

Patnaik, Ila; Pundit, Madhavi

**Working Paper**

## Is India's Long-Term Trend Growth Declining?

ADB Economics Working Paper Series, No. 424

**Provided in Cooperation with:**

Asian Development Bank (ADB), Manila

*Suggested Citation:* Patnaik, Ila; Pundit, Madhavi (2014) : Is India's Long-Term Trend Growth Declining?, ADB Economics Working Paper Series, No. 424, Asian Development Bank (ADB), Manila, <https://hdl.handle.net/11540/4219>

This Version is available at:

<https://hdl.handle.net/10419/128538>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



<https://creativecommons.org/licenses/by/3.0/igo/>

# IS INDIA'S LONG-TERM TREND GROWTH DECLINING?

*Ila Patnaik and Madhavi Pundit*

**NO. 424**

December 2014

**ADB ECONOMICS  
WORKING PAPER SERIES**



ADB Economics Working Paper Series

## Is India's Long-Term Trend Growth Declining?

Ila Patnaik and Madhavi Pundit

No. 424 | 2014

Ila Patnaik (ilapatnaik@gmail.com) is Professor,  
National Institute of Public Finance and Policy.  
Madhavi Pundit (mpundit@adb.org) is Economist,  
Economics and Research Department, Asian  
Development Bank.

Asian Development Bank  
6 ADB Avenue, Mandaluyong City  
1550 Metro Manila, Philippines  
[www.adb.org](http://www.adb.org)

© 2014 by Asian Development Bank  
December 2014  
ISSN 2313-6537 (Print), 2313-6545 (e-ISSN)  
Publication Stock No. WPS 147033-3

The views expressed in this paper are those of the author and do not necessarily reflect the views and policies of the Asian Development Bank (ADB) or its Board of Governors or the governments they represent.

ADB does not guarantee the accuracy of the data included in this publication and accepts no responsibility for any consequence of their use.

By making any designation of or reference to a particular territory or geographic area, or by using the term “country” in this document, ADB does not intend to make any judgments as to the legal or other status of any territory or area.

Note: In this publication, “\$” refers to US dollars.

The ADB Economics Working Paper Series is a forum for stimulating discussion and eliciting feedback on ongoing and recently completed research and policy studies undertaken by the Asian Development Bank (ADB) staff, consultants, or resource persons. The series deals with key economic and development problems, particularly those facing the Asia and Pacific region; as well as conceptual, analytical, or methodological issues relating to project/program economic analysis, and statistical data and measurement. The series aims to enhance the knowledge on Asia’s development and policy challenges; strengthen analytical rigor and quality of ADB’s country partnership strategies, and its subregional and country operations; and improve the quality and availability of statistical data and development indicators for monitoring development effectiveness.

The ADB Economics Working Paper Series is a quick-disseminating, informal publication whose titles could subsequently be revised for publication as articles in professional journals or chapters in books. The series is maintained by the Economics and Research Department.

## CONTENTS

TABLES AND FIGURES	iv
ABSTRACT	v
I. INTRODUCTION	1
II. DRIVERS OF GROSS DOMESTIC PRODUCT GROWTH	4
A. Labor and Human Capital	4
B. Capital	6
C. Infrastructure	7
D. Total Factor Productivity	10
III. ESTIMATING TREND GROWTH	11
IV. BUSINESS CYCLE SLOWDOWN	16
V. CONCLUSION	18
APPENDIX	19
REFERENCES	21

## TABLES AND FIGURES

### TABLES

1	Educational Attainment	5
2	Business Cycle Peaks and Troughs	16

### FIGURES

1	Percentage of Population in Each Age Group	5
2	Investment	6
3	Firm Data and Credit	8
4	Infrastructure Projects Under Implementation and Commissioned	9
5	Infrastructure—Roads and Rail	10
6	Contributions to Gross Domestic Product per Worker Growth	14
7	Trend Growth Rate of Output per Worker	15
8	Business Cycle	16
9	Exports and Investment	17

## ABSTRACT

The recent decline in gross domestic product (GDP) growth in India raised a debate about whether it is a trend or a business cycle slowdown. We observe a cyclical downturn post-global financial crisis due to external and domestic conditions. With global recovery strengthening and appropriate demand management policies, the business cycle downturn can be reversed. At the same time, the economy witnessed negative shocks to trend growth caused by policy uncertainty. In this paper, we argue that these shocks are temporary. A stable policy environment can give positive shocks to growth. Policy action eliminating frictions that hamper efficient allocation of resources in factor markets can be seen as a positive shock that will pull up trend growth of output. Given that the supply of factors, namely labor, human capital, infrastructure, and non-infrastructure capital appears robust and productivity growth potentially strong, timely reforms that eliminate structural bottlenecks will enable trend growth to pick up.

Keywords: trend growth, business cycle, factors of production, policy shocks, India

JEL Classification: E32, O47

## I. INTRODUCTION

After growing at an average rate of 6.3% in the past three decades (1981–2011), India's gross domestic product (GDP) growth fell from 8.9% in 2011 to 6.7% in 2012 and further to 4.5% in 2013<sup>1</sup>. On the one hand it is believed that the recent fall in GDP growth below the long run average may be the beginning of a permanent decline in potential growth of output. Anand, Cheng, and Rehman (2014) show that trend growth in India reached a peak of 8% before 2008 and then declined. Mishra (2013) analyses the growth performance in the last two decades and finds that potential output saw the highest increase from 2002 to 2007. Since then growth has slowed down raising concerns about whether it is a decline in trend. Pritchett and Summers (2014) suggest that after a period of strong growth, it is to be expected that India is slowing down, because cross-country evidence shows that following rapid growth, deceleration is highly likely, representing a 'regression to the mean' in the growth process.

On the other hand, a growing body of recent literature shows that emerging economies are subject to business cycle fluctuations beginning in the 1980s and 1990s, and that the cycles are characterized by significant volatility in output (Agenor, McDermott, and Prasad 1999; Rand and Tarp 2002; Male 2010; Neumeyer and Perri 2005; Aguiar and Gopinath 2007). Following liberalization reforms in 1991, Ghate, Pandey, and Patnaik (2013) find that India started having business cycle fluctuations closer to market-based advanced economies, though characterized by stylized features of emerging economy cycles such as higher relative consumption volatility and countercyclical trade balance.

This raises a question about whether the recent GDP growth decline is in the trend or the cycle. While the global downturn suggests that India's growth slowdown may be part of the international cycle, policy and structural issues in India could have acted as negative shocks that caused trend growth to fall. In this paper, we look at the supply-side factors that generated output growth in the past 3 decades, and assess whether their growth patterns can throw light on this question—is the economy currently operating below trend in a business cycle slowdown, or has trend growth of output itself declined?

Evidence suggests that there is a strong element of both factors in India's growth decline. We see a cyclical downturn post-financial crisis caused by external and domestic idiosyncratic factors. India's economy was part of the global slowdown owing to its trade and financial linkages with the rest of the world. Further, over exuberance in investments in infrastructure and non-infrastructure capital due to easy financing conditions faced a correction post-crisis, dragging down growth below its long-term trend. However, part of the slowdown can be attributed to negative shocks to trend arising from the policy and decision making framework. This increased uncertainty in the economy led many projects to be stalled, which caused investment, in particular, to drag down output growth.

The question is: are the shocks permanent or can they be overcome, and can trend growth be reversed? Aguiar and Gopinath (2007) show that emerging economies are subject to shocks to trend growth due to policy changes. Accordingly, a positive supply-side shock causes the trend growth of output to increase and a negative shock causes trend growth to decline. Thus, in their framework, trend growth itself becomes cyclical. The policy uncertainty

---

<sup>1</sup> Growth rate is computed using annual GDP at factor cost in million rupees.



and inaction in India, with bottlenecks in various factor markets, may be such a negative shock to trend growth. However, appropriate policy changes aimed at reform can resolve the bottlenecks so that the negative shock has a temporary effect. The policy changes can in turn act as a positive shock to growth. Then, given that the supply of factors appears robust, the decline in trend growth can be reversed.

But does India have the institutional framework to overcome negative shocks through policy reform? Pritchett and Summers (2014) make the point that institutional reforms are crucial, but the process of reform may result in slower trend growth in the erstwhile rapidly growing Asian economies. In the case of the People's Republic of China (PRC), they argue that the transition away from a political system characterized by a high degree of state control, authoritarian rule, and corruption makes growth deceleration very likely. However, India's story is different in this regard. The country has already gone through various difficult stages of learning how to operate a democracy and has reached a level of political maturity. So the major problem of transition that they believe the PRC faces at this point is not a risk for India. While, so far, the political process has not managed to achieve support for all the required reforms, the institutional capability to do so exists. Hence, with sufficient resources and the capacity for reform, negative shocks to trend growth can potentially be reversed.

