Factor accumulation had driven growth in Indian economy in 21st century, however, TFPG also played a significant role.
Content

1. India KLEMS database 2017
2. Broad sector analysis
3. Disaggregated Industry Level analysis
4. Challenges to TFP growth improvement
5. Conclusion
Growth and Productivity
India KLEMS Database 2017
The database underlying the computation of productivity and sources of growth is the India KLEMS dataset (version 2017)

- **Sources:** It is compiled from National Accounts Statistics (NAS), published annually by the Central Statistical Organization, Government of India and supplemented by Input-Output tables, Annual Survey of Industries & National Sample Survey Organizations (NSSO) surveys on employment & unemployment.

- **Variables:** The dataset provides consistent estimates of factors of production – namely capital (K), labour (L), energy (E), material (M), and services (S) along with both labor as well as total factor productivity (TFP) for 27 industries.

- **Time period & industry coverage:** Since the focus of the present study is 21st century India, we cover the period 2000-01 till 2015-16. The disaggregated 27 sectors include agriculture, mining and quarrying, along with 13 manufacturing industries and several service sectors including transport and storage, telecommunication, financial services. Together they account for the total value added of the Indian economy.

- **Labour input:** It is measured by combining data on labour persons and data on labour quality as in the KLEMS framework it is desirable to estimate changes in labour composition by industries on the basis of age, gender and education.

- **Capital input:** For capital input, we compute the measure of capital services from the measurement of capital services. We have used capital stock estimates for detailed asset types and the shares of each of these assets in total capital remuneration.

- **The intermediate inputs:** They are comprise- Energy input (E), Material input (M) and services input (S) and we have constructed the volume series of intermediate input for each of these categories. The key building block for constructing time series on Intermediate Inputs at current prices is the input-output transaction tables.

- **Factor income:** To compute the labor income share out of value added, the sum of the compensation of employees and that part of the mixed income which are wages for labor have been taken into account.

- **Results:** Using the above mentioned variables annual growth rates of labour productivity and TFP for the 27 industries are computed for the period 2000-01 to 2015-16. Both the indexes and growth rates of LP and TFP are computed with 2011-12 as base year.
Growth and Productivity

Broad sectors
The gradual reform of 1990s and benign global economy drove Indian economy into a higher growth path as it enters 21st century

- India’s long-term trend growth of GDP accelerated after 2000-01 and reached its peak in 2007-08, the gradual reform of 1990s and benign global growth before financial crisis of 2008-09 helped
- The growth experience of 21st century had two distinct phase
  - In phase I (2000-01 to 2007-08) India’s growth moved in sync with World Growth and enjoyed buoyant Global growth impetus
  - In phase II (2008-09 to 2015-16), India has gone through a cycle where domestic factors influenced more to the cyclical downturn, the cycle has started to revise in last few years

Note: India’s data are in Financial Year basis, GDP growth has been split into trend and cyclical component using HP filter

Source: IMF WEO database April,2018, India KLEMS Database 2018
Capital deepening remained the dominant sources of growth in India GVA growth in 21st century but its composition changed favourably.

- Following historical trend capital deepening was the most dominant factor in Indian economic growth even in the 21st century, but there has been some change in composition.

- India’s Gross Value added growth since 2000-01 has been majorly driven by capital accumulation, the contribution of capital increased from 49% to 57% when compared in two phases.

- One third of the growth also came from growth in TFP but its contribution fell in the second half after 2007-08.

- The asset composition of capital input changed and its contribution increased in second half of the reference period.

- Even though labour quality contribution did not changed between the two phases, there has been a sharp fall in labour person growth.
Gross output growth was driven mainly by intermediate input, services sector had significant contribution from TFP growth

**Sources of growth of Gross Output: Broad Sectors**

- Intermediate input played the major role in growth of Gross Output in Indian economy, mainly for manufacturing and construction.
- Construction which was growing at 11% in the phase I was driven by mainly labour and intermediate input, but TFP growth contribution was negative.
- Contrary to believe, Market services growth in gross output had significant contribution from TFP growth.
- TFP growth contribution improved in labour intensive manufacturing in phase II.

