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Growth and Productivity in 21st Century India: A Disaggregated Industry Level Analysis

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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

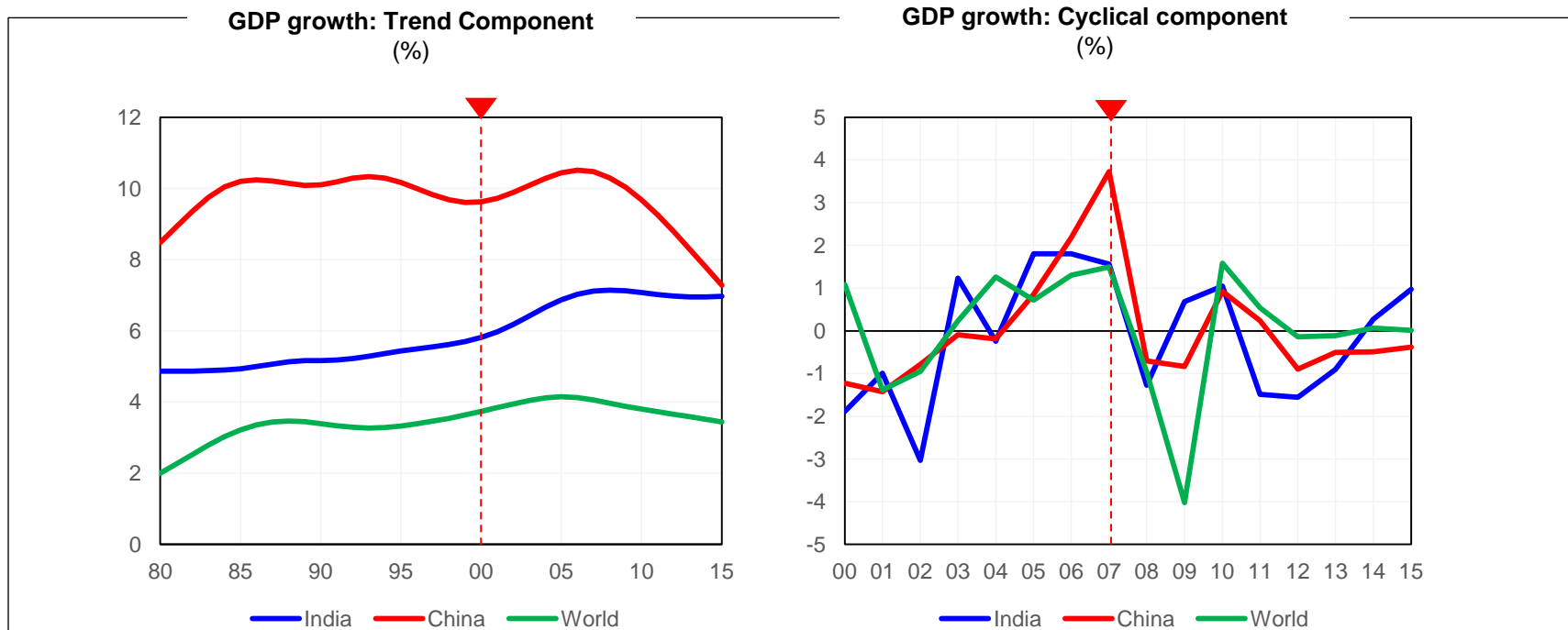
The database underlying the computation of productivity and sources of growth is the India KLEMS dataset (version 2017)

- **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

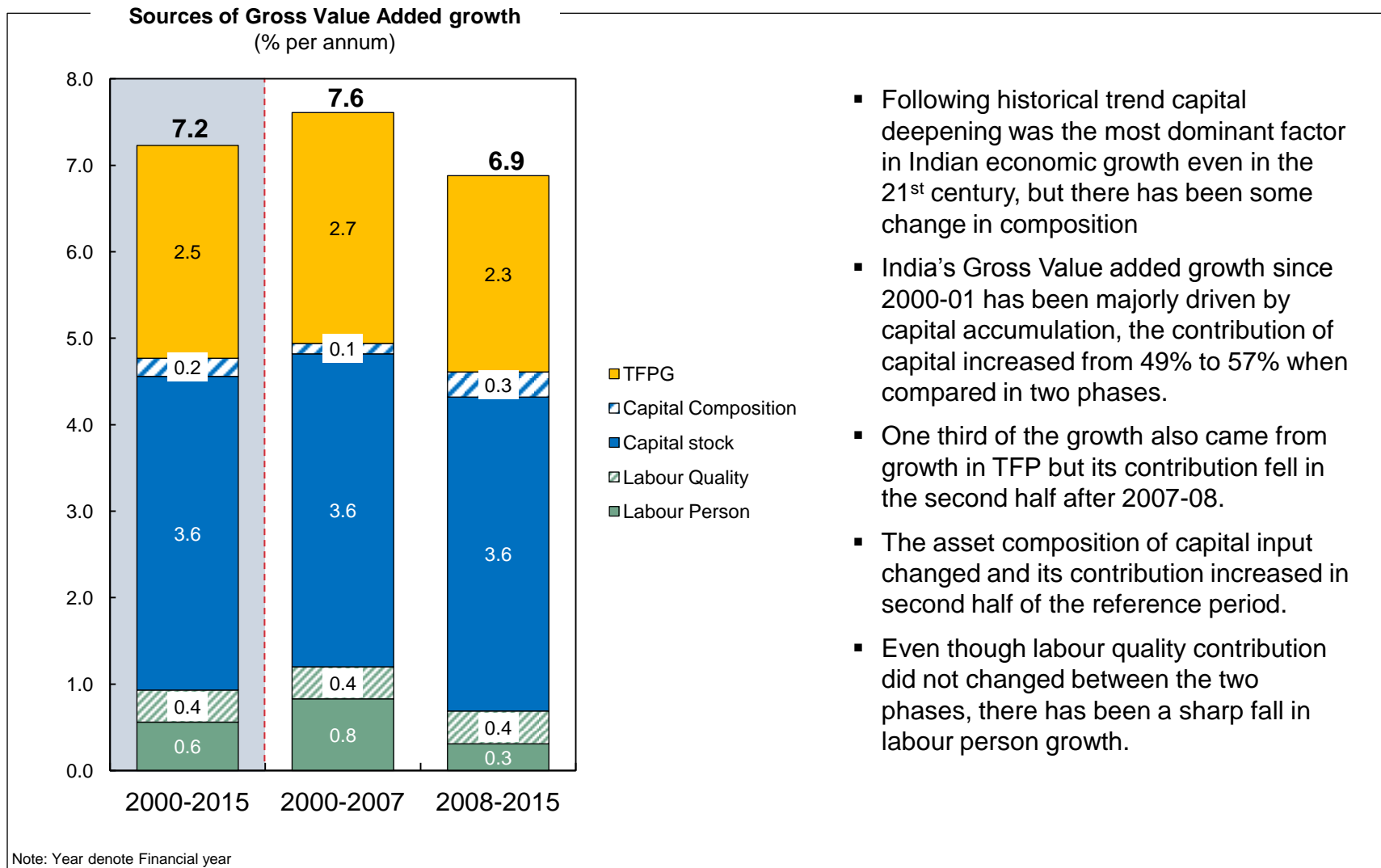
The gradual reform of 1990s and benign global economy drove Indian economy into a higher growth path as it enters 21st century