To assess the supply strength of factors, we describe the growth pattern of the inputs—labor, human capital, physical capital, and infrastructure capital, over the past 3 decades to understand their dynamics and contributions to output growth. The supply of quality-adjusted labor does not appear to be declining given that: the proportion of the population in the working-age group is favorable to a strong supply; there is scope for increasing the labor force participation rate (LFPR); and education and skill levels are low, but improving. However, in the labor market, even if sufficient and high quality human capital is available, laws and regulations must enable its efficient allocation for labor to meaningfully contribute to output growth.

With regard to capital—the rate of investment has been increasing over time and the growth of capital stock remains one of the highest among emerging countries. Recently though, there has been a decline in investment. On the one hand, some cyclical factors appear to be at play. The decrease in global demand during the crisis and the fall in exports dragged down domestic investment. During the boom years of 2005–2008, when credit conditions were easier, a number of new projects were initiated, but these became unviable with the onset of the global crisis. The fall in activity can be seen as a correction of the over investment during the boom years, but we can expect investment rates to return to at least the long-run level as many of these issues get resolved. As global recovery strengthens, domestic investment activity will pick up, since there is available capacity. But besides external and domestic cyclical factors, investment projects were also stalled due to policy decisions, or in some cases, policy inaction in the face of severe bottlenecks related to land acquisition, corruption scandals, taxation, regulatory hurdles, etc. The policy framework that severely hampered firms' investment activity and investors' business confidence was a negative shock to the trend growth of output.

Again, investment in infrastructure capital has been increasing over the years, and additions to the physical stock of infrastructure, in terms of roads, rail, telecommunication networks, remain strong. But we see a decline in infrastructure investment post-global crisis, and evidence suggests that besides cyclical factors, policy and structural reasons contributed to the fall.

In the analysis, we distinguish infrastructure capital from other types of capital because in India, investment in infrastructure was undertaken mainly by the government, whereas the private sector played a major role in other types of investment. Infrastructure capital, which consists of transportation networks, telecommunication, irrigation, power, fuel, and other utilities like water supply, has externalities to other factors of production. The public nature of this capital requires public investment for its development, in general, and certainly did in India (Krichel and Levine 1995). For example, roads, railways, and power are largely owned by the government. In cases where natural monopolies developed due to network effects, such as water supply, ports, etc., they are regulated by the government. Since infrastructure capital is subject to various types of government intervention, it may not receive the same share of income as non-infrastructure capital that are assumed to be paid their marginal productivity in the private sector. Also, the role of infrastructure capital in generating economic growth has been emphasized in the literature, particularly for developing economies; hence, we measure infrastructure capital separately in the growth accounting framework.<sup>2</sup> To this end, we construct an index for infrastructure capital using multiple dimensions of physical infrastructure, namely roads, electricity, and telecommunication.

The strong output growth in the past 3 decades was not only due to additions to labor and capital, but also because of improvements in productivity. Total factor productivity (TFP), computed as a residual in the production function, dragged down growth in the 1980s, but has been increasing since then to become a main contributor to growth. Based on the literature on factors facilitating productivity growth, such as globalization and learning, development of information and communication technologies in India, and spillovers from infrastructure development, we conjecture that productivity can potentially leap forward to the frontier with the right policy environment.

The trend of real GDP is a long-run phenomenon and can be thought of as a forecast for the period considered, which Basu and Fernald (2009) refer to as a “steady state” of the economy.<sup>3</sup> In this paper, we compute the trend GDP growth of the economy, using a production function approach. An advantage of using this approach for estimation, particularly over statistical techniques, is that the assumptions are based on economic theory. Output is represented by a combination of inputs and productivity, and the parameters are the output elasticities with respect to each factor. This methodology gives us the ability to specify the inputs that go into the production function, based on our knowledge of the structure of the Indian economy. Following the literature on the estimation of potential output, we use a Cobb-Douglas specification for its simplicity. The Cobb-Douglas production function assumes constant returns to scale and perfect competition in factor markets, so that the output elasticity with respect to a factor is equated to the factor's share in income. The production function is also consistent with our definition of potential output and the growth accounting approach to this study; we combine the trend growth of input factors and productivity, along with estimates of the elasticities of output with regard to the inputs, to compute trend growth of output. For the period 1981–2014, we compute the average trend growth of output per worker to be above 6.0%.

---

<sup>2</sup> See Straub (2011) for a review of the innumerable empirical papers written since the 1980s assessing the role of infrastructure capital in output growth.

<sup>3</sup> This is one way of defining potential output. Another definition of potential output used in the literature is the level of output which can be achieved using available factors of production, without creating inflationary pressures.

The remainder of the paper is structured as follows. In section II, we analyze the various factor inputs, namely labor and human capital, physical capital, infrastructure capital, and TFP, to identify trend and cyclical influences to growth. In section III, we decompose output per worker growth into its components using a Cobb-Douglas production function. We also estimate the long-run trend GDP growth from 1981 to the present. In section IV, we plot the business cycle to discuss the fluctuations, and in section V, we summarize and conclude.

## II. DRIVERS OF GROSS DOMESTIC PRODUCT GROWTH

Output growth is determined by the supply of factors of production. We discuss the patterns in the last 3 decades of labor, human capital, physical capital, and infrastructure capital supply, and comment on productivity growth in India. While the long-run supply of the inputs appears to be strong, and hence favorable to strong output growth, there are signs that in recent years, growth declined, particularly in infrastructure and non-infrastructure investments. We analyze whether the decline is due to factors affecting the cycle or the trend.

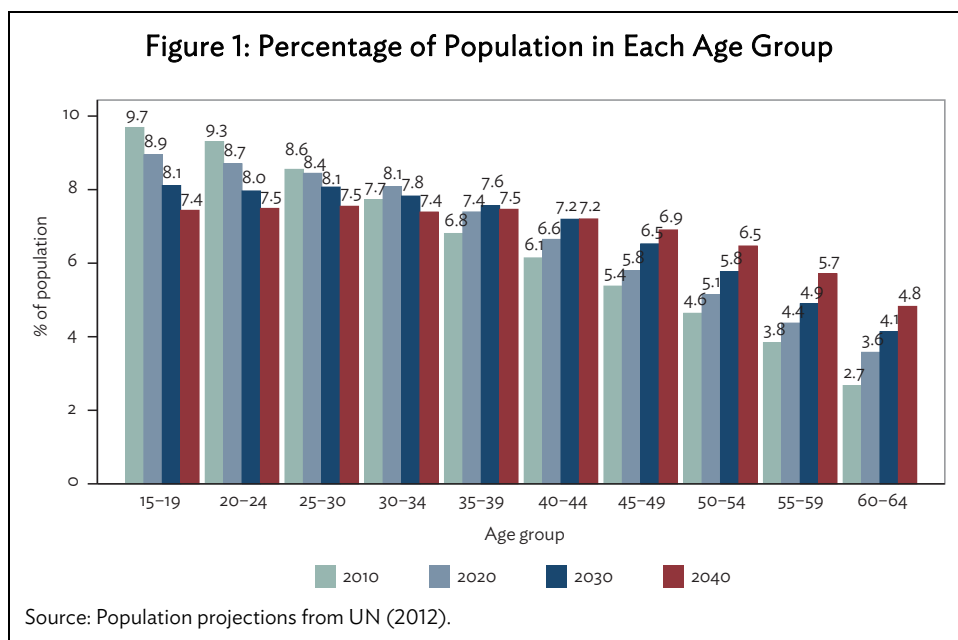
### A. Labor and Human Capital

Labor supply has two components—the number of workers and the quality of workers—that we conceptualize as human capital. The long-term trend of labor supply in terms of number of workers and hours of work is determined mainly by demographics. India's demographic transition into a bulging workforce began in the 1980s. The working-age population (15–64) has been rising by 2.0% on average every year (adding approximately 130 million people).

Figure 1 shows that, currently, 65.0% of the total population is in this age group. Over 35.0% is “young,” i.e., below 34 years of age, and will remain in the working-age group in the next 30 years. Going forward, the age structure of the population (due to declining infant mortality and fertility rates) is such that India is projected to have a steady increase in the working-age population for the next few decades (Aiyar and Mody 2011, and Kim 2012).<sup>4</sup> According to population forecasts (UN 2012), the working-age group will increase to constitute 69.0% of the population by 2040.

---

<sup>4</sup> PwC (2013) notes that among the 24 emerging and advanced countries they study, only India does not see a declining share of total population in the 15–59 working-age group between 2011 and 2050, based on United Nations (UN) projections.



For human capital, education and development of skills drive the long-run growth. Human capital, which started out at a low level in India, has been increasing steadily (Table 1). In 2012, over 70.0% of the population was literate, and it is reasonable to expect that the literacy rate will reach 100.0% in the near future.<sup>5</sup> Other measures of educational attainment, such as percentage of the working population with primary, secondary, and tertiary education also show improvement. A widely used indicator to measure human capital, the average number of years of schooling per person, has also increased over time, though it is still quite low at 5.2 years in 2010 (Barro and Lee 2012). But starting from a low point provides tremendous scope for improvement, and the impact on growth of even small increases in educational attainment of the population can be considerable.<sup>6</sup>

**Table 1: Educational Attainment**

	Literacy Rate (%)	Education Level Completed			Years of Schooling
		Primary (%)	Secondary (%)	Tertiary (%)	
1980	58.7	8.5	0.4	1.3	2.3
1990	62.8	4.8	0.6	2.3	3.4
2000	68.1	17.5	0.7	2.8	4.2
2010	75.1	19.3	0.8	4.0	5.2

Note: Literacy rate is weighted by population.