Note: Year denote Financial year

Source: India KLEMS Database 2017
Labour productivity grew more than twice the pace of TFP growth, driven by labour intensive manufacturing and market services.

- Labour Productivity grew more than twice the pace of Total Factor productivity since 2000-01
- Comparing across the phases, all the sectors except Non-labour intensive manufacturing and construction saw labour productivity grew faster in second half
- Across all sectors, labour intensive manufacturing and market services experience fastest growth

Note: Year denote Financial year

Source: India KLEMS Database 2017
Labour quality improvement has insignificant role, capital and intermediate input drove labour productivity growth since 2000-01

- The sources of the rapid growth in labour productivity was mainly driven by growth in either capital services per employed or use of more intermediate input.
- Increase in labour quality had insignificant contribution in growth in labour productivity.
- Manufacturing labour productivity growth was majorly because of large contribution of intermediate input consumption per employed.
- Whereas in case of services, the contribution of capital services, intermediate input per employed played balanced role.
- On an average 10% of the labour productivity growth came from increase in TFP growth exception being Mining and Construction sector where TFP growth contributed negatively.
Material input consumption had driven higher share of intermediate consumption in manufacturing and construction

- The higher contribution of intermediate inputs in manufacturing and construction was mainly because of large share of material inputs.
- Material input contribution was almost 4 times higher in manufacturing and construction compared to services sector.
- Services as input also played significant role in manufacturing sector, where 1/5th of the intermediate contribution in labour intensive manufacturing was from services.
- Besides electricity and mining which are traditionally energy intensive, Market services had relatively high share of energy input consumption.
- Similarly construction sector had 27% of services input contributing to the intermediate contribution.
Growth and Productivity

Disaggregated Industry Level
Intermediate input and capital deepening drove output growth in Indian economy, however some market services had very high TFPG.

- Market services comprising mainly Post & Telecom, Business and Financial services experienced very high output growth since 2000-01 driven by TFPG and intermediate input growth.
- Business and Financial services and construction had high labour input contribution.
- There is clear sign of very high contribution of intermediate input consumption across all sectors except domestic trade, mining and agriculture.
- Domestic trade, mining and agriculture’s output growth was driven by capital deepening.

![Graph showing Sources of Gross Output Growth: 27 India KLEMS sector (% per annum 2000-2015)](image)

Source: India KLEMS Database 2017

Note: The code inside the parenthesis indicate industry code

Note: Year denote Financial year
Post & Telecom sector had the highest labour productivity growth since 2000-01, followed by other manufacturing, paper and textile and leather

- Post & Telecom sector which experience large technological progress in 21st century experience 17% of labour productivity growth.
- In terms of top 5 industries we note that apart from post & telecom, other manufacturing, paper, chemicals and textiles are the industries with high rates of improvements in labour productivity.
- Among major sectors in terms of their GVA share in 2015, Domestic trade (wholesale+ retail) emerged as an sector which had relatively high Labour productivity growth.

Note: The code inside the parenthesis indicate industry code

Note: Year denote Financial year

Source: India KLEMS Database 2017
Barring few services sectors, labour productivity growth was driven by consumption of more capital and intermediate input per employed.

Sources of Labour Productivity Growth: 27 India KLEMS sector (% per annum 2000-2015)

- The growth in Post & telecom labour productivity was mainly driven by TFPG.
- The other services sector which show significant contribution of TFPG to labour productivity was Financial services, Public Administration and defense and transport.
- Domestic trade which we highlighted as major sector in the economy actually had TFPG negatively impacting labour productivity growth and its was capital deepening per employed which contributed significantly.

Note: The code inside the parenthesis indicate industry code
Note: Year denote Financial year

Source: India KLEMS Database 2017
Market services experienced relatively high TFPG since 2000-01, Post & Telecom and Financial services were the best performer.

As highlighted earlier, Post & Telecom and Financial services were the two major sectors which experienced unprecedented TFP growth in 21st century.

