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ISID Institute for Studies in Industrial Development
An institution of Indian Council of Social Science Research (Ministry of Education)
4 Vasant Kunj Institutional Area, New Delhi – 110 070
Phone: +91 11 3510 4511 | *E-mail:* info@isid.org.in | *Website:* https://isid.org.in

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Assessing Regional Manufacturing Productivity in India: A Comparative Analysis of Organised and Unorganised Manufacturing

Mahua Paul [*] **&** ***Smruti Ranjan Sahoo*** [**]

Abstract: *This study assesses regional Total Factor Productivity (TFP) across India's manufacturing sector, examining the distinct roles of the formal (organised) and informal (unorganised) sectors in driving economic growth and reducing regional disparities. We aim to understand if these sectors contribute equally to state-level growth and if their TFP growth trajectories differ across states and industries. We utilize unit-level data from both formal and informal manufacturing plants across 18 major Indian states from 2000-01 to 2022-23. Productivity was estimated using the Ackerberg, Caves, and Frazer (2015) method at the NIC 4-digit level for 22 industry groups, then aggregated to calculate state-level TFP. Ackerberg, Caves, and Frazer (2015) identify the gross value-added production function and address endogeneity concerns, thereby providing robust estimates of TFP than prior approaches. Capital measurement received meticulous attention. Our analysis reveals a dual-track evolution in India's manufacturing TFP over the past two decades. The organised sector has demonstrated a consistent trend of maturing and consolidating productivity, particularly in high-value industries such as chemicals, textiles, and leather, showing a general improvement since 2010. Conversely, the unorganised sector exhibits a mixed picture; some industries adapted and grew, while others faced collapse due to policy, scale, or automation pressures. Notably, since 2010, the productivity of the unorganised sector has diverged sharply, accelerating rapidly in some states but declining significantly in others. These findings underscore significant regional and sectoral disparities in India's manufacturing productivity. The uneven TFP growth, especially the fragmented and volatile performance of the unorganised sector, poses challenges to inclusive economic development and necessitates targeted policy interventions. Policies should foster broader technological adoption and skill enhancement across all manufacturing segments, particularly within the unorganised sector, to ensure balanced and sustainable industrial growth and mitigate regional inequalities.*

JEL classification: *L60, D24, C14, R11*
Keywords: *Organised manufacturing, Unorganised manufacturing, Total factor productivity, Semi-parametric method, Regional growth*

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[*] Assistant professor, Institute for Studies on Industrial Development (ISID), New Delhi. Email: mahua@isid.org.in

[**] Research Fellow, Centre for WTO Studies, IIFT, New Delhi. Email: smrutiranjancds@gmail.com

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1. Introduction

Organised and unorganised manufacturing sectors are vital to the growth and structural transformation of the Indian economy. Over the years, these sectors have contributed significantly to the accumulation of capital, strengthened production linkages, promoted technological spillovers across industries, and absorbed surplus labour from the primary sector, thereby increasing aggregate productivity and per capita income growth in India (Bhattacharya, 1996; Kumar and Gupta, 2008; Szirmai and Verspagen, 2015; Erumban et al., 2019; Krishan et al, 2022; Rijesh 2023; and Das and Glodar, 2024).

A number of studies, for instance, Kathuria et al. (2010), Krishna and Mitra (1998), Krishna et al. (2018), Pattnayak and Thangavelu (2005), Raj (2011), Unel (2003), Natrajan and Duraisamy (2008), have examined Total Factor Productivity (TFP) growth in India's manufacturing sector. While most studies delve into analysing the TFP growth of organised manufacturing across Indian states, studies relating to the unorganised sector are rather limited. Further, to our understanding, only two studies, Kathuria et al. (2010) and Krishna et al. (2018), provided a detailed analysis by comparing the TFP growth of the organised and unorgnised manufacturing industries in India. Kathuria et al. (2010) asserted an improvement in TFP of the organised manufacturing sector in most states post-2000, which led to growth in output driven by productivity. On the contrary, declining total factor productivity but increasing capital intensity of the unorganised sector has been observed during this period. Krishna et al. (2018) compared the TFP growth of 13 two-digit manufacturing industries of organised and unorganised sectors using the India-KLEMS database. TFP growth of both sectors has been studied in three periods, that is, 1980-81 to 1993-94, 1994-95 to 2002-03, and 2003-04 to 2011-12 by using the production function approach. The authors found a decline in TFP growth in the second period (1994-95 to 2002-03) compared to the first period (1980-81 to 1993-94). Though TFP increased in the third period (2003-04 to 2011-12), the rise is faster for organised than the unorganised manufacturing industries. Krishna et al. (2018) analyse TFP at the aggregate level, missing the state-level TFP dynamics. The study by Kathuria et al. (2010) addressed this limitation; however, the timeframe addressed by these studies and the method employed for estimating TFP are not up-to-date.

Therefore, it is crucial to assess the total factor productivity (TFP hereafter) across states in the context of the organised and unorganised sectors in India. It addresses the difference in the role played by the organised and unorganised manufacturing sectors in the economic growth of states. Finally, the study examines the difference in total factor productivity between the organised and unorganised sectors in fostering economic growth across the selected states in India. This study contributes to the existing literature by considering recent plant-level data and estimating a gross value-added production function using the Ackerberg, Caves, and Frazer (2015) semi-parametric method. Further, it compares the TFP growth of organised and unorganised manufacturing industries by sector and states, highlighting the change in productivity dynamics over 23 years.