- 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

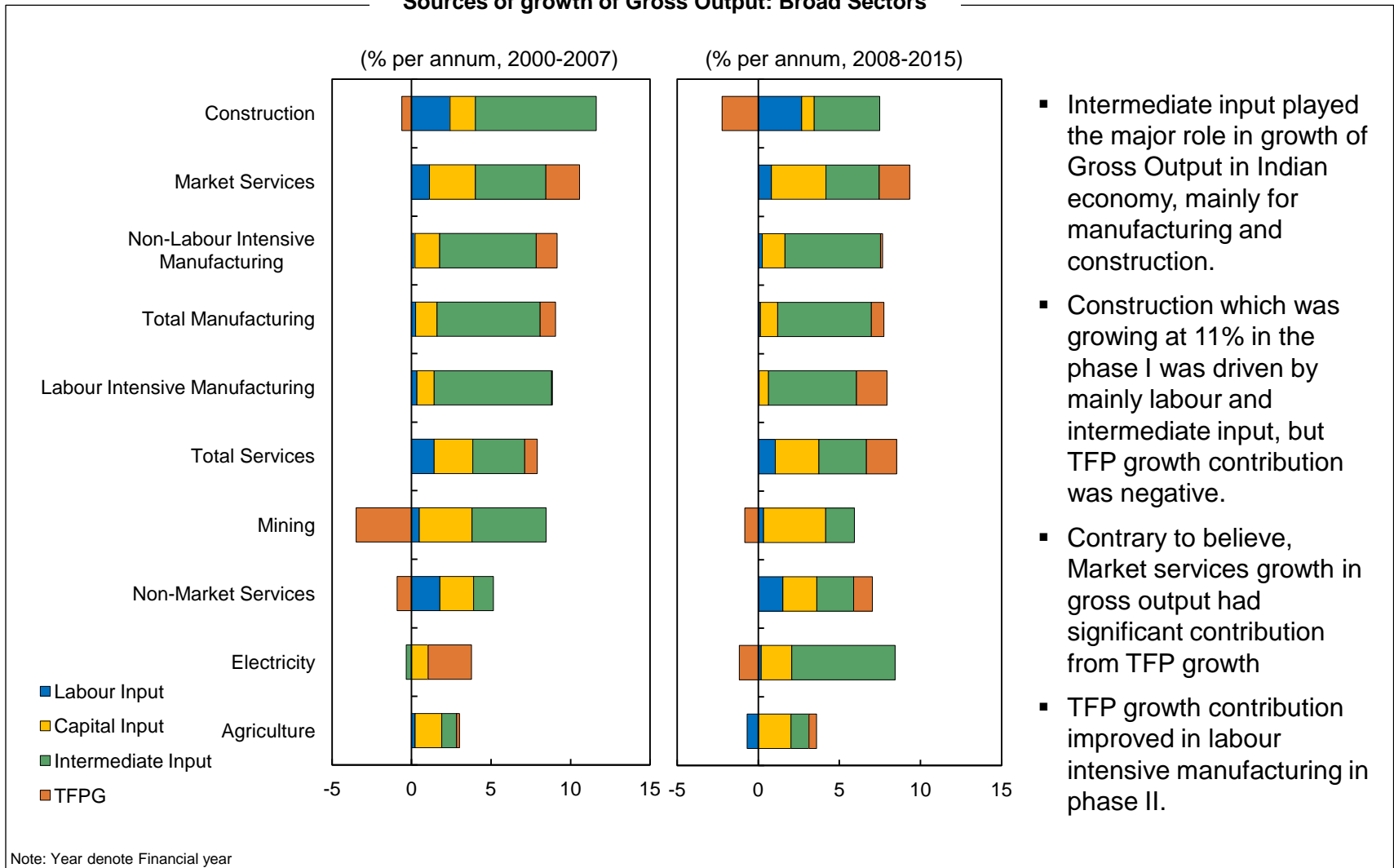
Note: India's data are in Financial Year basis, GDP growth has been split into trend and cyclical component using HP filter

Capital deepening remained the dominant sources of growth in India GVA growth in 21st century but its composition changed favourably



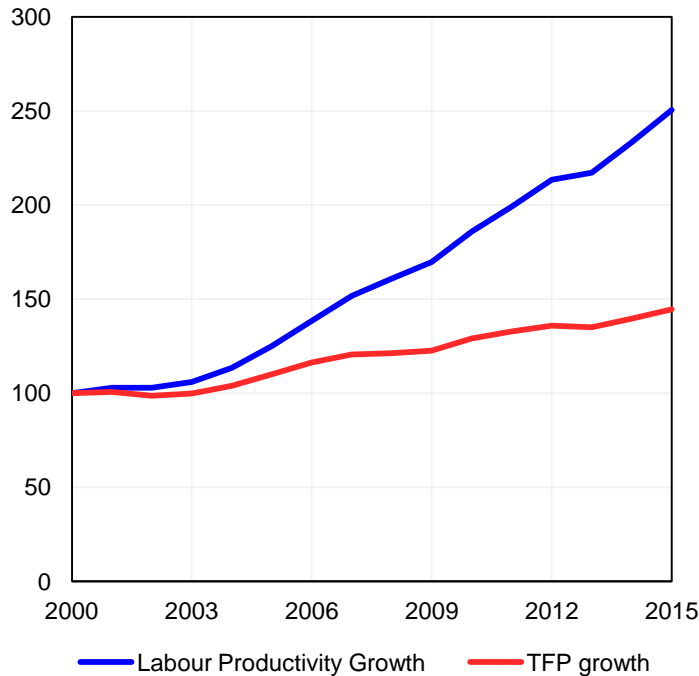
Gross output growth was driven mainly by intermediate input, services sector had significant contribution from TFP growth

Sources of growth of Gross Output: Broad Sectors

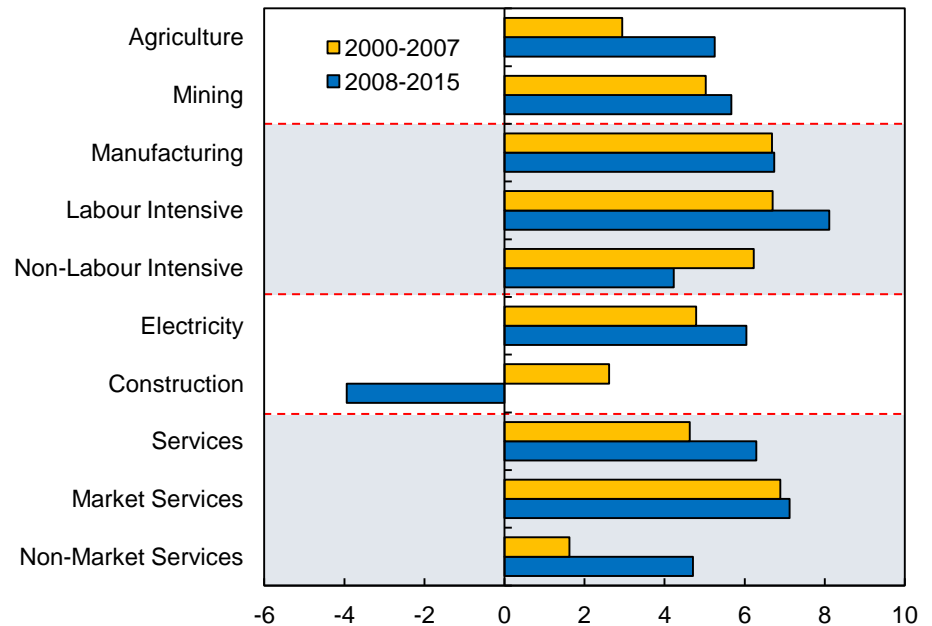


Labour productivity grew more than twice the pace of TFP growth, driven by labour intensive manufacturing and market services

