.2	…	…	0.30 ***
Initial average years of education	-0.1	-0.2	0.4	-0.1	
Trade openness	0.5 **	0.6 **	0.5	0.2	0.15 ***
Initial financial sector development (ln)	0.2	0.0	0.0	-0.1	0.07 **
Cost of starting new business (in percent of GDP per capital)	-0.4 *	-0.2	-0.7 *	-0.7 ***	-0.04
Institutional quality	0.6	0.6	1.0 **	1.1 ***	-0.04
Growth in average schooling years	…	…	…	…	0.05
Growth in capital-to-labor ratio	…	…	…	…	0.03
R-Squared	0.73	0.66	0.68	0.65	0.80
Observations/countries	74	65	57	57	53

Source: IMF, *World Economic Outlook* (2006, September).

1/ The coefficients denote the impact on the dependent variable (in percentage points) of a one standard increase in its determinants. The estimates are based on weighted least squares regressions (with robust errors) using as dependent variable the average annual value over 1965--2005 of the variables in the given column. *** denotes coefficients significant at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.
2/ Labor shifts from agriculture are defined as minus the change in agriculture's employment share. The specification includes both the initial employment share and its square, and the coefficient shown is the sum of the coefficients on the variable and on its square.

The pickup in India's productivity growth since 1980 could be related to reforms, which enhanced productivity. As documented in Kochhar and others (2006), the pro-business reforms in 1980 were accelerated in the 1990 in the wake of the external crisis, with a shift toward a more pro-market orientation including trade liberalization. What are the prospects in the future?

- First, potential productivity gains from cross-sector reallocation could be large, but might require progress in labor market reforms. BCV (2007) estimate that cross-sector reallocation effects have contributed as much as one quarter of labor productivity gains since 1980. In addition, untapped potential remains: employment in low-productivity agriculture is high (at 57 percent of total employment, compared to 47 percent in China and 34 percent in Asia), and nonagriculture labor productivity is 4–5 times that in agriculture. However, the pace of labor shifting has been slower in India than in other Asian countries. Between 1980 and 2000, the employment share of the highly-productive service sector has remained nearly flat and lower than the cross country average controlling for income and size (Kochhar and others, 2006); and industrial growth has been skewed to the capital-intensive sectors. Therefore, in order to reap potential benefits fully, further reforms to facilitate labor mobility could be needed.

- Second, potential productivity gains within a sector could also be large. Indeed, Rodrik and Subramanian (2004b) find that given the modest scope of reforms in the past 20 years, India seems to have reaped a large amount of productivity. Indeed, Rodrik, Subramanian, and Trebbi (2002) suggest that India's level of TFP is just 30−40 percent of what it should be, given its institutional, geographic, and trade openness conditions, creating scope for productivity improvements based just on catching up. In addition, Hsieh and Klenow (2007) find that improving resource misallocation across plants within an industry could give TFP gains of 40−50 percent in the Indian manufacturing sector. However, can this potential be reaped without additional steam from further reforms? This question has become increasingly relevant owing to the difficulties experienced in some parts of the reform program, such as the Special Economic Zones program, and the associated questions about how, for example, labor market reforms will accompany that program.

Overall, there is rich potential for India to sustain fast productivity growth, but risks are on both sides. As in Rodrik and Subramanian (2004a), a decade average of 2.5 percent TFP growth per year would make a conservative baseline for projection. Judging whether the averages for the recent few years of over 3 percent would mark a structural break or not requires care, especially, given the volatile TFP growth observed across countries and the difficulty of finding a proximate cause for the pickup in the form of closely preceding policy reforms.

D. Physical Capital Accumulation

India's favorable demographics, namely, a declining dependency ratio that increases saving, are often cited as a basis for higher potential growth in the future. In quantifying the impact, the key methodological questions relate to (1) translating demographic trends into the saving ratio, and (2) translating the saving ratio into capital stock growth. For different methodologies, the overall contribution to GDP growth ranges from 0.17 percent to 0.3 percent per 1 percent increase in the saving ratio. However, it should be noted that these mechanical exercises rely on implicit assumptions such as that (a) jobs are created for the rapidly increasing labor force and income is generated and saved, and (b) efficiency in the financial sector is improved to allocate savings into high-return investment projects. Both of these assumptions might not necessarily hold in the future (discussed Section III).