Sources: World Bank, World Development Indicators online database; Barro and Lee (2012).

<sup>5</sup> The World Bank measures literacy as being able to, with understanding, read and write a short, simple statement on everyday life as well as do basic arithmetic.

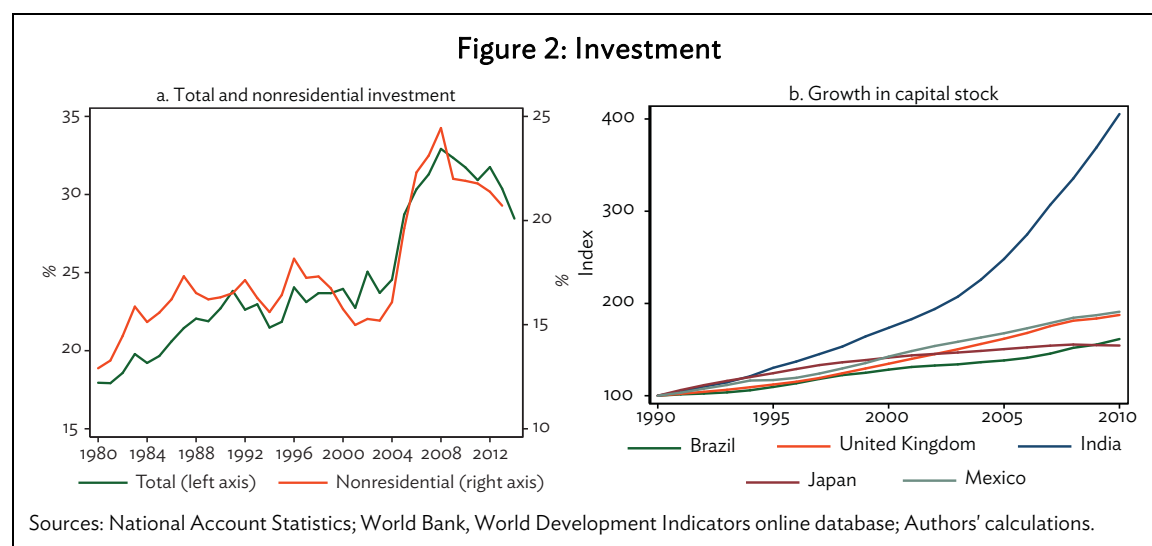
<sup>6</sup> In a cross-country study, Johanssen et al. (2013) assume that educational attainment of cohorts in the age group 25-29 in all countries slowly converges to a world frontier over the next 50 years. By this methodology, they project that increases in education are particularly sizable in India, which starts off at a low level.

Not everyone in the working-age group may be in the labor force; hence, another area for improvement is the LFPR, i.e., the number of people in the working-age group actively seeking employment. This is particularly relevant since the LFPR, which was around 60.0% from 1990–2005, started declining and stood at 55.5% in 2012, driven primarily by falling female LFPR.

In general, the supply of quality adjusted labor does not appear to be declining, given that the proportion of population in the working-age group is high, that there is scope for increase in the LFPR, and that education levels and skills acquisition are low but improving. However, even if abundant labor and human capital are available, they have to be properly absorbed into the production process to meaningfully contribute to output growth. Reforms in laws and regulations governing the labor market are required to reduce frictions and inflexibilities, to facilitate better reallocation of labor resources, to allow wage adjustments, to absorb labor into the formal sector, and to encourage female participation (Anant et al. 2006, Sharma 2006, Papola and Pais 2007, Jha and Golder 2008, Maiti 2014). While the absence of reforms in the labor market may have negatively affected the trend growth of output, we can expect that the initiation of such reforms can reverse the pattern, since there is sufficient labor capacity available to meet the demands of a growing economy.

## B. Capital

Again, the supply of capital stock, which is a key driver of output growth in the economy, appears robust when we take a long-term view. Total investment, measured as gross fixed capital formation (at constant prices), increased steadily from 17.9% of GDP in 1980 to 32.9% in 2008. Non-residential investment increased from 12.9% to 24.4% in the same period (Figure 2.a).



Since 2008, however, investment has declined. But though it has fallen from its peak value, the rate of investment is still high at 30.4% (in 2013). Similarly, non-residential investment remains over 20.0% of GDP in the same year. A comparison across a small sample

of emerging and advanced countries shows that the growth rate of capital stock is highest in India (Figure 2.b).<sup>7</sup>

Though capital supply still appears to be strong, a fall in investment raises serious concerns about the growth of output in the economy. To better understand the patterns in productive investment, we look at firm-level data on the value of new projects, projects under implementation, and stalled projects from the Centre for Monitoring Indian Economy Pvt. Ltd. (CMIE) capex database. As seen in Figure 3.a, the value of projects under implementation by non-financial firms increased over the years to reach \$1.6 trillion in 2011, after which, it started declining. This pattern is reflected in the other charts as well. We see a boom period for the value of new projects undertaken between 2005, when it crossed the long-run average, and 2008, followed by a decline (Figure 3.b). On the flip side, the projects under implementation in all industries and in private industries alone that were stalled, show a drastic increase since 2008 (Figures 3.c and 3.d).

The chart on bank lending to the commercial sector gives an insight into the slowdown in investment activity of firms (Figure 3.f). The economy witnessed an upswing in the cycle, primarily led by high credit growth during the boom years of 2005–2007.<sup>8</sup> In this period, firms borrowed and initiated a large number of projects. But with the onset of the crisis, investment activity was badly affected due to adverse global conditions. Export demand declined and many projects that were started earlier became unviable and had to be stalled or shut down. Thus, part of the decline in investments can be seen as a correction of over investments due to easy financing conditions in the pre-crisis economy. We can expect the investment rate to return to its long-run average as global activity recovers and domestic demand is stimulated, especially since it appears that there is capacity to return to the trend.

The slowdown in investment was only partly driven by cyclical factors. A number of negative shocks arising from the policy side increased uncertainty and exacerbated bottlenecks which affected trend growth negatively. An example is the retrospective taxation which affected investor sentiment adversely. Besides taxation laws, policy decisions, and, likewise, policy indecisions surrounding business, financial, labor market, and environmental regulations, and land acquisition laws, also created an environment of uncertainty and hampered the efficient allocation of capital resources. However, given that there is available capacity (stalled projects may be restarted), and that capital stock is at a comparatively high level, the right policies that create reform, can render the negative shocks that were experienced to be temporary and reverse the decline in trend growth.

### C. Infrastructure

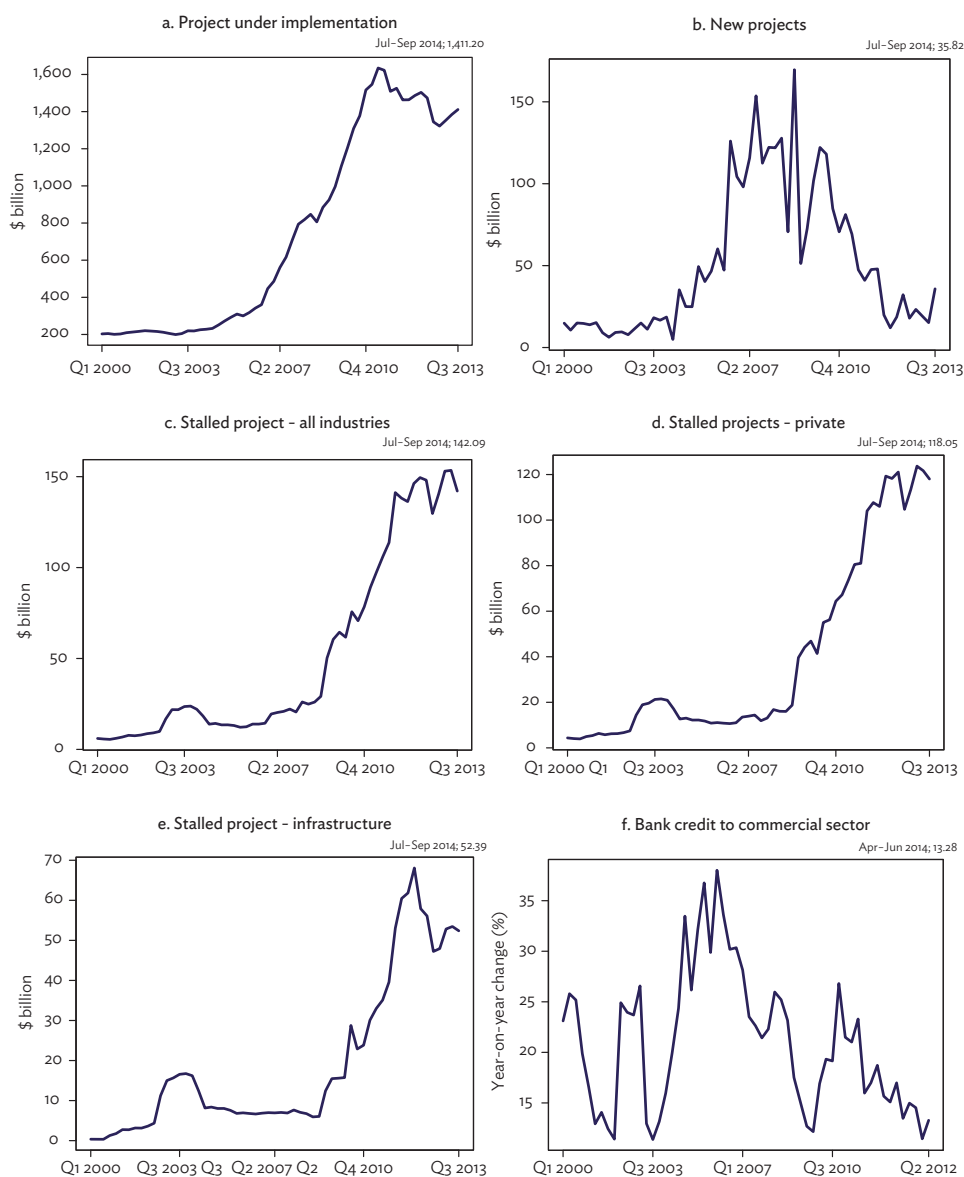
The story of the supply of infrastructure capital is similar to regular capital—while accumulation appears strong, the recent decline in investment raises concerns for growth. Following an increase in public investment in infrastructure, such as roads, railways, power, etc., infrastructure capital has been rising in India in the last 30 years. We plot the value of infrastructure projects