Labour and Total Factor Productivity Growth
(2000-01=100, Total Economy)



Labour Productivity growth: Broad Sectors
(% per annum)

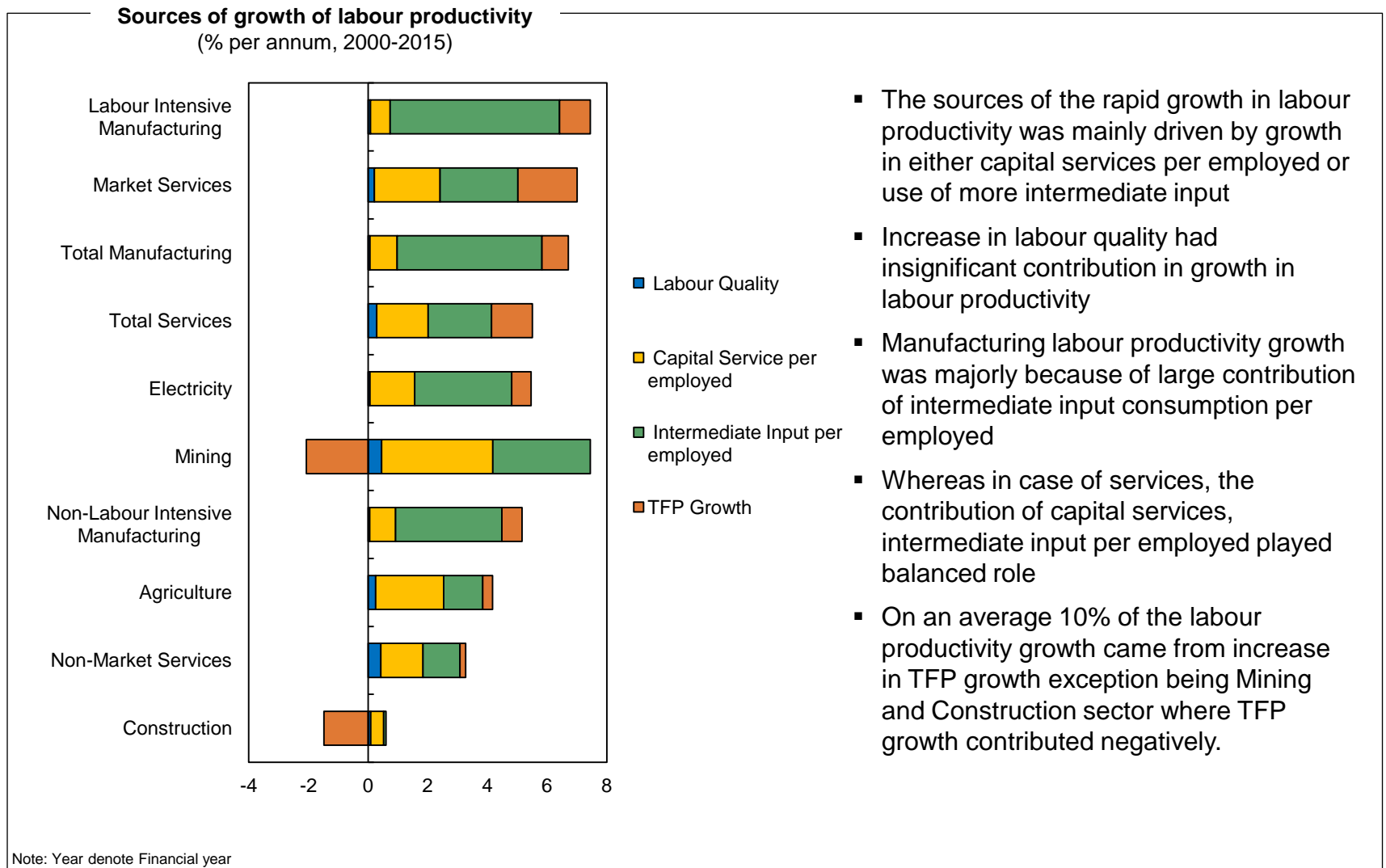


- Labour Productivity grew more than twice the pace of Total Factor productivity since 2000-01
- Comparing across the phases, all the sectors except Non-labour intensive manufacturing and construction saw labour productivity grew faster in second half
- Across all sectors, labour intensive manufacturing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

Note: Year denote Financial year

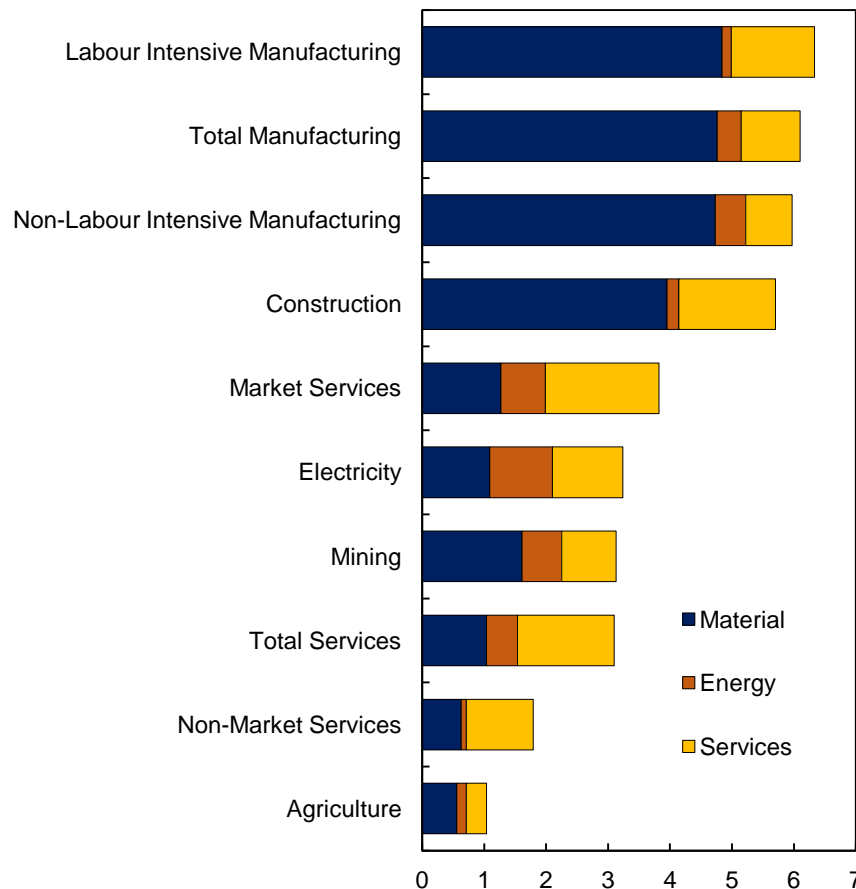
Source: India KLEMS Database 2017

Labour quality improvement has insignificant role, capital and intermediate input drove labour productivity growth since 2000-01