2. Rationale, Objectives, and Hypotheses of the study

2.1 Rationale

Most of the earlier studies in the context of the present study covered the period up to 2011-12. Therefore, it is worth making an effort to study this issue covering a long time period from 2000-01 to 2022-2023. This being a long period, it is expected that there would have been substantial changes in the trend of TFPG across various industries and states for the manufacturing sector.

The present study tries to estimate total factor productivity at the states' NIC 4-digit industry level for the manufacturing sector during the period 2000-01 to 2022-23, which has not been attempted so far in earlier studies. This helps us in capturing trends of TFP in Indian States and industries.

For this study, a total of 22 industry groups at the 4-digit level NIC and 18 states were considered, as they represented around 93 percent of the total organised and unorganised manufacturing GVA and around 91 percent of the total number of factories. This way, the analysis will take into consideration a substantial part of the manufacturing landscape of the country.

2.2 Objectives

- Why manufacturing industry is important in the context of regional economic growth and development
- Do the organised and unorganised manufacturing play an equal role in the growth of Indian states?
- Is there a difference in the TFP growth of the organised and unorganised manufacturing sectors when compared across states and Industries?

2.3 Hypotheses

Based on the overall objectives, the following are the hypotheses of the Study:

H1: India's manufacturing ecosystem has undergone a dual-track evolution in Total Factor Productivity (TFP) over the past two decades (2000-2022), with the organised sector showing maturation and consolidation, while the unorganised sector exhibits a mixed performance marked by both growth and collapse across industries.

H2: India's overall manufacturing TFP trajectory has evolved from broad stagnation to fragmented acceleration over the past two decades (2000-2022).

The remaining sections of the study are organised as follows. Section 3 reviews existing studies on the organised and unorganised manufacturing industries, emphasising the method used in the estimation of Total Factor Productivity (TFP). Section 4 provides the data sources, methodology, and construction of variables. Section 5 discusses the estimation results and analysis, and the last Section 6 provides the conclusion of the Study.

3. Review of Literature

Regional economic disparities in India have been a persistent policy and academic concern, with multiple studies exploring the underlying causes and dynamics of these inequalities. Early contributions by Mohanty (2015) emphasise the limitations of traditional convergence-divergence models, proposing that spatial factors and agglomeration effects, as framed by New Economic Geography (NEG), offer a more nuanced understanding of India's regional economic divergence.

India's economic transition since the 1980s is marked by a notable structural shift. Djidonou and McGregor (2022) highlighted the stagnation of the industrial sector amidst a rapidly expanding services economy, attributing subdued manufacturing growth to rising informality, which hampers sectoral productivity by redirecting labour from formal to informal employment. Similarly, Pal (2014) examined employment trends in the post-reform era and found that both income and employment levels in manufacturing declined between 1993–94 and 2005–06, emphasising the urgent need for policies promoting regional industrialisation, skill enhancement, and employment-led growth.

The question of productivity trends within India's manufacturing sector has received significant attention. Trivedi et al. (2000) analysed productivity developments from 1980 to the early 2000s, identifying inconsistent productivity improvements across industries and states, with sectors like food and textiles and states such as Bihar and West Bengal underperforming. This pattern was reaffirmed by Trivedi (2004), who used a translog growth accounting framework to show steady but modest gains in labour productivity, with varying performance across industries. Both studies emphasised that sustained productivity improvements must be accompanied by employment creation, especially given the dominance of informal employment in manufacturing.

Infrastructure has been consistently identified as a critical driver of TFP. Veeramani and Goldar (2005) demonstrated that a market-friendly investment climate, underpinned by efficient regulatory and infrastructural frameworks, boosts total factor productivity (TFP). Reinforcing this, Sahoo and Dash (2009) established a direct causal relationship between infrastructure investment and long-term economic growth. Earlier works by Nagaraj et al. (1998) and Mitra et al. (1998) highlighted the pivotal role of infrastructure in explaining inter-state variations in industrial performance and productivity, identifying power supply, transport connectivity, and irrigation as particularly influential.

Spatial patterns of industrial growth have also been examined in several studies. Saikia (2011) observed that while the spatial concentration of unorganised manufacturing decreased after 1991, the benefits mainly went to moderately developed states, with little progress in backward regions like Bihar and Odisha. Babu and Natrajan (2013) noted that industrial concentration continued through the 1990s but identified a shift after 2000, where technological progress and infrastructure development fuelled manufacturing growth in less industrialised states.

Historical perspectives on India's economic reforms have documented increasing regional variation in productivity. Rao et al. (1999) and Narayan Rath and S. Madheswaran (2010) both argued that post-1991 reforms disproportionately benefited wealthier states with better infrastructure and human capital, deepening regional income and productivity inequalities. These studies consistently recommended targeted policy measures, including infrastructure development and promotion of labour-intensive industries, in lagging states to address the imbalance.

More recent studies have confirmed the persistence of regional disparities in productivity despite signs of conditional beta-convergence in per capita GSDP among Indian states. Ghosh and Kaustubh (2025) argued that without strategic interventions such as population control, industrial growth promotion, and improved credit access, disparities would persist. In line with this, Kathuria and Natarajan (2022) applied shift-share analysis to fifteen major Indian states and concluded that economic accelerations were primarily driven by within-sector productivity gains, especially in agriculture, manufacturing, and trade, while structural changes via labour reallocation contributed minimally.