<sup>7</sup> Capital stock for the cross-country comparison is computed with the perpetual inventory method based on Caselli (2005) using data from the Penn World Tables.

<sup>8</sup> During this period, capital inflows were high and the Reserve Bank of India was purchasing dollars and only partially sterilizing its intervention, leading to an increase in money supply.

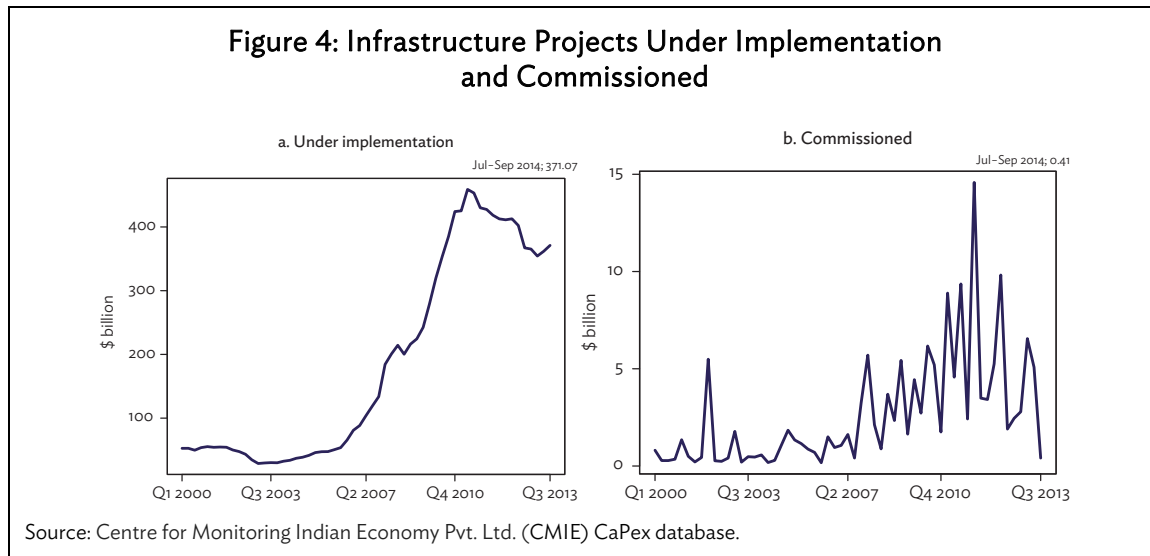
under implementation (Figure 4.a) and projects commissioned (Figure 4.b) from 2000<sup>9</sup>. The value of projects steadily increased—at the peak, projects under implementation were more than \$400 billion and projects commissioned were close to \$15 billion.

**Figure 3: Firm Data and Credit**



Source: Centre for Monitoring Indian Economy Pvt. Ltd. (CMIE) CaPex database.

<sup>9</sup> Infrastructure projects include electricity, storage and distribution, transport services, and communication services.

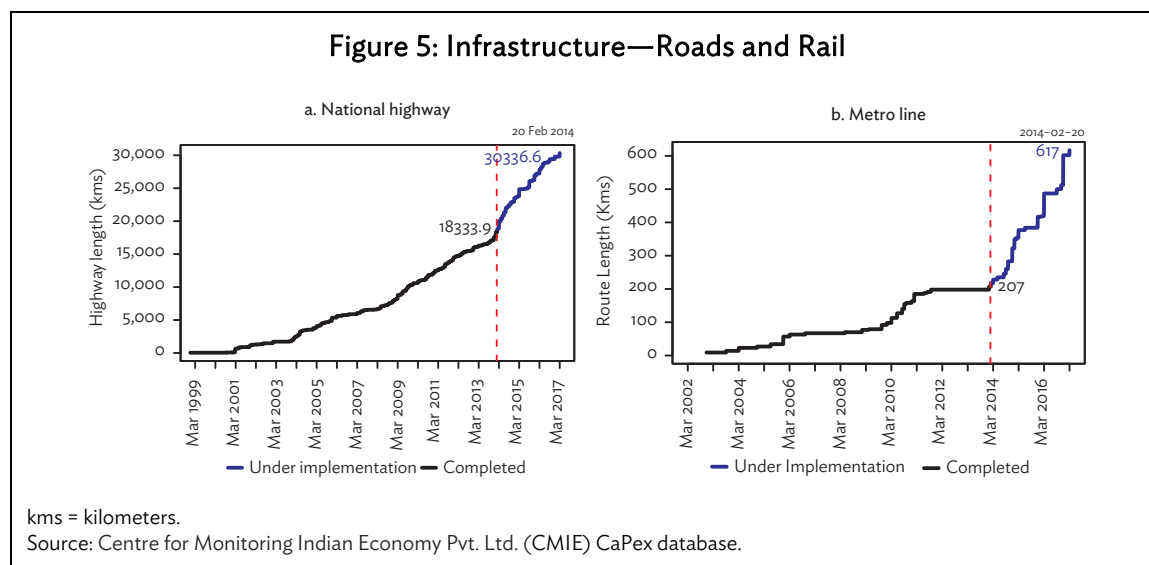


There was a steady increase until 2011, after which, we start seeing a decline in infrastructure investment. Again, part of this fall can be seen as a correction of the over exuberance in investment prior to 2008. Many of the projects that were started were either unviable in terms of business success and profits and were shelved (see Figure 3.e). But another reason for projects being stalled is the messy policy environment which hampered investment activity. Bureaucratic delays in issuing licenses for infrastructure projects; sudden decisions, such as the coal mining ban in some states; policy paralysis in the face of bottlenecks, such as land acquisition issues; and corruption scandals all increased uncertainty and negatively affected investment in this sector. But with the right policy environment that would reverse such shocks, can we expect trend growth to improve?

The capacity certainly seems to exist. If we look at additions to actual infrastructure, we get a sense of the kind of growth that is capable of taking place. Figure 5 is an example of infrastructure development in India. The plots show the length of inter-city highways and metro lines constructed since 1999 and 2002, respectively, using data on projects completed. Over a period of 12 years (2002–2014), 212 kilometers (kms) of metro lines and 18,334 kms of national highway were constructed, which averages 17.6 kms and 1,527 kms per year, respectively. After 2013, the lines are plotted based on the expected date of completion for projects under implementation, and show continued additions in the future.<sup>10</sup>

<sup>10</sup> The graphs are constructed based on project information in Centre for Monitoring Indian Economy Pvt. Ltd. (CMIE) database. We used 577 highway projects of the National Highway authority of India (the status of 390 is “completed” and 187 is “under implementation”). The projects studied included 32 metro rails involving 79 metro lines (25 completed and 54 under implementation).





The problem is not the lack of capacity as much as frictions and impediments that prevent the optimal use of resources. Stalled projects may be restarted and new projects initiated with the right policy reforms, which can reverse the decline in trend growth.

#### D. Total Factor Productivity

TFP measures the efficiency with which a given combination of factors of production operate in producing output, and hence is a crucial ingredient for long-term growth. If inputs are not increasing or have reached full utilization, which is not the case described above, an increase in TFP can lead to an increase in output by making existing resources more productive. If productivity growth is improving along with increasing inputs, then output growth is stronger.