Furthermore, it should be kept in mind that the demographic effects emerge only in the long run. It is not appropriate to incorporate these effects into the estimate of potential growth for the current period.

From the Dependency Ratio to Saving

Existing studies on India suggest a near one-for-one relationship between the dependency ratio and national saving. Poddar and Yi (2007) uses a simple estimation technique, which regresses the national saving ratio on the lagged value of the dependency ratio, and find that a 1 percentage point decrease in the dependency ratio adds 0.8 to the national saving ratio.

Rodrik and Subramanian (2004a) use estimation results by Mulheisen (1997) on India's consumption behavior, which shows a one-for-one relationship between the dependency and saving ratios.[6]

The experience over 2000/01–2005/06—a 5.2 percentage points of GDP increase in the domestic private saving ratio, corresponding to a 4.4 percentage point decline in the dependency ratio—seems to roughly support the negative one-for-one relationship between the overall dependency ratio and domestic saving.[7] Using this one-for-one ratio and U.N. population projection implies about a 10 percent increase in the saving ratio between 2005 and 2025. (14 percent for 2000–25 is used in Rodrik and Subramanian, 2004a).

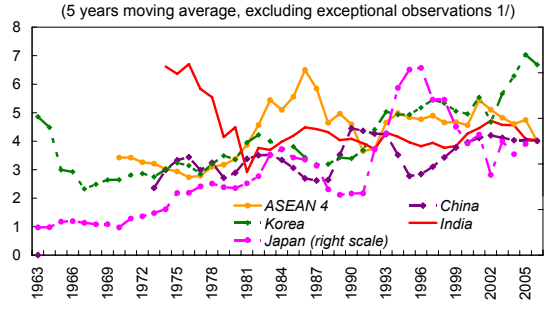
From Saving to Capital Accumulation and Growth

In estimating the impact of increased saving on growth, studies often consider increases in "financeable investment" by assuming a constant external deficit. A pickup in domestic saving, then, increases domestic investment by the same amount. However, various studies adopt different methodologies to link investment and output, resulting in a range of estimates of how increased saving affects economic growth. Poddar and Yi (2007) use a modified version of a calculation using the incremental capital output ratio (ICOR). Bosworth and Collins (2006) suggest using a steady-state equilibrium condition.

The simplest way to link saving and growth is to assume a constant ICOR and work out the direct impact of an increased investment ratio on GDP growth (GDP growth rate y = (I/Y)/ICOR). With the recent ICOR for India standing at about 3.5, the approach implies a coefficient of about 0.3 to a unit increase in the investment ratio. However, it could overestimate the impact, as the assumption implies simultaneous increases in productivity and/or labor that prevent diminishing returns to capital.

Indeed, the experiences of fast growing Asian countries seem to suggest ICOR tends to rise in the long run (Figure 2). The trend is particularly clear with early starters, such as Japan and Korea.

Figure 2. Selected Asian Countries: Incremental Capital Output Ratio
(5 years moving average, excluding exceptional observations 1/)



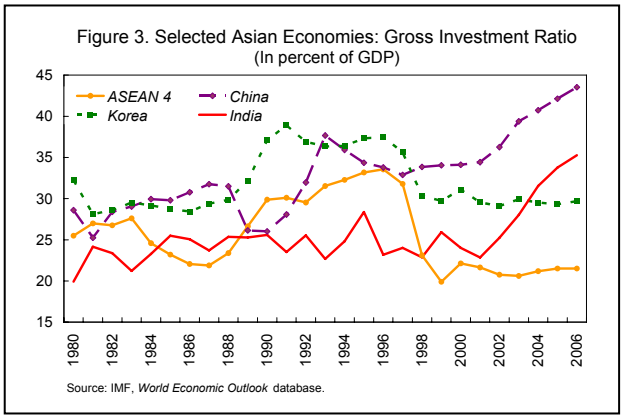
Source: IMF, *World Economic Outlook* database.
1/ Years with below 1 percent real GDP growth (often corresponds to negative growth) are dropped from calculation.