Material input consumption had driven higher share of intermediate consumption in manufacturing and construction

Contribution of Intermediate input to GVO growth
(% per annum, 2000-2015)



- 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

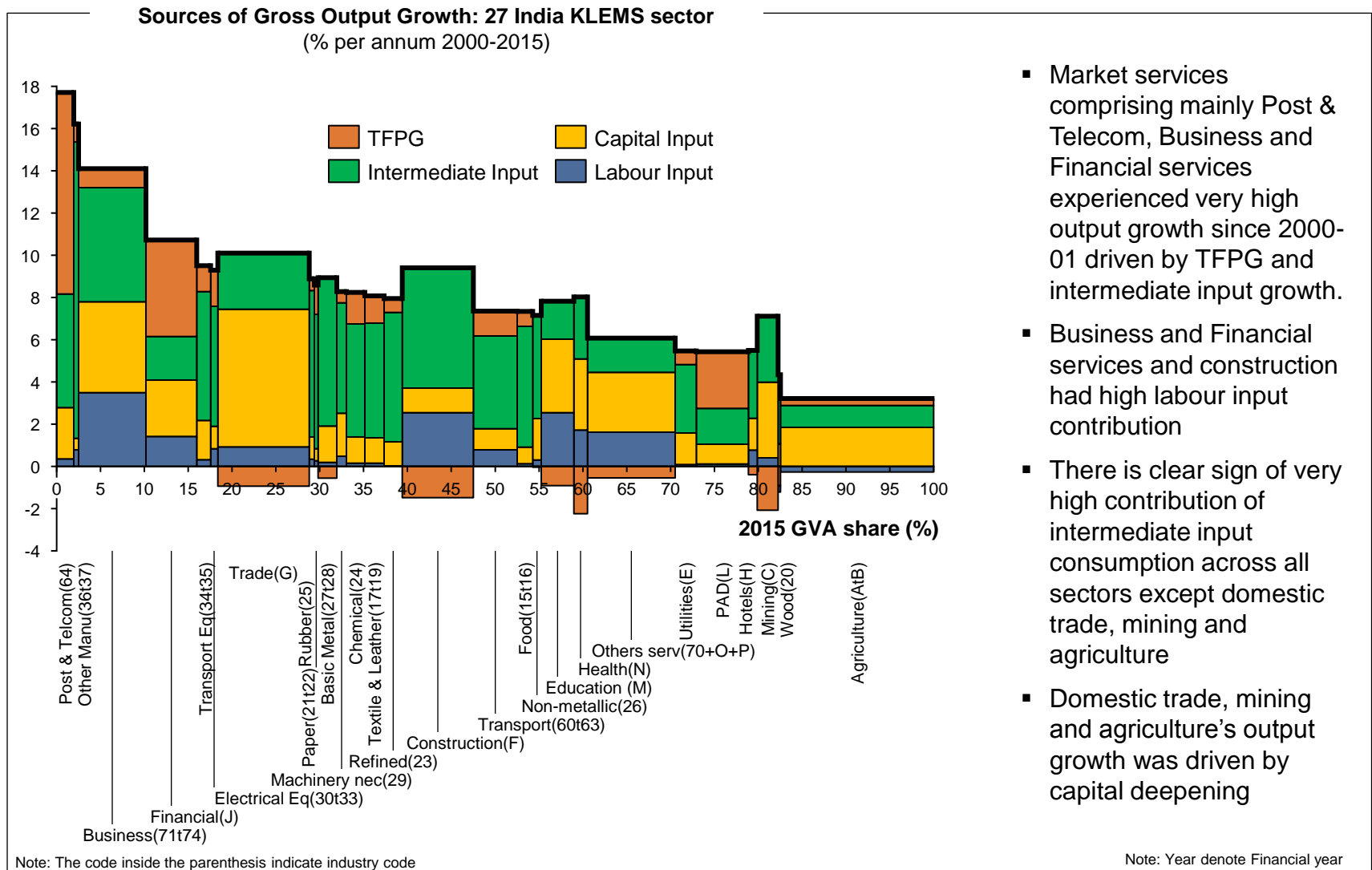
Note: Year denote Financial year

Source: India KLEMS Database 2017

Growth and Productivity

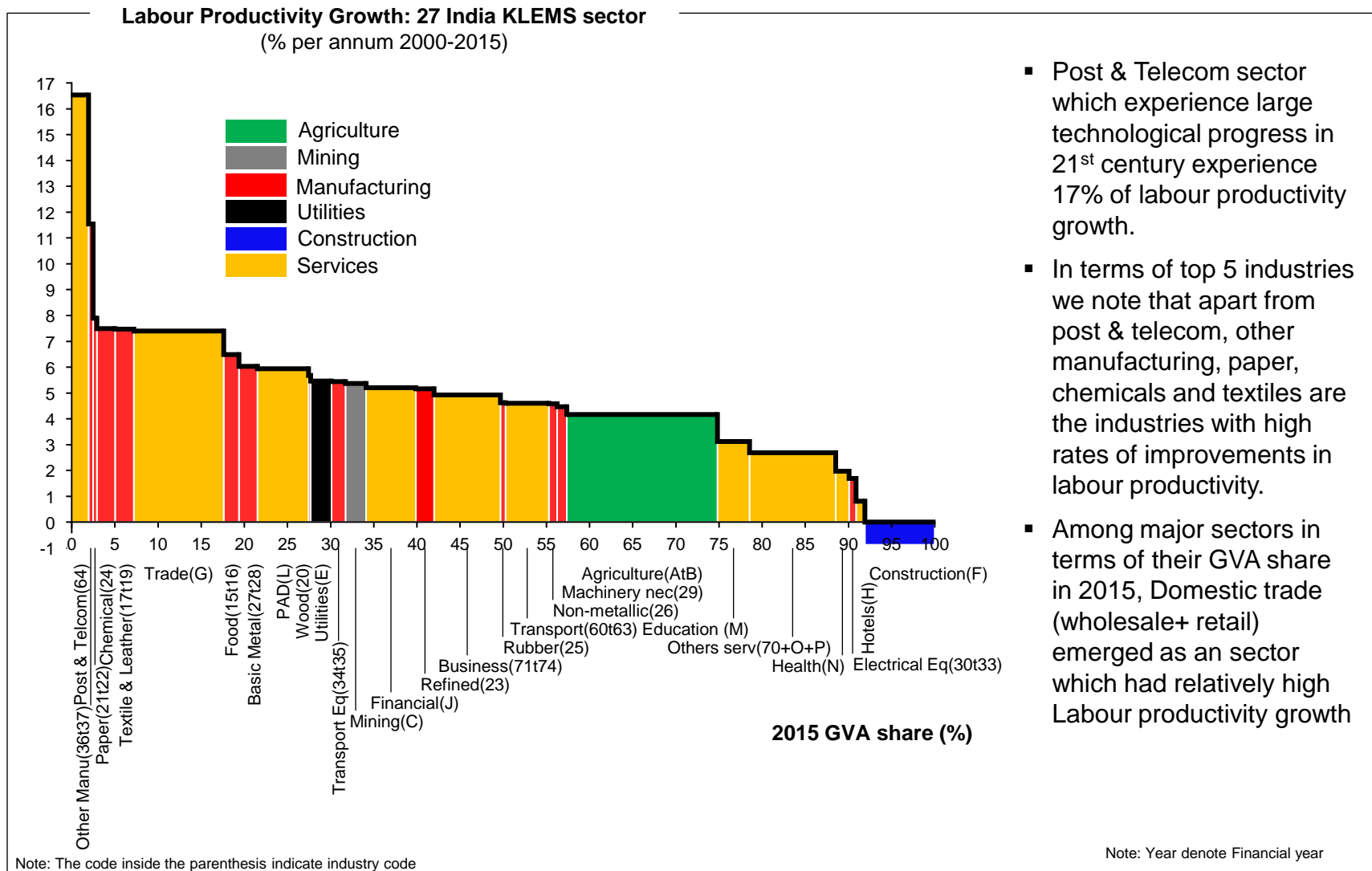
Disaggregated Industry Level

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



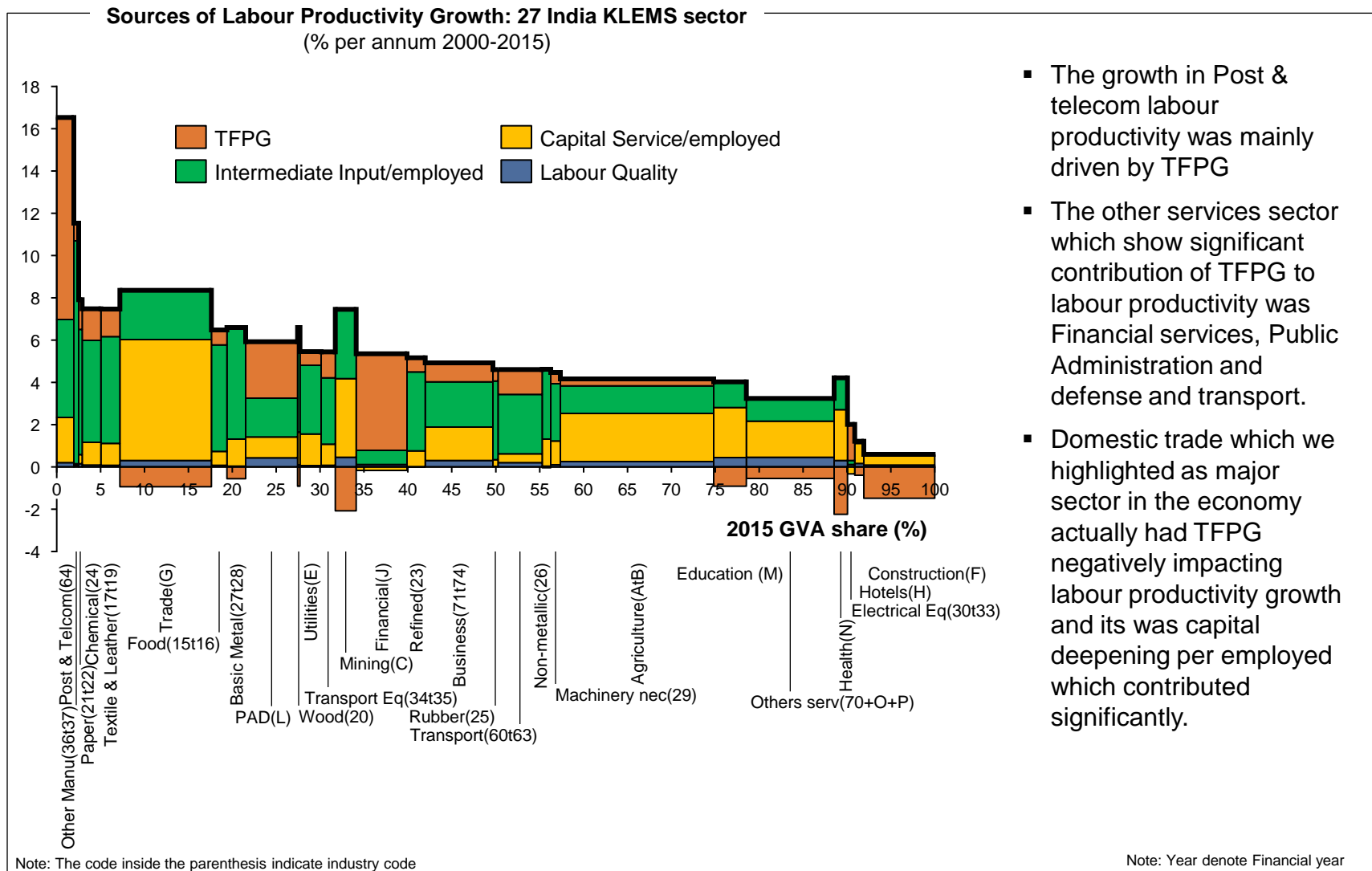
- Market services comprising mainly Post & Telecom, Business and Financial services experienced very high output growth since 2000-01 driven by TFPG and intermediate input growth.