Finally, offering a historical contextualization, Rodrik and Subramanian (2004) contended that India's growth transition began in the early 1980s due to a subtle but critical shift in government attitudes toward private enterprise, rather than conventional Keynesian stimulus or Washington Consensus reforms. This attitudinal shift, coupled with incremental reforms, catalysed productivity growth and laid the groundwork for India's broader liberalisation in the 1990s, though the benefits of this growth remained regionally uneven.

Collectively, the literature suggests that while sectoral productivity improvements have driven India's economic accelerations, persistent regional disparities continue to be shaped by infrastructural inequalities, labour market rigidities, and historical policy biases. Addressing these challenges requires a nuanced, regionally sensitive policy framework that combines infrastructure investment, industrial diversification, and labour market reforms to foster inclusive and balanced economic growth. A summary of relevant empirical studies highlighting the estimation method and the major findings of the relevant empirical studies on measuring TFP of the Indian manufacturing industry, along with their study period is provided in Table 1.

Table 1: Selected studies on TFP of the organised and unorganised manufacturing sector of India

Study	*Period*	*TFP estimation method*	*Main results*
Djidonou and McGregor (2022)	1980–2011	Shift-share approach	Industrial stagnation alongside the growing services sector. Informality reduced manufacturing productivity through labour shifts from formal to informal segments.

Study	*Period*	*TFP estimation method*	*Main results*
Trivedi et al. (2011)	1980–81 to early 2000s	Growth Accounting & Production Function Approach	Productivity gains are uneven by sector and region. Trade liberalisation improved some sectors, but overall gains were inconsistent. Organised-unorganised productivity gap persisted.
Trivedi et al. (2000)	1973-74 to 1997-98	Translog index within Growth Accounting	Steady labour productivity gains; aggregate levels remain low. Industry-specific trends revealed. Emphasised technology, reforms, and cost management.
Veeramani and Goldar (2005)	1980-2000	Value added & Gross Output function	Market-friendly investment climate raised TFP. Highlighted the need for effective regulatory and infrastructure frameworks.
Saikia (2011)	1994-1995 and 2005-2006	Data exploratory approach	Post-1991 spatial concentration declined, but backward states saw little benefit. Regional disparities worsened.
Rath and Madheswaran(2010)	1979–80 to 2000–01	Cross-sectional analysis	No absolute convergence in labour productivity. Gains in wealthier states post-1991. Recommended infrastructure and labour-intensive industry support.
Unni et al. (2001)	1978-1995	Comparative analysis	Gujarat outperformed all-India averages in manufacturing growth due to infrastructure-led industrialisation.
Babu and Natrajan (2013)	1980-2008	Data Envelopment Analysis	Until the 1990s, a few states dominated the industry. Post-2000, productivity improved in less industrialised states. Infrastructure gaps drove regional productivity differences.
Trivedi et al. (2004)	1980-81 to 2000-01	Growth Accounting & Production Function	Post-reform period widened productivity disparities. Metal industry alone showed productivity gains.
Kathuria and Natarajan (2022)	1980–81 to 2011–12	Shift-share analysis	Within-sector productivity, especially in manufacturing, trade, and agriculture, drove growth. Labour reallocation had a limited effect.
Krishna et al. (2018)	1980–2011	Comparative analysis	TFP is higher in the formal than in the informal sectors. Slowdown in the 1990s, recovery post-2003. Advocated restructuring towards the formal sectors.
Raj & Mahapatra (2009)	1978-2003	Growth Accounting and Data Envelopment Analysis	Organised sector's productivity declined during reforms, while the unorganised sector improved. Stressed efficiency and integrating informal sector concerns into policy.
Kathuria et al.(2010)	1994–95 to 2004–05	Production function approach	Post-2000, labour productivity and TFP grew in the organised sector, but declined in the unorganised sector. Capital gained dominance in output generation.

Study	*Period*	*TFP estimation method*	*Main results*
Rani and Unni (2004)	Late 1980s to 2001	Not Specified	Reforms initially boosted growth in the organised manufacturing sector while the unorganised sector saw early job losses but recovered in the late 1990s due to supportive policies and spill overs from infrastructure and automobile industry growth. The reforms deepened disparities between sectors in productivity and employment trends.

Source: Author's compilation

We find that only a few studies have provided a comprehensive analysis of the TFP growth in the organised and unorganised manufacturing. Furthermore, the timeframe addressed by these studies and the method employed for estimating TFP are not up-to-date. This study contributes to the existing literature in two ways: firstly, it considers recent plant-level data of the organised and unorganised manufacturing industry, and secondly, it estimates a gross value-added production function by using the Ackerberg, Caves, and Frazer (2015) semi-parametric method to compute the TFP of organised and unorganised manufacturing industries.

4. Methodology, Data, and Variables

4.1 Methodology

This study measures manufacturing plant productivity by the Total Factor Productivity (TFP). TFP can be measured in many ways[1]. We estimated a Gross Value-Added (GVA)-based production to obtain the TFP. Studies have argued for using GVA over output in the production function as it accounts for the heterogeneity in intermediate inputs, thereby enabling the comparison of TFP across industries[2]. The production function is given below in equation 1.

$$LogGVA_{it} = \alpha + \beta_l logl_{it} + \beta_c logc_{it} + u_{it} \quad (1)$$

where,

i represents plants or establishments, depending on whether the equation is estimated for the organised or unorganised sector, respectively, and t represents years.

$LogGVA_{it}$: Log Gross Value Added

$Logl_{it}$: Log labour

$Logc_{it}$: Log capital

u_{it} : Error term.

[1] Kathuria et al (2011) has provided a thematic review on the different approaches of TFP estimation.

[2] The variable section of this study provides a comparison of these two different production functions.