[6] Some cross-country studies on consumption in the *Asia and Pacific Regional Outlook* (2006) and on national saving in the WEO (2005) suggest that the elderly dependency ratio has a much stronger impact on saving and consumption behavior than the overall dependency ratio. In India, the projected increase in the elderly dependency ratio would actually work against growth potential. (Both of the studies include developing countries in the sample and estimate the model for a group of developing countries; and therefore, estimation is not driven by data for developed countries.)

[7] Total domestic saving increased by 9.2 percentage points of GDP, reflecting fiscal consolidation.

However, by contrast, the ICOR in India has been exceptionally stable over the past two decades. Will India continue to see a constant ICOR in the future?

The ongoing changes in the Indian growth pattern toward more investment-led growth might also be accompanied by changes in the investment-growth relationship that raise the ICOR. Indian growth in the past two decades has never been accompanied by a strong investment ratio of over 30 percent of GDP, in contrast to other fast-growing Asian countries. Indeed, the investment ratio remained fairly stable at a low level of about 22–24 percent of GDP until 2003/04 (Figure 3). In addition, relatively fast TFP growth in the past 20 years could also have limited upward pressure on India's ICOR. Yet, the magnitude of potential increase in saving and investment implied by the demographic trends is unprecedented (adding 10−15 percentage points of GDP), and the required TFP gains needed to maintain a constant ICOR might be massive.



Considering the caveats using ICOR, a simple simulation approach to project future potential growth is taken in this paper. The growth accounting equation in (1) is combined with a perpetual inventory model for capital accumulation (K(t)−K(t-1) = I(t)−dK(t-1), K: capital stock, I: investment, d: depreciation rate) to calculate future growth rate for both capital and real GDP sequentially. Dividing both sides of the perpetual inventory model by K(t-1) gives the following representation.

$$\frac{K(t)-K(t-1)}{K(t-1)} = \frac{I(t)}{Y(t)} \bullet Y(t) \bullet \frac{1}{K(t-1)} - d \qquad (2)$$

Results of the simulation exercises are presented in the next section, taking different sets of parametric assumption from the studies shown in Table 1.

E. Labor

Working age population growth (1.9 percent) as projected by the United Nations (medium fertility variant) is used for the simulations, as was done the studies in Table 1 with explicit projection exercises. As in those studies, labor input is assumed to grow at the same rate as the working-age population. No explicit assumptions on increases in the participation rate or unemployment rate are incorporated for the baseline projections; thus, the projections implicitly assume that both rates remain at present levels.

F. Human Capital Accumulation

The final factor in the growth equation is human capital. While all the approaches from each study in Table 1 are tried in the simulation, the methodology taken in Poddar and Yi (2007) will significantly overestimate the contribution from human capital accumulation compared to the other studies. In Poddar and Yi (2007) and Bosworth and Collins (2006), human capital accumulation is estimated using average schooling years (for population over age 15, compiled by Barro and Lee, 2000). Poddar and Yi (2007) take the simple growth rate of average schooling years (about 2 percent per year) as the growth rate of human capital stock. Bosworth and Collins (2003), on the other hand, calculate human capital stock by assuming a 7 percent return to average schooling year (human capital = (1+7%)^(average schooling year)), which gives about 0.7 percent human capital growth rate per year. It seems that Poddar and Yi (2007) could be overestimating the accumulation rate as WEO (2006), which took a different econometric approach, came out with a similar rate of accumulation to Bosworth and Collins (2003).[8] On the other hand, Rodrik and Subramanian (2004) did not incorporate the factor in their baseline projection.

III. Simulation Results

Potential Growth Estimate, 2006/07

Given actual capital stock growth in 2005/06 and parametric assumptions in each study, potential growth estimates for 2006/07 range from 6.8 percent to 8.8 percent (Table 1). A narrower range is obtained by using only the parametric assumptions from WEO (2006) and Bosworth and Collins (2006) (to adjust for possible overestimation in Poddar and Yi (2007) and underestimation in Rodrik and Subramanian (2004a)), namely, 7.4−8.1 percent. Notably, these estimates from the narrower range are 1.3–2 percentage points below the outturn of 9.4 percent.