- Business and Financial services and construction had high labour input contribution
- There is clear sign of very high 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

Post & Telecom sector had the highest labour productivity growth since 2000-01, followed by other manufacturing, paper and textile and leather



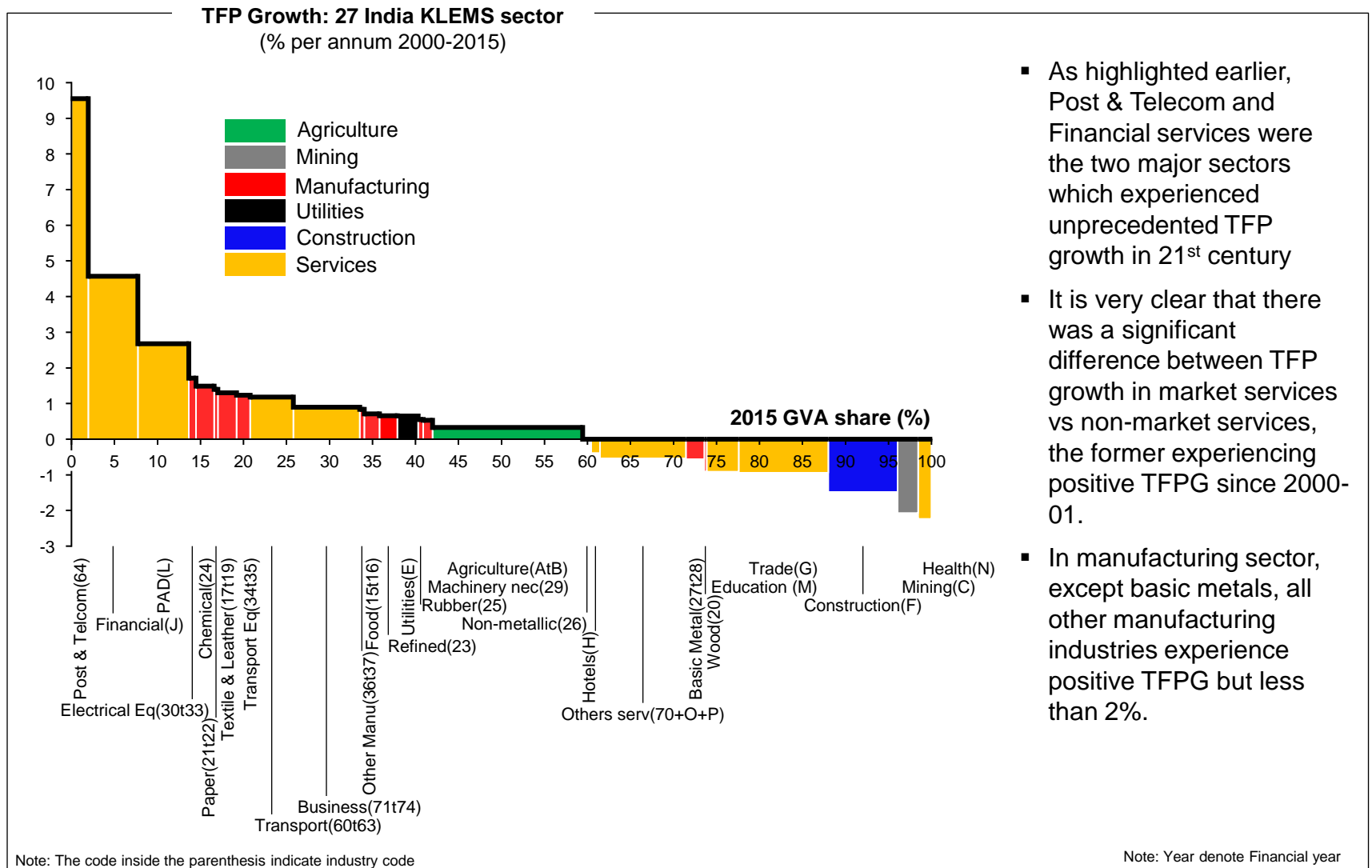
- Post & Telecom sector which experience large technological progress in 21st century experience 17% of labour productivity growth.
- In terms of top 5 industries we note that apart from post & telecom, other manufacturing, paper, chemicals and textiles are the industries with high rates of improvements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