It is very clear that there was a significant difference between TFP growth in market services vs non-market services, the former experiencing positive TFPG since 2000-01.

In manufacturing sector, except basic metals, all other manufacturing industries experience positive TFPG but less than 2%.

Note: The code inside the parenthesis indicate industry code

Source: India KLEMS Database 2017

Note: Year denote Financial year


Whereas for Financial services sector, TFPG improved in the second phase.


Within manufacturing, Food and Textile & leather sector experience higher TFPG in second phase whereas all other manufacturing sector’s TFPG fell in second half.

Note: Year denote Financial year
Source: India KLEMS Database 2017
Material input consumption dominates the contribution among intermediate input to output growth, but its share is smaller in services

- Relatively manufacturing sector industries had higher contribution of material input to Gross Output.
- Three services sector, Hotels, post & telecom and health had comparatively higher material input contribution.
- Within manufacturing sector, non-metallic and Basic metal had high contribution of energy along with mining, utilities and transport sectors.
- In services, both financial and business services had relatively higher energy intensity compared to other services sector.
- Agriculture sector which is very material intensive, also uses services as its core input.

Note: The code inside the parenthesis indicate industry code
Source: India KLEMS Database 2017

Note: Year denote Financial year
Growth and Productivity

Challenges to TFP growth improvement
Presence of informal segment (75% in employment) in Indian manufacturing create challenges for improvement in productivity growth

Note: Year denote Financial year

Source: India KLEMS Database 2016

- TFP growth: Indian manufacturing segments
  - (2003-2011, % per annum, GO basis)
  - Formal: 6.2
  - Informal: 3.1

- TFP growth: Disaggregated Manufacturing sectors
  - (2003-2011, % per annum, GO basis)

- Formal manufacturing sector TFPG during 2003-2011 was almost double what was observed in informal segment

- The difference in TFPG difference is observed across almost all the manufacturing sectors

- The difference seems to less for industries where there both formal and informal segment coexist with interconnected production system through sub-contracting-for example in Textile and Leather manufacturing

**Categories**
- Basic Metal (27t28)
- Other Manu (36t37)
- Wood (20)
- Non-metallic (26)
- Food (15t16)
- Transport Eq (34t35)
- Paper (21t22)
- Textile & Leather (17t19)
- Refined (23)
- Machinery nec (29)
- Chemical (24)
- Rubber (25)
- Electrical Eq (30t33)

**Graph Key**
- Formal
- Informal
Level of education has positive impact on productivity growth, however education attainment is yet to make the structural shift.

The fit is best with % share of employed between primary and higher secondary, compared to share of above higher secondary.

Note: Year denote Financial year

Source: India KLEMS Database 2017
Nature of factor accumulation depends on evolution of labour regulation and structure of changing capital asset types

- Since 2000-01, there has been sharp increase in contractualisation of Indian labour market especially Indian manufacturing sector, the impact of productivity is still not clear
- The phase I (2000-2007) saw shift towards increase share of equipment in capital stock which should positively impact TFPG, growth of which decelerated in second phase II.

Note: Year denote Financial year

Source: India KLEMS Database 2017
Growth and Productivity

Conclusion
India’s growth has been driven by factor accumulation, productivity growth has been also relatively high, but yet to reach potential

• **Structural shift in 21st century:** Indian economy entered a much higher growth trajectory after 2000-01, but there exist two phases separated by financial crisis.

• **Factor accumulation main driver:** Growth in gross value added was driven by capital deepening and intermediate input played major role in gross output growth.

• **Labour productivity sharply accelerated:** Even though contribution of labour input remained very small, labour productivity growth rose sharply owing to use of more intermediate and capital input.

• **Market services emerged as best performer:** Market services experienced relatively high TFPG since 2000-01, Post & Telecom and Financial services were the best performer.

• **Material consumption is very high:** Material input consumption dominates the contribution among intermediate input to output growth, but its share is smaller in services.

• **Challenges to productivity improvement:** Presence of informal segment in Indian economy, labour market regulation, distorted factor input both in terms of labour and capital assets and backlog in educational attainment hold back India’s productivity potential.