The error term u_{it} consists of a random error (e_{it}) and a productivity term (ω_{it}). While both errors are unobservable in the econometric model, the manager or the owner of a plant is aware of ω_{it}. This directly affects the volume of output to be produced by plants as producers can either adjust capital or labour inputs given their knowledge about the productivity shocks, thereby resulting in endogeneity in the estimation of a production function. Endogeneity in the model gives rise to inconsistent estimates of labour and capital parameters, thus a biased TFP. Econometric methods were developed to control endogeneity while estimating productivity. Olley and Pakes (1996) (OP), Levinsohn and Petrin (2003) (LP) and Ackerberg, Caves and Frazer (2015) (ACF) are a few widely used methods for TFP estimation. Endogeneity in estimation is addressed by using a proxy variable in these methods. While OP used investment as a proxy variable, in LP and ACP it is the intermediary inputs. As intermediary inputs increase monotonically with the plant's productivity shocks, thus can be inverted to control the unobserved effect of productivity (Ackerberg et al 2015). The productivity shocks can be expressed as a function of intermediate input $i_{it}$and capital c_{it}as given in equation 2, below

$$\omega_{it} = g^{-1}(i_{it}, c_{it}) \text{ (2)}$$

Using equation 2 in the production function mentioned above can be expressed as

$$\begin{gathered} LogGVA_{it} = \alpha + \beta_l logl_{it} + \beta_c logc_{it} + g^{-1}(i_{itt}, c_{it}) + e_{it} \\ = \alpha + \beta_l logl_{it} + \theta_t(logc_{it}, i_{it}) + e_{it} \text{ (3)} \end{gathered}$$

Since equation 3 estimates a non-parametric term $\theta_t(logc_{it}, i_{it})$, the OP, LP and ACF are called semi-parametric methods or the proxy variable approach to estimate productivity.

The semi-parametric approach used two steps to identify the labour and capital parameters of equation 3. OP and LP estimate the labour parameter in the first stage, and the second stage uses a second-order polynomial approximation to identify the capital parameter. However, Ackerberg et al (2015) argued that due to the functional dependency problem labour coefficient cannot be identified in the first stage. In their method, both labour and capital coefficients are identified in the second stage. Paul and Sahoo (2023) have explained the identification of labour and capital parameters in the ACF approach in detail; therefore, we have refrained from providing it here.

We used the ACF approach and estimated the labour coefficient $\hat{\beta}_l$ and capital coefficient $\hat{\beta}_c$. The input coefficients are then used to arrive at plants' productivity as shown in equation 4 below.

$$TFP_{it} = logGVA_{it} - \hat{\beta}_l logl_{it} - \hat{\beta}_c logc_{it} \qquad (4)$$

The estimated value of productivity is then multiplied by the value-added share ($share_{it}$) in the total manufacturing industry to obtain the weighted TFP (WTFP)

$$WTFP_{it} = TFP_{it} * share_{it} \qquad (5)$$

The $WTFP_{it}$ can be added together to obtain productivity at the state level, that is

$$STFP_{ts} = \sum_{i=1}^{N} WTFP_{it} \qquad (6)$$

4.2 Data

We have used unit-level data for formal and informal manufacturing plants to estimate productivity for the major states of India[3] from 2000-01 to 2022-23 (hereafter 2000 to 2022). Data for the formal manufacturing industry is collected from the Annual Survey of Industries (ASI). ASI covers the principle characteristics of the manufacturing plants registered under Sections 2(m)(i) and 2(m)(ii) of the Factory Act 1948. The units registered under this act are known as formal/organised manufacturing plants with 10 workers with an electricity connection or 20 workers without it. This survey covers all registered plants across Indian states, however it is entirely a census survey. ASI identifies a plant as either a census or a sample sector based on the number of workers it employs. Plants with 200 or more workers belong to the census sector and each unit under this sector is being surveyed, contrary to the sample sector, which collects information on the principal characteristics of only a representative sample of plants with fewer than 200 workers in every state. Information of the entire population of this sector is then derived by using the multiplier.

The informal manufacturing plants data have been collected from the different rounds of Unorganised Manufacturing and Service Enterprises (UMSE) and Annual Survey of Unincorporated Sector Enterprises (ASUSE) by the National Sample Survey (NSS). UMSE and ASUSE are sample surveys which cover non-agricultural establishments of all Indian states. Since 2000, NSS has published four UMSM surveys in the years 2000-01, 2005-2006, 2010-2011 and 2015-2016 with an interval of five years. ASUSE, however, is an annual survey by NSS starting from 2021-2022. Until now there are three ASUSEs. Plants covered under these surveys are mostly Micro, Small and Medium Enterprises (MSMEs) and are not registered under the Factory Act, therefore marked as informal/unorganised manufacturing plants. Table A1 in the appendix summarises the data source and their key features.

Until recently, the survey of unorganised manufacturing units was conducted with a gap of five years. Therefore, to draw a comparison between the productivity of the organised and unorganised manufacturing sector across the states, we have considered three time periods, that is, 2000-01, 2010-11 and 2022-23 (hereafter 2000, 2010 and 2022). We chose these years keeping the objective of the paper in mind, firstly to identify the source of economic growth at the sub-national level in the period where the Indian economy is fully liberalised. Secondly, it allows us to consider years when the Indian economy is in a stable position, ignoring

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[3] This paper considers 18 Indian states namely Andhra Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal. Together these 18 states account for than 90 percent of India's population, manufacturing output and employment. Moreover, share GSDP of these states added together is around 90 percent of India's GDP.

the short-term slowdown after the Global Financial Crisis in 2008 and the COVID-19 pandemic in 2019.