Barring few services sectors, labour productivity growth was driven by consumption of more capital and intermediate input per employed



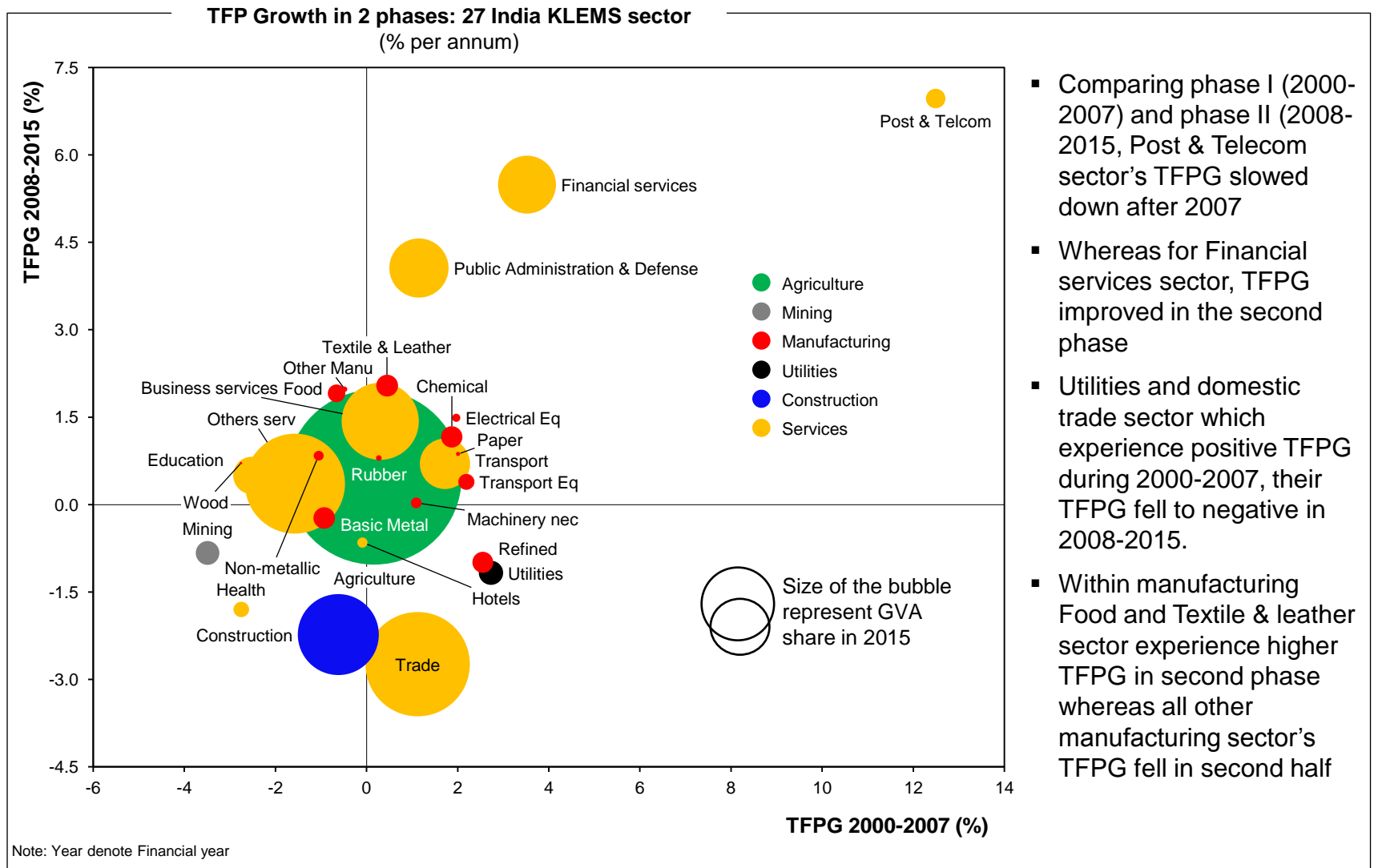
- The growth in Post & telecom labour productivity was mainly driven by TFPG
- The other services sector which show significant contribution of TFPG to labour productivity was Financial services, Public Administration and defense and transport.
- Domestic trade which we highlighted as major sector in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

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%.

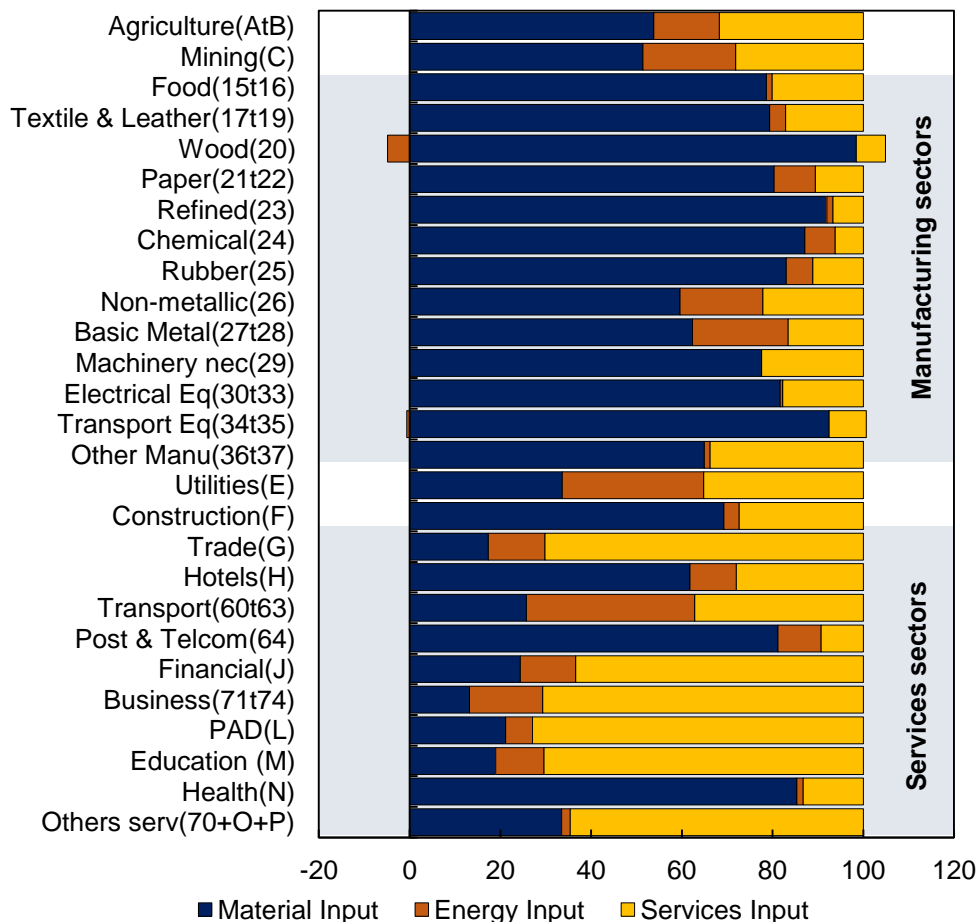
TFPG fell in the second phase (2008-2015) except few sectors like Financial & Business services, public administration, Food and Textile