In India, there are factors that have been highly conducive for TFP growth in the past 3 decades, and these do not show signs of slowing down. One is openness in the current and capital accounts, and the resulting inflow of financial and physical capital, labor, and skills. The globalization of domestic firms and the flow of foreign direct investment (FDI) has resulted in the cross-border transfer and diffusion of new technology, management practices, and production techniques; and generated competition with international firms. The TFP growth that comes from learning from advanced countries is immense, resulting in a “catching up” to the technology frontier (Baltabaev 2013, Dasgupta 2012, Saggi 2002).

Another factor is the growth of information and technology, which also facilitates the process of learning in a significant way. It is well known that India’s software sector took off in the 1990s to grow into an internationally competitive and high-tech industry (Patibandla and Petersen 2002, Krishnan and Vallabhaneni 2010). The development of the software industry, based on science, engineering, and technology, by its nature, represents productivity growth in the economy. Most global information technology firms have a presence in India where technical knowledge is developed for their in-house needs. While the software sector has grown at a much faster pace than many other sectors in India up to now (D. Costa 2003), in the near future, the advantages will quickly start spilling over to other industries and raise their productivity to new levels. The development and widespread use of telecom equipment, mobile

communication technology, broadband, etc. will facilitate this spread.<sup>11</sup> For any industry trying to “learn,” there is almost instant access to vast amounts of information, enhanced communication, and ability for dissemination. Compared with the last 20 years, the technological advances will be so much more nuanced in the next 20 years, and we will see that TFP growth in India will not just follow a similar path as any other economy, but can potentially leap forward to the frontier.

Positive spillovers from other physical infrastructure will also boost productivity of factors. The development of all such networks as well as the improvement in education and skills can lead not only to “catching up,” but also to technological innovation, which will further raise TFP growth.

We conjecture, based on evidence in the literature, that TFP is driven by infrastructure, human capital, the spread of information and communications technology, and the globalization of firms, among other reasons. In the growth accounting framework, we do not directly measure TFP. It is measured indirectly as a residual in the production function—output growth that is not explained by the growth of other inputs (described further in the next section).

### III. ESTIMATING TREND GROWTH

In this section, we estimate the trend growth of GDP. We use a simple accounting framework that decomposes output growth into the growth of factor inputs and the growth of TFP. Output ( $Y_t$ ) is defined using a Cobb-Douglas production function with constant returns to scale featuring physical capital ( $K_t$ ), infrastructure capital ( $X_t$ ), human capital ( $h_t$ ), labor ( $L_t$ ), and TFP ( $A_t$ ) as:

$$Y_t = A_t K_t^\alpha X_t^\beta (h_t L_t)^\gamma \quad (1)$$

where  $\alpha$ ,  $\beta$  and  $\gamma$  represent the shares of capital, infrastructure capital, and quality adjusted labor in output, with the assumption of constant returns to scale.

In per worker terms,

$$y_t = A_t k_t^\alpha x_t^\beta h_t^\gamma. \quad (2)$$

The share of capital in output,  $\alpha$ , is assumed to be 0.3, based on the estimate used in the literature. The output elasticity of infrastructure in a Cobb-Douglas production framework is obtained in cross-country studies in the range of 0.07–1.0 (Canning 1999; Calderon, Moral-Benito, and Servén 2011). For South Asia, Sahoo and Dash (2012) obtain a higher elasticity of 0.2. We run a simple constrained least squares regression on our data and obtain an estimate of

---

<sup>11</sup> Fixed broadband internet subscribers increased from 50,000 in 2001 to 14 million in 2012 (WDI). According to data published by the Telecom Regulatory Authority of India, the number of mobile subscribers increased from 8.7 million in 2002 to 886 million in 2013.

0.04. Hence, we take the upper value of the cross-country range and set  $\beta$ , the share of infrastructure capital, as 0.1.<sup>12</sup>

We use annual data for the period 1981–2013. Output is measured by real GDP at factor cost (million rupees, 2004–2005 prices). For capital stock, we use the series on net fixed capital stock computed in the National Account Statistics.<sup>13</sup> A series on employment is not available for India, hence, we use the working-age population (15–64) as a proxy for the employed labor force. All variables being divided by this measure can be thought of as per worker.<sup>14</sup>

We follow the literature to generate a measure of human capital stock. Data is obtained on the average number of years of schooling of the population in this age group (Barro and Lee 2012). Following Bils and Klenlow (2000), human capital is modeled as a function of the average years of schooling of the working-age population ( $s$ ):

$$h = \exp \Psi(s) = \exp \left( \frac{\theta}{1-\psi} s^{1-\psi} \right) \quad (3)$$

where  $\psi=0.58$  and  $\theta=0.32$ .

For physical infrastructure, we use different indicators to represent the many dimensions, such as transport, telecommunications, and energy. Any single indicator is inadequate to provide a sense of the overall stock of infrastructure in the economy, and the use of a single indicator may give a misleading picture of the availability and contribution of infrastructure (Canning 1999, Calderon, Moral-Benito, and Serven 2011). The indicators we use are

1. Roads ( $X_1$ ): Highways (km),
2. Electricity ( $X_2$ ): Electricity production (kWh), and
3. Telecommunications ( $X_3$ ): Sum of the number of telephone lines and cellular mobile subscriptions.

To assess the role of infrastructure as a whole, we build an index summarizing the three indicators using principal component analysis. As with the other input factors, the variables are expressed in per-worker terms (where  $L$  is the working-age population) and in logs.<sup>15</sup> The infrastructure index can be expressed as:

$$x_t = 0.377 \ln \left( \frac{X_1}{L} \right) + 0.318 \ln \left( \frac{X_2}{L} \right) + 0.305 \ln \left( \frac{X_3}{L} \right). \quad (4)$$

<sup>12</sup> Calderon, Moral-Benito, and Serven (2011) explain that since infrastructure capital appears in  $x$  and in  $k$ , the elasticity of output with respect to infrastructure capital can be approximated as  $\Psi = \beta + \lambda\alpha$ , where  $\lambda$  is the share of infrastructure capital in overall capital (value). For evaluating  $\lambda$ , data on the price of infrastructure is required, which is not easily available. However, they find this share is small, so  $\Psi$  is typically close to the estimate  $\beta$ .

<sup>13</sup> Capital stock series are published by the Central Statistical Organisation, Government of India. The series are computed using the perpetual inventory method described in CSO (2010).

<sup>14</sup> The average rate of growth of the working-age population is 2.2% per annum.

<sup>15</sup> The first principal component accounts for 0.9% of the overall variance. The correlation between the first principal component and each indicator is above 0.9. For details on the principal component analysis, see Appendix B.

TFP is derived as:

$$A_t = \frac{y_t}{k_t^\alpha x_t^\beta h_t^\gamma} \quad (5)$$

Since it is a residual measure – the difference between output and inputs, TFP measures how factors are being used productively. But a disadvantage is that, it absorbs measurement errors associated with both sets of variables. While in theory, it is supposed to be neutral to the growth of inputs, in practice, if a higher weight is assigned to a faster growing factor of production, then the change in TFP is lowered arbitrarily.<sup>16</sup> This is an issue to keep in mind while interpreting the results of the analysis.

### Decomposition of output growth

First, we analyze the sources of output growth. Real GDP data series is available until 2013. The data on capital stock ends in 2007; using the constant ratio of capital stock to GDP, the series is extended until 2013. Average years of schooling is available until 2010, electricity until 2011; and highways, mobile subscriptions, and telephone lines until 2012. These series are extended by using the average growth rate of the last 5 years.

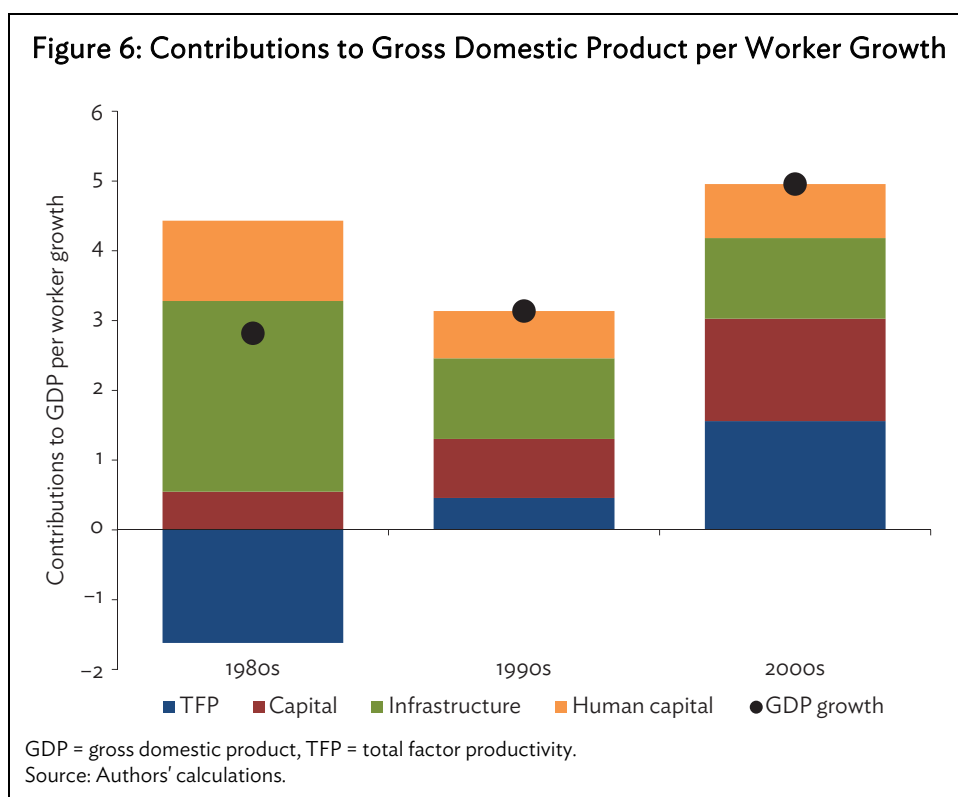
Using the data and Equation 2, we decompose GDP per capita growth as follows:

$$\hat{y} = \hat{A} + \alpha \hat{k}_t + \beta \hat{x}_t + \gamma \hat{h}_t \quad (6)$$

such that changes in output per worker can be explained by changes in the factor inputs (denoting by  $\hat{z}$  the growth rate of variable  $z$ )—physical capital and infrastructure per worker, human capital, and TFP. The decomposition of output growth averaged for 3 decades (from 1980–2013) is shown in Figure 6.<sup>17</sup>

<sup>16</sup> Bosworth, Collins, and Virmani (2006) discuss the difficulties in obtaining reliable estimates for factor shares in India, due to a large informal sector as well as a large proportion of self-employed individuals whose reported income cannot be separated into labor and capital income. However, they show that the choice of specific values for the shares has marginal impact on the estimation of TFP because, in general, they find relatively small differences in the growth rates of labor and capital inputs.

<sup>17</sup> The decade 2000s covers the period 2000–2013.



Additions to capital per worker have always been important for growth, and its share in output per worker growth has been rising through the decades—from 0.5 percentage points in the 1980s to 0.8 percentage points in the 1990s, and further, to 1.5 percentage points in 2000s. In the 1980s, infrastructure capital per worker contributed a prominent 2.7 percentage points to output per worker growth. This followed from the increase in public investment in infrastructure during this period compared to the past years (Acharya et al. 2006). The share of human capital growth was also strong at 1.1 percentage points. In the 1990s and 2000s, infrastructure per worker contributed around 1.1 percentage points to growth and human capital around 0.7 percentage points. A reason for the sizable difference from the 1980s to the next 2 decades was the drastic change in the role of TFP in output growth. TFP dragged down growth by 1.6 percentage points in the 1980s. The policy environment prior to 1980 had an adverse effect on the productivity of the economy, particularly in the industrial sector (Acharya et al. 2006). However, post-reforms in the 1990s, which included trade and financial liberalization, and deregulation and delicensing in industry, the share of TFP growth in GDP per worker growth increased to 0.5% in the 1990s; and in the 2000s, TFP growth became a main driver of growth by contributing 1.6 percentage points.

India experienced strong growth during the period 2000–2013, averaging 5% per year for GDP per worker, more than 2 percentage points higher than in the 1980s. In the last decade, along with the other factors, growth in TFP played a significant role.

### Estimating trend output growth

For the sake of completeness, we compute the trend growth of output. As discussed in section II, since the trend growth of the supply factors does not appear to be declining, there is no

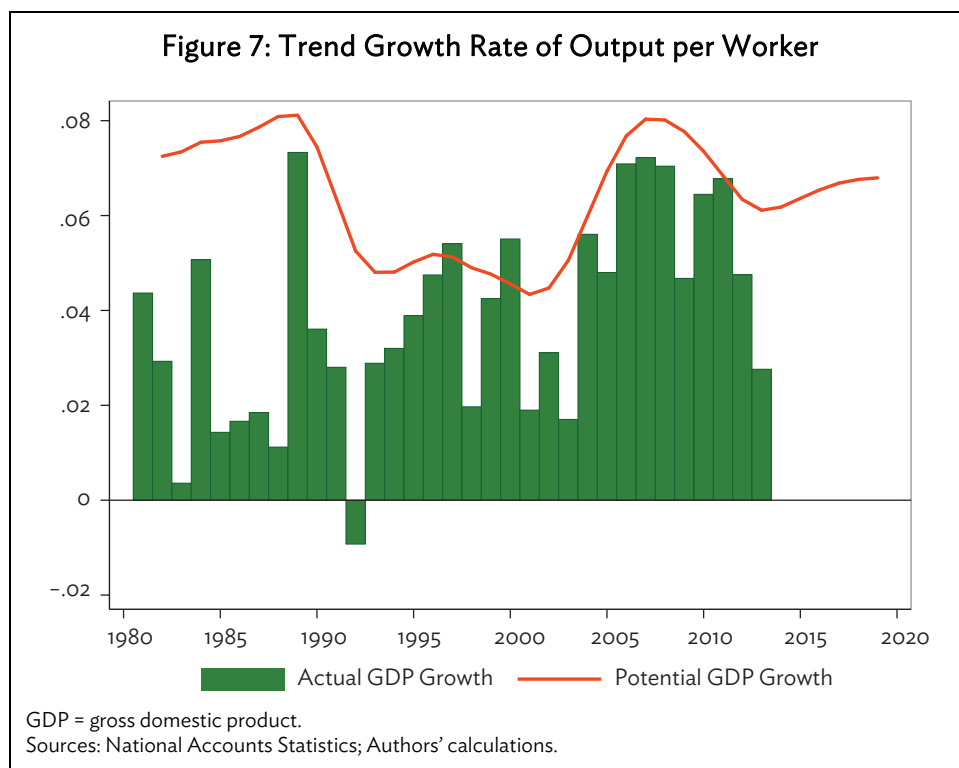
reason to believe that the trend growth of output is declining. This statement is forward looking, but in this paper, we do not undertake a forecasting exercise for output growth, based on assumptions for the growth of input variables, to show that trend growth is not declining in the long run. We only compute trend GDP growth based on available past data on inputs. Hence, the measure of trend output growth moves with actual data.

The trend growth of all input variables and TFP is obtained by HP filtering the log of the series and computing the growth of their trend components. The HP filter is a symmetric two-sided filter that requires past and future information to estimate the end of the sample point. So to avoid the end sample bias, we extend all series until 2019. Real GDP is grown using forecasts by the IMF.<sup>18</sup> The remaining series are extended using the same rules as applied earlier. TFP is computed up to 2013, as a residual, and then extended using the average growth rate of the past 5 years. Thus, we compute the trend for all series for the period 1981–2019.

From Equation 2, output growth is decomposed as follows:

$$\hat{y} = \hat{A} + \alpha \hat{k}_t^T + \beta \hat{x}_t^T + (1 - \alpha - \beta) \hat{h}_t \quad (7)$$

such that trend growth in output per worker can be computed by combining trend growth in the factor inputs (denoting by  $\hat{z}^T$  the growth rate of the trend of variable  $z$ )—physical capital and infrastructure per worker, human capital and TFP. Figure 7 plots the actual GDP growth per worker since 1981 and the computed trend GDP per worker growth.

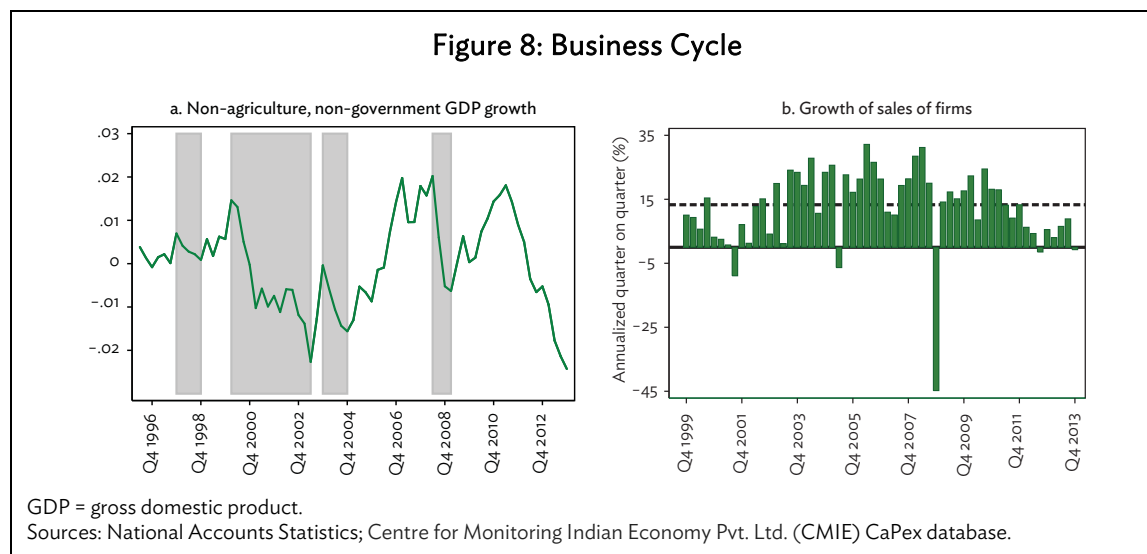


<sup>18</sup> World Economic Outlook database (accessed 8 April 2014).