This study covers a long time period, that is, 2000 to 2023. There are a number of revisions in the National Industrial Classification (NIC) during this period. To make the industries comparable across different years, we concorded the old NICs to NIC 2008, following Paul and Sahoo (2023)

4.3 Variables

We have constructed industry-level Output, Capital, labour and material inputs by consolidating the unit-level data for the estimation of TFP. GVA, capital and material are originally in nominal values. We have converted these variables into 2011 prices by using appropriate price deflators for analysis purposes. Details of the conversion process for each variable is explained below.

Output

Industry output is typically measured either by the gross output (GO) or its Gross Value Added (GVA) in the existing studies. Studies in support of gross output argued that it is difficult to separate intermediate inputs (material) from others, namely capital and labour (Trivedi 2004). Cobbold (2003) argues that the intermediate inputs embody technology, which is a source industries growth. Thus, considering intermediate inputs in the GO production function provides a complete picture of the production process and accurately estimates the industry's productivity. Additionally, the GO production accounts for the productivity growth in the intermediary industry as a result: "*correctly accounting for the quantity and quality of intermediate inputs, the gross output concept allows aggregate TFP gains to be correctly allocated among industries*" (Jorgenson and Stiroh 2017).

On the contrary, studies using the GVA as a measure of output strongly argued that heterogeneity in intermediate inputs across the industries may result in biased TFP estimation by neutralising the effect of capital and labour (Hossain and Karunaratne, 2004). Additionally, the GVA-based production function allows the comparison of TFP across industries (Kathuria et al, 2010). Gandhi et al (2020) pointed out that the existing procedure to estimate the production function by accounting for factor endogeneity, namely OP, LP and ACF, encounters identification issues, unless gross output is Leontief in intermediate inputs.

A number of studies in India have used the GVA to estimate manufacturing TFP, due to the advantages it offers as discussed above[4]. This study also estimates a GVA production function. Industries' GVA in different years are in nominal prices. Two procedures have been followed alternatively in the literature to compute the real GVA: the single deflation (SD) and double deflation (DD) methods. Existing studies debated the merits of SD over DD and vice versa. Kathuria et al (2011) provided a detailed review of these papers and pointed out

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[4] Kathuria et al (2011) provides a detail review of these studies.

that the SD procedure is more appropriate for the ASI data, as GVA for several plants is negative, there are a large number of multi-product plants, and lastly, finding appropriate industry-specific input deflator is difficult. In this study, we used the SD procedure and deflated the GVA with the WPI of industries to get the real GVA of industries.

Capital

Capital is computed in three different ways in the literature. Some studies measured it by the fixed assets of the industry, while others considered payment for rent, repairs and depreciation as capital. The last group of studies used a more nuanced approach, that is, the Perpetual Inventory Method (PIM) to construct the capital input. Since the fixed assets of plants are in historical costs, it may over- or underrepresent the actual capital of a plant in a given year. PIM overcame this by assuming a benchmark year and computing additions to the capital each year. Parameswaran (2004) provides a step-by-step guide on the computation of capital input through PIM. However, the PIM method is not free from limitations. Firstly, it fails to address the issue of capacity utilisation of the plant; secondly, computation of capital through the PIM method requires time series data on the depreciation of capital.

In the absence of continuous data for the unorganised manufacturing plants, the computation of depreciation of capital is difficult. Thus, following Kathuria et al (2010), this study used fixed assets and deflated them with the WPI of plants and machinery to arrive at the capital input for the organised and unorganised manufacturing industries.

Labour

Labour input is computed from the average number of workers in plants. It includes total workers, managers and supervisors, unpaid family workers, and other employees.

Material Input

Both the imported and intermediary inputs are added together to obtain the material input. To deflate the material inputs, a material price index has been constructed. To construct the price index, the input share from the total input consumed by the plants has been calculated using the supply-use table provided by the Asian Development Bank (ADB)[5]. The input share, which serves as a weight, is then multiplied by the WPI to construct the material price index.

The descriptive statistics of the key variables for both organised and unorganised manufacturing sectors by NIC 2-digit industries are presented in Tables A2 and A3 of the appendix,

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5 Since MoSPI Input-Output (IO) table is only updated till 2015-16, we have used ADB's IO table. The IO table whether from MoSPI or ADB, are compiled under the SNA framework, meaning the underlying economic relationships and accounting principles are consistent. Therefore, the approach is very similar to what one does with official MoSPI data

respectively

5. Results and Discussion

India's manufacturing sector is a dual economy composed of the organised and unorganised sectors. The organised sector is dominated by large, capital-intensive manufacturing units, whereas the unorganised sector is composed of a large number of labour-intensive micro, small, and medium manufacturing units. Given the distinct characteristics of both sectors, an examination of the evolution of TFP in these two sectors across Indian states from 2000 to 2022 offers valuable insights into the dynamics of industrial transformation, regional disparities, and the efficacy of policy interventions.

This study dissects the data across two key periods – Phase I (2000 to 2010) and Phase II (2010 to 2022), followed by a longitudinal assessment (2000 to 2023) to reveal deeper structural trends and their implications.

- **Phase I (2000 to 2010)**: The post-liberalisation expansion phase.
- **Phase II (2010 to 2022)**: A phase marked by structural reforms (GST, demonetisation), global economic shocks, and technology shifts.