- Comparing phase I (2000-2007) and phase II (2008-2015), Post & Telecom sector's TFPG slowed down after 2007
- Whereas for Financial services sector, TFPG improved in the second phase
- Utilities and domestic trade sector which experience positive TFPG during 2000-2007, their TFPG fell to negative in 2008-2015.
- Within manufacturing Food and Textile & leather sector experience higher TFPG in second phase whereas all other manufacturing sector's TFPG fell in second half

Material input consumption dominates the contribution among intermediate input to output growth, but its share is smaller in services

Contribution of Intermediate input to GVO growth
(% share in intermediate input contribution, 2000-2015)



- 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.

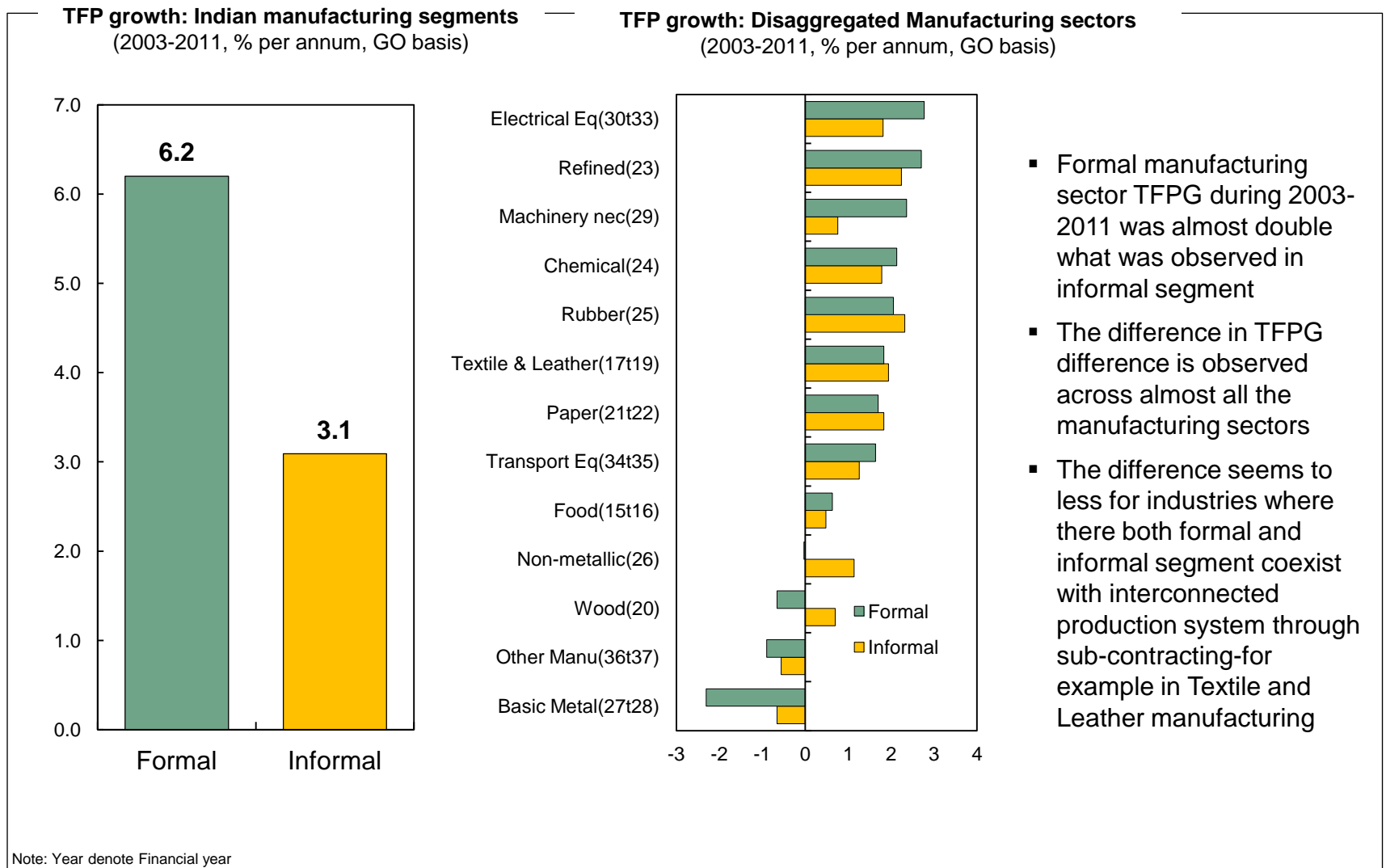
Note: The code inside the parenthesis indicate industry code