Potential Growth Estimate, Medium-Term

Medium-term potential growth is simulated starting in 2007/08 based on equations (1) and (2) and parametric assumptions given in the four studies. Projections are built on actual growth rate of 9.4 percent in 2006/07, the gross investment ratio of 35.3 percent,[9] and the actual capital stock growth of 8.8 percent in 2005/06 estimated by the CSO.[10]

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[8] WEO followed Jorgenson and Vu (2005) and employed a regression model to construct a labor quality index using educational attainment and institutional variables.

[9] As of early July 2007, the expenditure side GDP data for 2006/07 were still missing errors and omission term for investment, which is needed to estimate the gross investment ratio. The ratio is tentatively estimated assuming the same value for the term in 2006/07 as that in 2005/06.

[10] CSO data show significant changes when National Account Statistics are rebased or revised. For instance, while 1993/94 based data show 3.9 percent annual growth for the 2003/04 real net capital stock, 1999/00 based data show 6.2 percent. In addition, even for the data with the same base year, the estimate for 2004/05 real capital stock growth of 5.6 percent in the 2006 *National Account Statistics* was revised upward to 7.1 percent in 2007. These types of statistical issues could give rise to significant variations among growth accounting

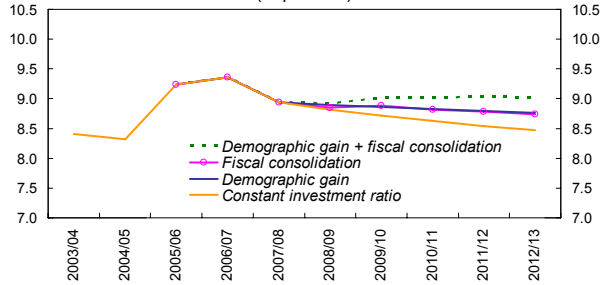
(continued…)

Four different scenarios are simulated: (1) the investment ratio remains at the same level as 2006/07; (2) the investment ratio increases reflecting additional saving from fiscal consolidation under the Fiscal Responsibility and Budget Management framework (using IMF staff projection as of Spring 2007 WEO); (3) the investment ratio increases reflecting demographics (0.5 percentage points of GDP per year, based on the U.N. projection discussed above); and (4) the investment ratio increases reflecting both fiscal consolidation and demographics. The medium-term profile of investment ratio is given in Table 3, and the following set of charts (Figures 4−7) summarizes the exercise. Notable features of the projections include:

Table 3. Assumption: Investment Ratio
(In percent of GDP)

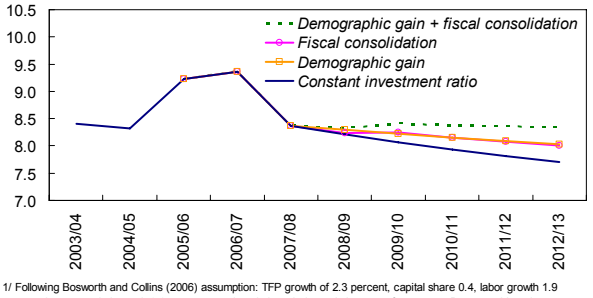
	Constant at 2006/07 Level	Fiscal Consolidation	Demogaphic Gain	Fiscal Consolidation and Demo-graphic Gain	Public Saving
2005/06	33.8	33.8	33.8	33.8	7.4
2006/07	35.3	35.3	35.3	35.3	7.9
2007/08	35.3	35.5	35.8	36.0	8.1
2008/09	35.3	36.4	36.3	37.4	9.1
2009/10	35.3	36.8	36.8	38.3	9.4
2010/11	35.3	37.2	37.3	39.2	9.9
2011/12	35.3	37.6	37.8	40.1	10.2
2012/13	35.3	38.2	38.3	41.2	10.8

Figure 4. India: Potential Growth 1/
(In percent)