The remainder of this section provides a detailed comparison of TFP growth of the organised and unorganised manufacturing sectors across Indian states, followed by which TFP growth is being compared across industries of both sectors.

5.1 Comparison of TFP growth of organised and unorganised manufacturing sectors across states

5.1.1 Organised Manufacturing Sector - From Expansion to Uneven Decline

Phase I (2000 to 2010): Growth Era: In the first decade of the 21st century, the organised manufacturing sector registered positive TFP growth in most states (Krishna et al., 2018). States like Maharashtra (13.2%), Himachal Pradesh (13.7%), and Gujarat (10.7%) were among the top performers. This period coincided with post-liberalisation industrial acceleration, driven by FDI inflows, SEZ policies, and infrastructure development. Even laggard states like Uttar Pradesh (16.4%), Jharkhand (6.4%), and Haryana (6.7%) posted decent growth, suggesting broader sectoral dynamism.

Phase II (2010 to 2022): Widespread Decline and Polarisation: The next decade presents a marked shift, with several states witnessing sharp contractions. Gujarat (-33.8%), Chhattisgarh (-16.0%), and Jharkhand (-25.3%) experienced significant declines in TFP, indicating industrial slowdown, capacity underutilisation, or capital misallocation. This period was marked by global economic uncertainty, demonetisation (2016), GST implementation (2017), and later COVID-19 disruptions, which affected capital-intensive units. Yet, outliers like Madhya Pradesh (61.1%), Uttar Pradesh (81.3%), and Bihar (51.1%) displayed a dramatic TFP surge, possibly due to base effects, delayed industrial policy benefits, and public investment in industrial infrastructure.

Long-Term Trends (2000 to 2022): Over the 22 years, only a few states have consistently shown high TFP growth, notably Uttar Pradesh (111.1%), Madhya Pradesh (67.8%), Uttarakhand (39.8%), Himachal Pradesh (32.4%), Punjab (27.7%), and Karnataka (19.7%). States like Chhattisgarh (-16.8%), Gujarat (-26.7%), Haryana (- 3.2 %), and Jharkhand (- 20.5 %) show either stagnation or decline, despite being historically industrialized. The mean national TFP growth for organised manufacturing over the full period is 18.5%, highlighting an overall moderate performance with high inter-state variance.

Table 2: State wise comparison of TFP growth of organised and Unorganised manufacturing sector (In %)

States	*Total factor productivity growth in the Organised Manufacturing*			*Total factor productivity growth in the Unorganised Manufacturing*		
	2000 to 2010	*2010 to 2022*	*2000 to 2022*	*2000 to 2010*	*2010 to 2022*	*2000 to 2022*
Andhra Pradesh	3.9	-6.4	-2.7	2.6	35.4	38.9
Bihar	-11.6	51.1	33.6	-0.2	65.9	65.7
Chhattisgarh	-0.9	-16	-16.8	-1.6	-29.7	-30.8
Gujarat	10.7	-33.8	-26.7	1.5	-25.5	-24.4
Haryana	6.7	-9.3	-3.2	-1.7	60.8	58.1
Himachal Pradesh	13.7	16.4	32.4	-4	-52.2	-54.1
Jharkhand	6.4	-25.3	-20.5	2.5	-87.8	-87.4
Karnataka	3.6	15.6	19.7	2.3	35.0	38.1
Kerala	3.2	-13.5	-10.7	1.6	99.2	102.5
Madhya Pradesh	4.2	61.1	67.8	-2.6	-35.5	-37.1
Maharashtra	13.2	5.3	19.2	-2.7	57.1	52.9
Odisha	-4.7	37.3	30.8	5.4	59.2	67.8
Punjab	6.7	19.7	27.7	-1	-71.4	-71.7
Rajasthan	4.1	4.9	9.2	1.2	-60.3	-59.8
Tamil Nadu	7.6	6	14.1	1.2	56.0	57.9
Uttar Pradesh	16.4	81.3	111.1	-4.8	185.5	171.9
Uttarakhand	4.4	33.9	39.8	1.1	72.9	74.9
West Bengal	7	1.4	8.5	-9.2	-27.8	-34.5
Mean	5.3	12.8	18.5	-0.5	18.7	18.3

Source: Author's computations

5.1.2 Unorganised Manufacturing Sector: Resilience, Reinvention, and Rapid Growth

Phase I (2000 to 2010): Mild and Uneven Growth: Unlike the organised sector, the unorganised segment showed subdued and mixed TFP growth during the 2000-10 period. Only a few states, such as Odisha (5.4%), Andhra Pradesh (2.6%), Jharkhand (2.5%), and Karnataka (2.3%), showed modest increases. Many industrially advanced states, including Maharashtra

(-2.7%), Punjab (-1.0%), and West Bengal (-9.2%), reported TFP contraction, suggesting neglect of informal sector needs amid the formal sector's rise.

Phase II (2010 to 2022): Explosive Productivity Gains: This decade marked a transformative leap in TFP growth for the unorganised sector. The average growth unorganised manufacturing industry increased to 18.7 % during this period from -0.5 % in the period 2000-10. Uttar Pradesh (185.5%), Kerala (99.2%), Uttarakhand (74.9 %), and Bihar (65.9 %) emerged as clear leaders. Growth here could reflect the impact of microfinance penetration, digitisation (e.g., UPI, Jan Dhan), and self-employment schemes (like MUDRA) that empowered small producers. On the flip side, states like Jharkhand (-87.8 %), Punjab (-71.4%), Rajasthan (-60.3), and Himachal Pradesh (-52.4 %) reported massive declines, possibly due to supply chain disruptions, migration outflows, or regulatory burdens post-GST.