Note: Year denote Financial year

Growth and Productivity

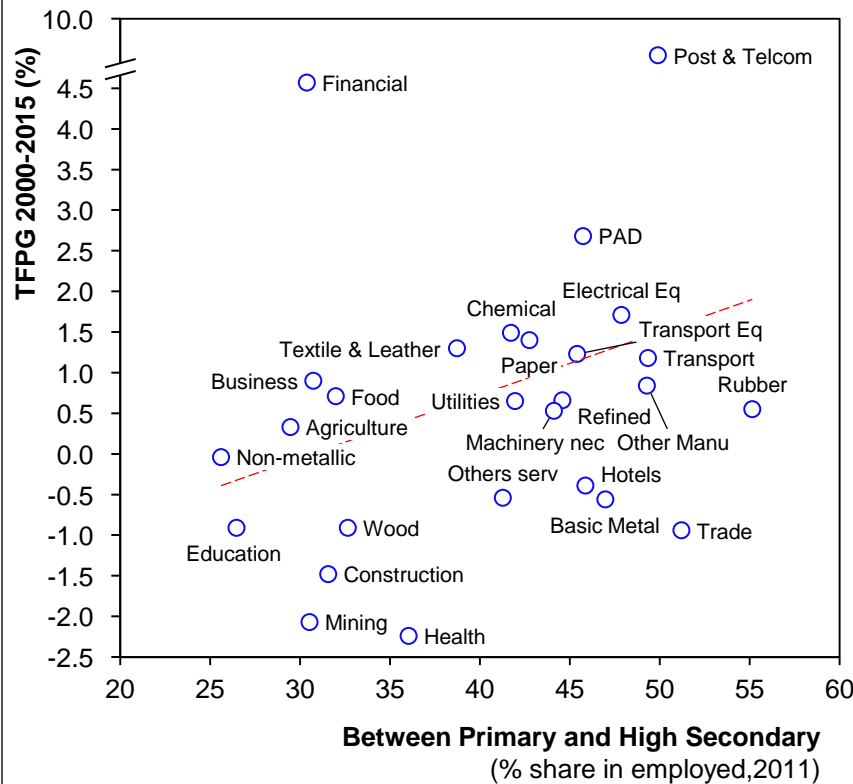
Challenges to TFP growth improvement

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



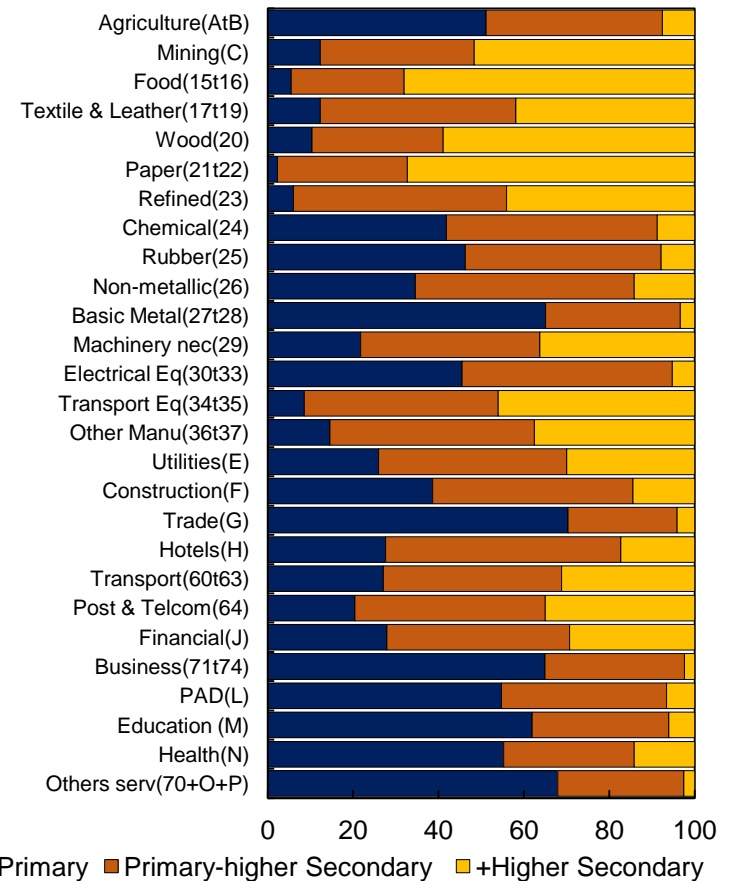
Level of education has positive impact on productivity growth, however education attainment is yet to make the structural shift

TFP growth vs Education attainment
(For all 27 India KLEMS industries)



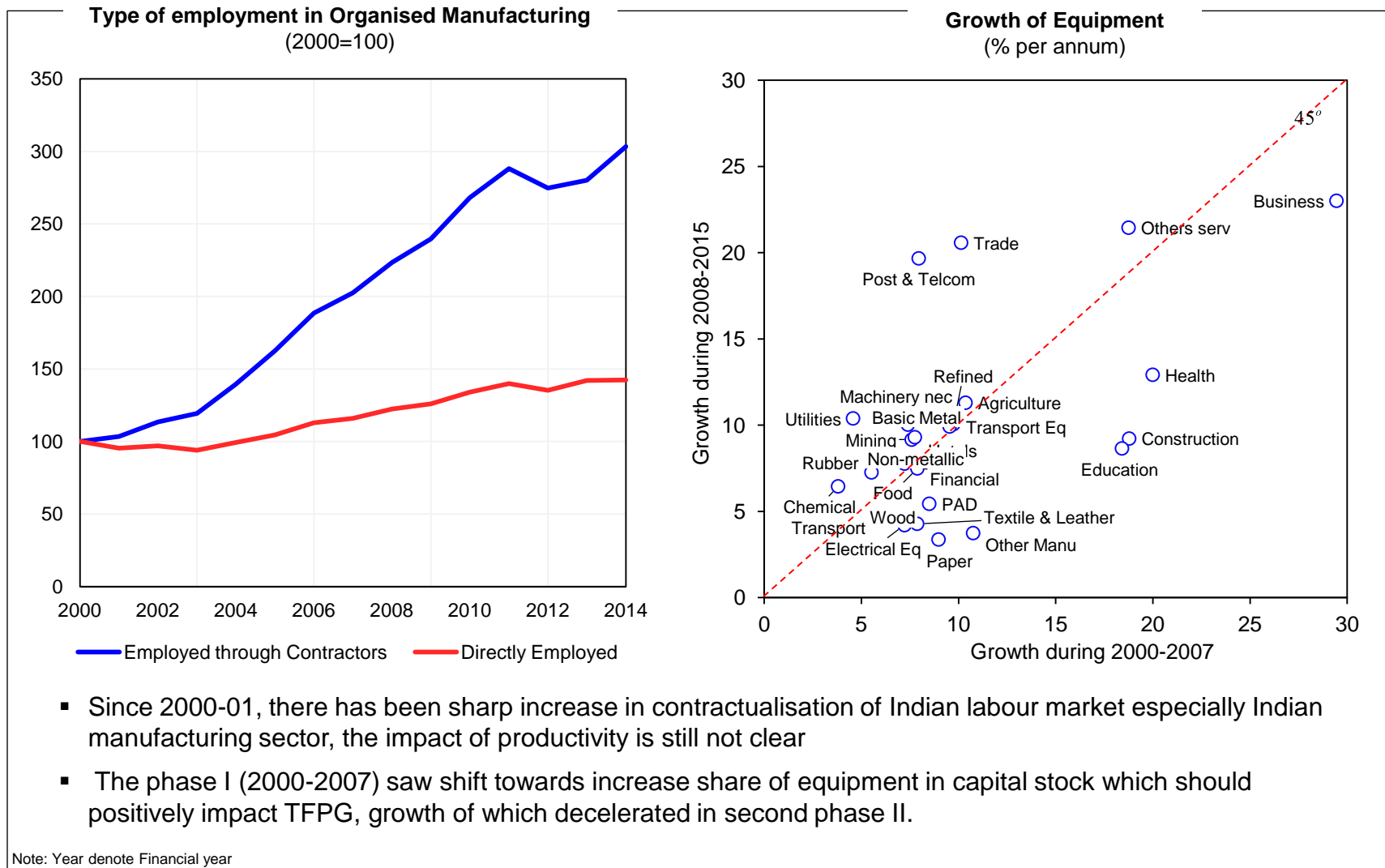
- The fit is best with % share of employed between primary and higher secondary, compared to share of above higher secondary

Category of education level across industries
(2011, % share)



Note: Year denote Financial year

Nature of factor accumulation depends on evolution of labour regulation and structure of changing capital asset types



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.