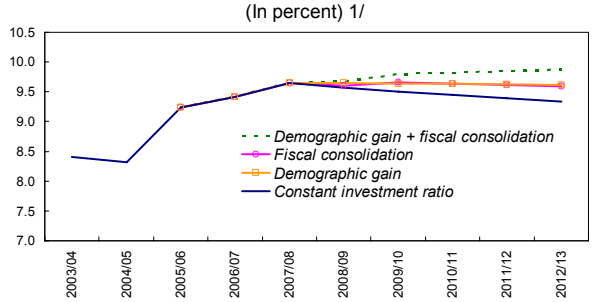
1/ Following WEO (2006) assumption: TFP growth of 3.2 percent, capital share 0.35, labor growth 1.9 percent, human capital growth 0.83 percent, and capital stock depreciation rate of 4 percent. Demographic gains assume 0.5 percentage points GDP gains in saving and investment ratio based on UN projection of 10% decline in dependency ratio from 2005 to 2025. Actual growth rate of real GDP at market prices up to 2006/07.

Figure 5. India: Potential Growth
(In percent) 1/



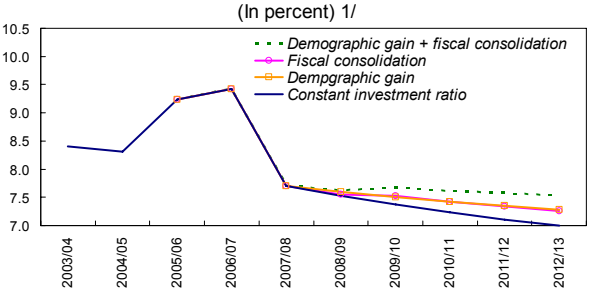
1/ Following Bosworth and Collins (2006) assumption: TFP growth of 2.3 percent, capital share 0.4, labor growth 1.9 percent, human capital growth 0.67 percent, and capital stock depreciation rate of 4 percent. Demographic gains assume 0.5 percentage points GDP gains in saving and investment ratio based on UN projection of 10 percent decline in dependency ratio from 2005 to 2025. Actual growth rate of real GDP at market prices up to 2006/07.

Figure 6. India: Potential Growth
(In percent) 1/



1/ Following Poddar and Yi (2007) assumption: TFP growth of 3.3 percent, capital share 0.33, labor growth 1.9 percent, human capital growth 2 percent, and capital stock depreciation rate of 4 percent. Demographic gains assume 0.5 percentage points GDP gains in saving and investment ratio based on UN projection of 10 percent decline in dependency ratio from 2005 to 2025. Actual growth rate of real GDP at market prices up to 2006/07.

Figure 7. India: Potential Growth
(In percent) 1/



1/ Following Rodrik and Subramanian (2004) assumption: TFP growth of 2.5 percent, capital share 0.35, labor growth 1.9 percent, human capital growth 0 percent, and capital stock depreciation rate of 4 percent. Demographic gains assume 0.5 percentage points GDP gains in saving and investment ratio based on UN projection of 10 percent decline in dependency ratio from 2005 to 2025. Actual growth rate of real GDP at market prices up to 2006/07.

exercises as discussed in BCV (2007). In this paper, the latest CSO estimate for capital stock growth is used as a base, as it is fairly close to the WEO (2006) estimate (WEO shows 8.1 percent for 2005/06 and CSO shows 8.8 percent) based on Nehru-Dhareshwar (1993) and Fajnzylber-Lederman (1999), which serves as a crosscheck. Original estimates by Poddar and Yi (2007), which were based on capital stock data from 2006 CSO estimates, are updated in Table 1 to reflect this upward revision.

- Depending on parametric assumptions, the medium-term average potential growth rate ranges from 7.3 percent to 9.5 percent. Excluding Poddar and Yi (2007) and Rodrik and Subramanian (2004a), assumptions from WEO (2006) and Bosworth and Collins (2006) give a narrower range of 8.0−9.0 percent. The major difference between the two latter series is in the TFP growth assumption: WEO (2006) assumes 3.2 percent, and Bosworth and Collins (2006) assume 2.3 percent.

- Above-potential growth in 2006/07 (implying an additional positive TFP shock) will have a lasting, albeit diminishing, positive impact on medium-term growth. This is because, given the assumption that saving ratio will not fall after a positive income shock, the pickup in income would be translated into larger saving and capital formation, which will increase production capacity for the following period, raising potential growth. Alternatively, this could be interpreted as the push-up effects on potential growth from a shift to investment-led growth, which can rapidly increase production capacity. However, the assumption that investment translates immediately into a higher capital stock could skew estimates upward; if time to build capacity matters, this would delay the impact of strong investment in one period on production capacity in the immediate future.