Long-Term Trends (2000–2022): The average TFP growth in the unorganised sector over the entire period is 18.3%, slightly lower than the organised sector, but with notable highs and extreme lows. States like Kerala (102.5%) and Uttar Pradesh (171.9%) indicate that unorganised manufacturing is not inherently stagnant, but can thrive with the right enabling environment.

Hence, there are several paradoxes. In several cases (e.g., Gujarat, Himachal Pradesh, Punjab), high formal sector presence did not correlate with long-term TFP gains. Conversely, states like Bihar, UP, and Kerala - typically not industrial leaders - registered extraordinary productivity gains in their informal sectors.

There are also States with converging sectoral growth. Karnataka, Tamil Nadu, and Uttarakhand showed balanced TFP growth across both sectors, pointing to better state-level integration and policy alignment. These states potentially benefited from cluster development, MSME linkages, and a higher human capital base.

Data also shows that there is a bifurcation of performance between the industrialised vs. emerging states. Historically industrialised states like Gujarat, Maharashtra, and Punjab are showing signs of industrial fatigue, while emerging economies like Uttar Pradesh, Madhya Pradesh, and Bihar are rapidly scaling up. This raises the question: Is India's industrial core shifting eastward and northward, driven by cheaper labour, land availability, and policy push?

Despite higher capital investment, the organised manufacturing sector has shown uneven TFP growth, with several states experiencing stagnation or decline. This suggests that capital-intensive industries may face diminishing returns without concurrent innovation and efficiency improvements.

The informal sector's remarkable TFP growth indicates a dynamic adaptation to market demands, possibly through innovation, flexibility, and the adoption of digital tools. However, this growth is not uniformly distributed, with some states facing challenges in sustaining productivity gains.

The three-decade journey of India's manufacturing TFP growth reveals a complex interplay of regional dynamics, policy shifts, and global shocks. While the organised sector has stagnated or declined in several traditional hubs, the unorganised sector's unexpected resilience underscores the importance of inclusive, bottom-up industrial policies.

5.2 Comparison of TFP growth of organised and unorganised manufacturing sectors across Industries

5.2.1 Organised Manufacturing Sector: Mixed Fortunes and Industrial Polarisation:

Phase I (2000–2010): A Foundation of Moderate Growth: The organised sector posted modest TFP growth, averaging 4.5%, with strong performance in. Tobacco (22.2%), Other transport equipment (24.7%), and Rubber & plastics (14.2%). High growth in chemical-related industries (8.7%), pharmaceuticals (8.6%), and motor vehicles (8.1%), indicating early signs of industrial deepening and export orientation. However, several industries lagged or declined. Paper (-2.5%) and basic metals (0.4%) saw stagnation, reflecting structural inefficiencies or global price pressures.

Phase II (2010–2022): Sharp Bifurcation: This phase shows polarised TFP growth across industries. The average TFP growth of 47.6% across industries in this period masks extreme divergence. Chemicals (172.6%), Pharmaceuticals (77.1%), Leather (72.8%), and Textiles (61.7%) reflect global integration, product diversification, and policy incentives (e.g., PLI schemes). Severe contractions in printing (-75%), motor vehicles (-61.3%), petroleum (-66.7%), and tobacco (-31.8%) indicate automation-related disruptions, regulatory overhangs, and demand shifts.

Long-Term (2000–2022): Rising Productivity in Few, Long-term Contraction in Many: Over the full period, only a handful of industries like chemicals (196.4%), pharmaceuticals (92.3%), and leather (80.2%) sustained long-term growth. Others like motor vehicles (-58.2%), tobacco (-16.7%), and electrical equipment (-3.3%) showed net declines, despite capital intensity—indicating inefficiency, overcapacity, or global competitiveness issues.

Table 3: Industry wise comparison of TFP growth of organised and Unorganised manufacturing sector (in %)

Products	*Organised Manufacturing*			*Unorganised Manufacturing*		
	2000-01 to 2010-11 (in %)	*2010-11 to 2022-23 (in %)*	*2000-01 to 2022-23 (in %)*	*2000-01 to 2010-11 (in %)*	*2010-11 to 2022-23 (in %)*	*2000-01 to 2022-23 (in %)*
Food products	5	-16.8	-12.6	-1.0	13.2	12.1
Beverages	4.8	-15.7	-11.7	3.6	-30.7	-28.1
Tobacco products	22.2	-31.8	-16.7	-0.3		
Textiles	6	61.7	71.4	3.4	31.9	36.4
Wearing apparel	1.7			0.0	0.0	0.0
Leather and related products	4.3	72.8	80.2	2.4	15.4	18.2