For the period 1981–2014, the average trend growth rate of output per worker is around 6.0%. In the last 5 years, this average is above 6.5%.

#### IV. BUSINESS CYCLE SLOWDOWN

Since the liberalization reforms in 1991, the Indian economy is subject to business cycle fluctuations with high output volatility, a characteristic feature seen in emerging economies (Ghate, Pandey, and Patnaik 2013).



We use quarterly non-agriculture, non-government seasonally adjusted real GDP to capture the business cycle conditions in the recent years. By HP filtering the log of the series, we obtain the cyclical component (Figure 8.a). The shaded portion shows the periods of recession (between the peak and the trough), based on the Bry and Boschan (1971) algorithm. We see a business cycle downturn in 2008 that hits the trough in the fourth quarter. From 2009, there is an uptick in the cycle, which reaches a peak in the first quarter of 2011, after which we again see a downturn.

Table 2 shows the business cycle peaks and troughs identified by the Bry and Boschan (1971) algorithm applied to the cyclical component of hp filtered seasonally adjusted quarterly non-agriculture, non-government real GDP.

**Table 2: Business Cycle Peaks and Troughs**

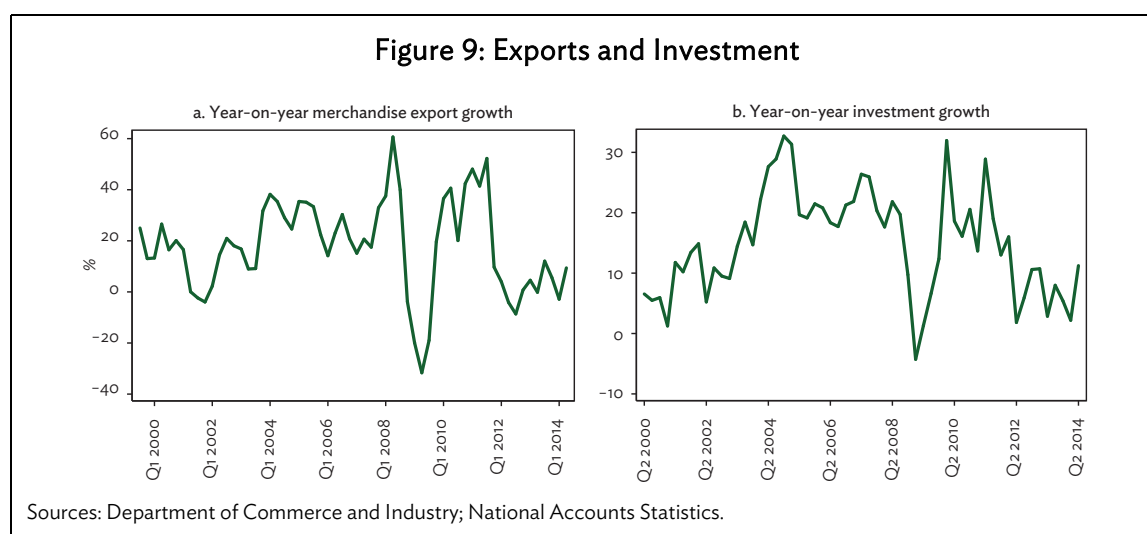
Peaks	Q4 1996	Q1 2000	Q1 2004	Q1 2007	Q3 2009	Q1 2011
Troughs	Q3 1997	Q1 2003	Q4 2004	Q4 2008	Q1 2010	

Source: National Accounts Statistics.

We plot another indicator of cyclical fluctuations in the economy, namely, the growth of sales of big firms. Figure 8.b shows the annualized quarter-on-quarter growth rate of seasonally adjusted nominal net sales of non-oil, non-finance firms. The growth rate of net sales started

declining in the third quarter of 2010, picked up tentatively for some quarters and again showed a drop towards the end of 2013. In the last eight quarters, net sales is below the long-run median growth of 13.3%.

India experienced a business cycle slowdown in 2008 along with other emerging economies during the global financial crisis (IMF 2013). This could be the result of greater synchronization of domestic cycles with global cycles (Jayaram, Patnaik, and Shah 2009). The economic downturn, which started in the advanced economies, spilled over to India and also to other emerging markets through trade and financial linkages (Patnaik and Shah 2010, UNCTAD 2013). During the crisis, when economic growth and activity slowed down, export demand in advanced countries declined. If we look at export growth in India (Figure 9.a), we see a corresponding sharp deceleration. The period was also characterized by a slowdown in investment (Figure 9.b) due to weak external demand and tight financial conditions.



The uptick in GDP seen in 2009 is also mainly a business cycle upswing. Concerns about the negative effects of the global financial crisis on the Indian economy prompted the government to announce fiscal and monetary stimulus policies in 2008–2009. For example, the government introduced three fiscal stimulus packages in the form of tax cuts and increased expenditure to boost consumer demand and production in key sectors. The Fiscal Responsibility and Budget Management (FRBM) Act, 2003, according to which, the government is required to follow fiscal prudence to reduce its deficits to a target rate, was suspended in 2009 in order to accommodate the stimulus policies. On the monetary side, the Reserve Bank of India introduced measures, such as rate cuts, to increase liquidity and ease credit in order to boost investment (RBI 2009b). Guidelines for External Commercial Borrowing were also liberalized to ease firms' access to external finance (RBI 2009a).

Since 2011, again, we see a business cycle slowdown, partly because the domestic stimulus measures were withdrawn. However, the cycle may be starting to reverse. Global activity has picked up and the recovery is strengthening, further driven by improvements in advanced economies (IMF 2014). We can expect positive spillovers to emerging economies, like India, through increased external demand, which will boost domestic growth.



## V. CONCLUSION

In this paper, we analyze the slowdown in India's GDP growth starting from 2011, specifically discussing whether the decline is in the trend or the cycle. We observe a cyclical downturn driven mainly by a fall in investment post the global financial crisis due to subdued external demand as well as due to domestic cyclical factors, such as tight credit conditions. At the same time, the economy also witnessed negative shocks to the trend growth of output caused by policy uncertainty, contributing to the recent growth decline.

The economic cycle can be reversed through appropriate stimulus policies, and as global recovery continues, the spillovers will boost domestic growth. Additionally, we argue that the decline in trend growth can also be reversed. The right policy environment can render previous negative shocks to trend to be temporary, and since the supply of factor inputs appears to be abundant, this can result in an increase in trend growth. In our analysis, we discuss the growth patterns of the factors of production in the last 3 decades, and find that there is no reason to believe that the long-run supply is declining. However, reforms are required to eliminate frictions that hamper their efficient allocation. Policy changes to effect such reforms are positive shocks to the trend that will enable growth to pick up. India, being a political democracy, has the institutional structure in place to facilitate such policy changes that can bring reforms in factor markets.

Besides productivity, labor, and capital, we include infrastructure capital explicitly in the analysis by constructing an infrastructure index based on physical measures of infrastructure, namely, roads, railways, and electricity. We decompose GDP growth into its components and find that, along with labor and capital, TFP contributed significantly to growth, especially in recent years. Finally, using growth accounting in a production function framework, we compute the trend growth of output to be around 8.5% during the period 1981–2014 and 8.7% in the last 5 years.

## APPENDIX

### A. Data

**Table A.1: Descriptive Statistics (1980–2010)**

	Mean	SD	Min	Max	Unit
GDP growth	3.87	2.20	0.93	7.33	percent
Capital growth	3.31	1.63	1.46	6.88	percent
Electricity production	0.75	0.28	0.32	1.32	thousand kWh
Telephone lines	0.16	0.30	0.01	1.17	number
Length of highway	0.02	0.01	0.00	0.04	km
Average years of schooling	3.84	0.80	2.44	5.20	years

GDP = gross domestic product, kWh = kilowatt-hour, SD = standard deviation.

Note: All variables are in per worker terms except human capital which is per person.

Source: Described in Table A.2.

**Table A.2: Data Sources**

Indicator	Variable	Source
Gross domestic product	GDP at factor cost (2004–2005 prices)	NAS
Investment	Gross Fixed Capital Formation	NAS
Highways—India	Length of Highways	CEIC
Electricity—India	Electricity production	WDI
Telephone—India	Telephone and mobile subscriptions	WDI
Population	Population	UN
Schooling	Average years of schooling	Barro and Lee (2012)
Literacy rate	Literacy rate	WDI
Investment projects	Projects under implementation and commissioned	CMIE
Infrastructure	Metro lines and length of highways	CMIE

GDP = gross domestic product, CMIE = Centre for Monitoring Indian Economy Pvt. Ltd., NAS = National Accounts Statistics, WDI = World Development Indicators, UN = United Nations.