- Alternative saving ratio assumptions imply about 0.5−0.6 percentage points differences in potential growth at the end of the medium term for all the four cases. The difference seems small given the maximum 5 percentage points variation in the investment ratio for 2012/13. This result seems to reflect a larger role for productivity growth than factor accumulation in driving potential growth in India.

IV. DISCUSSION

Overall, the simulation exercise highlights the importance of productivity in contributing to potential growth, both in the past and the future. That said, there is no guarantee that the current pace of productivity growth would be sustained, and it should not be implied that investment trends would not matter. First, as discussed in the previous section, productivity growth could be experiencing a cyclical upswing. Second, capital stock growth could be subject to downside risks as investment tends to be a volatile component of GDP.

There may also be some challenges in maintaining efficiency of investment, which is at an already high level of 35 percent of GDP over the medium term. India's investment ratio for 2006/07 is already quite high at about 35 percent of GDP, comparable to the Asian countries just before the crisis (Figure 3). Based on the cross-country experiences in the Asian region, maintaining efficiency may require proactive policies vis-à-vis the financial sector. Issues to be grappled with would include the large share of state-owned banks; high statutory liquidity requirements that compel banks to set aside a quarter of their deposits for government securities; high lending requirements (40 percent of net lending) for the priority sector (including agriculture, small-scale business, and education); and underdeveloped government and corporate bond markets.

Another challenge may be turning favorable demographics into job creation and increased saving. On the back of a declining dependency ratio, an average of 13 million people is expected to enter India's labor force each year for the next four decades. Increasing saving requires creating quality jobs for these entrants, which seems to be a difficult task given the weak job creation record (in the formal sector) of recent Indian growth so far. Employment in the organized (formal) sector has *declined* over the past 5 years (Table 4). While the latest survey by the National Sample Survey Organization shows employment in the unorganized (informal) sector has increased, that sector's productivity is lower than the organized sector, limiting the income generated by additional employment. In order to reap the full benefit of favorable demographics in the future, reform of labor laws that hamper creation of organized-sector jobs might be needed.

Table 4. Employment Situation in India

	1999/00	2004/05	1999/00–2004/05
	(In millions)		(Percent change, annual average)
Employment	397	459	2.9
Of which:			
Organized	28	26	-1.2
Unorganized	369	432.6	3.2

Sources: National Sample Survey Organization; Ministry of Labor; Ministry of Finance.

V. CONCLUSION

This paper attempts to project India's potential growth and clarify differences in underlying assumptions that lead to a range of estimates. Parameter estimates from four recent growth accounting exercises are combined with demographic trends to simulate the medium-term potential growth path.

Based on the parameters from the four growth accounting exercises, potential growth in 2006/07 is estimated to be in the 6.8–8.8 percent range. Excluding two studies with rather extreme assumptions on human capital contribution, the range would become 7.4−8.1 percent. The narrower range estimates are 1.3–2.0 percentage points below the 2007/08 outturn of 9.4 percent, indicating overheating pressures.

The average potential growth estimates for the medium term range from 7.3 percent to 9.5 percent based on the parameters from the four studies. Excluding the two studies with more extreme human capital assumptions, the range would be 8.0–9.0 percent. The width of this latter range mainly reflects differing assumptions on TFP, rather than on saving/investment.

Overall, the recent shift to a more investment-led growth pattern, along with strong productivity gains, seem to have raised India's medium-term potential growth to around 8 percent; however, there are risks on the both sides. For example, productivity gains could be volatile (based on experiences of other fast-growing Asian economies), and could require continued improvement in economic policies. The pace of investment could decline as well, to the extent it is underpinned by cyclical forces. On the other hand, given the potentially large rooms for productivity catch up, medium-term potential growth could be higher. However, reaping these gains, and more generally the economic potential of demographic shifts that would support saving, would require policies to foster improvements in labor market conditions for better job creation and in the financial sector for sustaining investment efficiency.

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