### B. Infrastructure Index

**Table A.3: Principal Component Analysis, India**

	Eigen-value	Proportion Explained		Weights (1st comp)	Correlation with Index
Comp 1	2.642	0.881	Electricity	0.377	0.9979
Comp 2	0.352	0.118	Telephone	0.318	0.9167
Comp 3	0.005	0.002	Highway	0.305	0.8978

Source: Authors' computation.

## REFERENCES

- Acharya, S., I. Ahluwalia, K. L. Krishna, and I. Patnaik. 2006. Economic Growth in India, 1950–2000. In K. S. Parikh, ed. *Explaining Growth*. New Delhi: Oxford University Press.
- Agenor, P.-R., J. McDermott, and E. Prasad. 1999. Macroeconomic Fluctuations in Developing Countries: Some Stylised Facts. *IMF Working Paper*. No. 99/35. Washington, DC: International Monetary Fund.
- Aguiar, M. and G. Gopinath. 2007. Emerging Market Business Cycles: The Cycle is the Trend. *Journal of Political Economy*. 115 (1). pp. 69–102.
- Aiyar, S. and A. Mody. 2011. The Demographic Dividend: Evidence from the Indian States. *IMF Working Paper*. No. 11/38. Washington, DC: International Monetary Fund.
- Anand, K., K. C. Cheng, and S. Rehman. 2014. Potential Growth in Emerging Asia. *IMF Working Paper*. No. 14/2. Washington, DC: International Monetary Fund.
- Anant, T., R. Hasan, P. Mohapatra, R. Nagaraj, and S. Sasikumar. 2006. Labor Markets in India: Issues and Perspectives. London: Palgrave Macmillan.
- Baltabaev, B. 2013. Foreign Direct Investment and Total Factor Productivity Growth: New Macro-evidence. *Discussion Paper*. No. 27/13. Monash University.
- Barro, R. J. and J.-W. Lee. 2012. A New Data Set of Educational Attainment in the World, 1950–2010. *Journal of Development Economics*. No. 104 (C). pp. 184–198.
- Basu, S. and J. G. Fernald. 2009. What Do We Know (and Not Know) About Potential Growth? *Federal Reserve Bank of St. Louis Review*. 91 (4). pp. 187–213.
- Bils, M. and P. J. Klenlow. 2000. Does Schooling Cause Growth? *American Economic Review*. No. 90 (5). pp. 1160–1183.
- Bosworth, B., S. Collins, and A. Virmani. 2006. Sources of Growth in the Indian Economy. India Policy Forum, Global Economy and Development Program. *The Brookings Institution*. 3 (1). pp. 1–69.
- Bry, G. and C. Boschan. 1971. Cyclical Analysis of Time Series: Selected Procedures and Computer Programs. National Bureau of Economic Research, Inc.
- Calderon, C., E. Moral-Benito, and L. Servén. 2011. Is Infrastructure Capital Productive? A Dynamic Heterogeneous Approach. *World Bank Policy Research Working Paper*. No. 5682.
- Canning, D. 1999. Infrastructure's Contribution to Aggregate Output. *World Bank Policy Research Working Paper*. No. 2246.

- Caselli, F. 2005. Accounting for Cross-Country Income Differences. In P. Aghion and S. Durlauf, eds. *Handbook of Economic Growth*. 1 (A). pp. 679–741.
- Central Statistical Organisation (CSO). 2010. New Series on National Accounts Statistics. Publication, Central Statistical Organisation, Ministry of Statistics and Programme Implementation, Government of India.
- D. Costa, A. P. 2003. Uneven and Combined Development: Understanding India's Software Exports. *World Development*. 31 (1). pp. 211–226.
- Dasgupta, K. 2012. Learning and Knowledge Diffusion in a Global Economy. *Journal of International Economics*. No. 87 (2). pp. 323–336.
- Ghate, C., R. Pandey, and I. Patnaik. 2013. Has India Emerged? Business Cycle Stylized Facts from a Transitioning Economy. *Structural Change and Economic Dynamics*. No. 24. pp. 157–172.
- International Monetary Fund (IMF). 2013. World Economic Outlook. Washington, DC.
- . 2014. World Economic Outlook. Washington, DC.
- Jayaram, S., I. Patnaik, and A. Shah. 2009. Examining the Decoupling Hypothesis for India. *Economic and Political Weekly*. XLIV (44). 109–116.
- Jha, P. and S. Golder. 2008. Labour Market Regulation and Economic Performance: A Examining the Decoupling Hypothesis for India. A Critical Review of Arguments and Some Plausible Lessons for India. Technical report, International Labour Office.
- Johanssen, A., Y. Guillemette, F. Murtin, D. Turner, G. Nicoletti, C. de la Maisonneuve, P. Bagnoli, G. Bousquet, and F. Spinelli. 2013. Long-Term Growth Scenarios. *Economics Department Working Papers*. No. 1000. Paris: OECD.
- Kim, J. 2012. Past and Future of the Labor Force in Emerging Asian Economies. *Japan and the World Economy*. 24 (2). pp. 87–100.
- Krichel, T. and P. Levine. 1995. Growth, Debt and Public Infrastructure. *Economics of Planning*. 28 (2–3). pp. 119–146.
- Krishnan, R. T. and S. K. Vallabhaneni. 2010. Catch-up in Technology-Driven Services: The Case of the Indian Software Services Industry. *Seoul Journal of Economics*. 23 (2).
- Maiti, D. 2014. Reform and Productivity Growth in India: Issues and Trends in the Labour Markets. Routledge.
- Male, R. 2010. Developing Country Business Cycles: Revisiting the Stylised Facts. Queen Mary, University of London, School of Economics and Finance. *Working Paper* No. 664.

- Mishra, P. 2013. Has India's Growth Story Withered? *Economic and Political Weekly*. XLVIII (15). pp. 51--59.
- Neumeyer, P. A. and F. Perri. 2005. Business Cycles in Emerging Economies: The Role of Interest Rates. *Journal of Monetary Economics*. 52 (2). pp. 345-380.
- Papola, T. and J. Pais. 2007. Debate on Labour Market Reforms in India: A Case of Misplaced Focus. *The Indian Journal of Labour Economics*. 50 (2). pp. 61-65.
- Patibandla, M. and B. Petersen. 2002. Role of Transnational Corporations in the Evolution of a High-tech Industry: The Case of India's Software Industry. *World Development*. 30 (9). pp. 1561-1577.
- Patnaik, I. and A. Shah. 2010. Why India Choked when Lehman Broke. *Finance Working Papers*. No. 22974. East Asian Bureau of Economic Research.
- Pritchett, L. and L. H. Summers. 2014. Asia-phoria Meet Regression to the Mean. *Working Paper*. No. 20573. National Bureau of Economic Research.
- PwC. 2013. World in 2050: The BRICs and Beyond: Prospects, Challenges and Opportunities. Technical report.
- Rand, J. and F. Tarp. 2002. Business Cycles in Developing Countries: Are They Different? *World Development*. 30 (12). pp. 2071-2088.
- Reserve Bank of India. 2009a. External Commercial Borrowings (ECB) Policy - Liberalisation. RBI/2008-09/343 A.P. (DIR Series) Circular No. 46.
- . 2009b. RBI Announces Further Monetary Stimulus. Press release, 2008-2009/1432.
- Saggi, K. 2002. Trade, Foreign Direct Investment, and International Technology Transfer: A Survey. *The World Bank Research Observer*. 17 (2). pp. 191-235.
- Sahoo, P. and R. K. Dash. 2012. Economic Growth in South Asia: Role of Infrastructure. *Journal of International Trade and Economic Development*. 21 (2). pp. 217-252.
- Sharma, A. N. 2006. Flexibility, Employment and Labour Market Reforms in India. *Economic and Political Weekly*. XLI (21) pp. 2078-2085.
- Straub, S. 2011. Infrastructure and development: A critical appraisal of the macro-level literature. *The Journal of Development Studies*. 47 (5). pp. 683-708.
- United Nations. 2012. World Population Prospects: The 2012 Revision. Technical Report 23. Department of Economic and Social Affairs.
- United Nations Conference on Trade and Development (UNCTAD). 2013. Impact of the Global Slowdown on India's Exports and Employment. United Nations Publication.

## Is India's Long-Term Trend Growth Declining?

The paper finds that the recent growth decline in India has elements of a business cycle and a trend slowdown. We observe a cyclical downturn post-global financial crisis due to external and domestic conditions. The economy also witnessed a negative shock to trend caused by policy uncertainty. With global recovery strengthening and appropriate demand management policies, the cycle can be reversed. Besides, given that the long-run supply of factors appears strong and institutional capacity for reform exists, policy action in eliminating structural bottlenecks in factor markets can render the negative shock temporary. Thus, trend growth can also pick up.

### About the Asian Development Bank

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to approximately two-thirds of the world's poor: 1.6 billion people who live on less than \$2 a day, with 733 million struggling on less than \$1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.



**ASIAN DEVELOPMENT BANK**

6 ADB Avenue, Mandaluyong City

1550 Metro Manila, Philippines

[www.adb.org](http://www.adb.org)