Products	*Organised Manufacturing*			*Unorganised Manufacturing*		
	2000-01 to 2010-11 (in %)	*2010-11 to 2022-23 (in %)*	*2000-01 to 2022-23 (in %)*	*2000-01 to 2010-11 (in %)*	*2010-11 to 2022-23 (in %)*	*2000-01 to 2022-23 (in %)*
Wood and of products of wood and cork, except manufacture of articles of straw and plaiting materials furniture;	6	4.5	10.8	-0.6	3.2	2.6
Paper and paper products	-2.5	76.4	72	9.3	-67.8	-64.8
Printing and reproduction of recorded media	2.3	-75	-74.4	5.6	6.6	12.6
Coke and refined petroleum products	10.7	-66.7	-63.1	-0.8		
Chemicals and chemical products	8.7	172.6	196.4	1.9	14.9	17.0
Pharmaceuticals, medicinal chemical and botanical products	8.6	77.1	92.3	16.3	66.5	93.6
Rubber and plastics products	14.2	32.1	50.9	1.9	63.5	66.7
Other non-metallic mineral products	2.5	-37.4	-35.9	-0.8	41.6	40.4
Basic metals	0.4	-20.9	-20.6	0.0	0.0	0.0
Fabricated metal products, except machinery and equipment	4.2	46.6	52.7	-1.4	33.5	31.5
Computer, electronic and optical products	9.2	-6.8	1.8	5.8		
Electrical equipment	5.2	-8.1	-3.3	-0.1	-5.6	-5.7
Machinery and equipment n.e.c.	6.9	-20.5	-15.1	5.0	246.3	263.8
Motor vehicles, trailers and semi-trailers	8.1	-61.3	-58.2	6.7		
Other transport equipment	24.7	44	79.5	-1.7	75.9	72.9
Manufacture of furniture	3.2	-7.7	-4.7	4.2	-30.3	-27.4
Other manufacturing	1.8	50.9	53.7	3.7	14.0	18.3
Mean	4.5	47.6	51.5	3.1	39.8	42.0

Source: Author's computations

Note: Since the TFP of some industries in certain years is among the outliers, we omitted those when calculating the growth rate. The blank cell in the table corresponding to Industries indicates this. The outliers in TFP are detected by using the rule $Mean \pm 3$ Standard Deviation.

5.2.2 Unorganised Manufacturing Sector: Quiet Transformation and Selective Resilience

Phase I (2000–2010): Broad Underperformance: With average TFP growth of just 3.1%, the unorganised sector suffered from negative or near-zero TFP growth in food (-1.0%), basic metals (0.0%), petroleum (-0.8%), and electrical equipment (-0.1%). Only pharmaceuticals (16.3%) and paper (9.3%) showed promise - likely due to small-scale processing or cottage-level production niches.

Phase II (2010–2023): Productivity Boom in Select Segments: The average growth soared to 39.8%, but it was highly concentrated. Machinery & equipment (246.3%), rubber & plastics (63.5%), and pharmaceuticals (66.5%) led the surge. Growth may reflect digitisation, access to microfinance, and informal-to-formal transitions (e.g., MSME registration post-GST).

COVID-induced local production revival in health-related and essential goods sectors. However, a complete collapse was seen in Paper and Paper products (-67.8 %), Beverages (-30.9 %), and Manufacture of Furniture (- 30.3 %), due to regulatory bans, scale inefficiencies, and automation displacement.

Long-Term (2000–2023): Solid Average, Uneven Distribution: Long-term TFP growth averaged 42.0%, but this was driven by a few outperformers. Industries like chemicals (17.0%), pharmaceuticals (93.6%), and machinery (263.8%) lifted the average. But others like beverages (-28.1%) and furniture (-27.4%) still reflect severe inefficiencies.

The period from 2000 to 2023 has revealed a dual-speed transformation in Indian manufacturing. While the organised sector is consolidating in select high-tech industries, the unorganised sector is defying expectations with productivity surges in unlikely places. However, both sectors face challenges from regulatory flux, automation, and global volatility.

6. Conclusion and Policy Suggestions

The analysis of TFP trends in India's manufacturing sector from 2000 to 2023 reveals a complex and dual-speed transformation, necessitating a nuanced and targeted policy approach. The diverging paths of the organised and unorganised sectors, coupled with significant inter-state and inter-industry variations, demand strategic interventions to foster inclusive, sustainable, and productivity-led growth.

1. Bridging the Productivity Divide—Tailored Support for the Unorganised Sector: The unorganised sector's dramatic TFP surges in some states (e.g., Kerala, Uttar Pradesh, Himachal Pradesh), contrasting with collapses in others (e.g., Chhattisgarh, Maharashtra, Punjab) present both a challenge and an opportunity.

- Targeted Ecosystem Development: Policies should focus on creating an enabling ecosystem for the informal sector in lagging states. This includes improving access to formal credit (e.g., strengthening MUDRA and microfinance initiatives), facilitating adoption of digital tools (e.g., promoting UPI for small businesses, digital literacy programs), and providing skill development and technical training tailored to their specific needs.
- Regulatory Simplification & Support: While reforms like GST are crucial, their implementation must be sensitive to the unorganised sector's capacity. Streamlining compliance procedures and providing accessible support for MSME registration and formalisation can help prevent negative TFP shocks and encourage growth.
- Promoting Backward and Forward Linkages: Policies should actively foster linkages between the organised and unorganised sectors. This could involve incentivising large formal units to source inputs or outsource processes to efficient informal units, thereby integrating them into value chains and facilitating knowledge transfer.

2. Revitalising Organised Sector TFP: Focus on Innovation and Global Competitiveness: Despite initial post-liberalisation growth, the organised sector shows signs of "industrial fatigue" in historically industrialised states (e.g., Gujarat, Maharashtra, Punjab), with TFP declines in Phase II. This indicates that mere capital investment is not sufficient without concurrent innovation and efficiency improvements.

- Incentivise R&D and Technology Upgradation: Policy measures should actively promote research and development (R&D), particularly in industries experiencing TFP stagnation or decline (e.g., motor vehicles, printing, petroleum). This could involve enhanced tax incentives for R&D, grants for adopting advanced manufacturing technologies (Industry 4.0), and establishing industry-academia collaboration platforms.
- Enhance Ease of Doing Business Beyond Entry: While India has improved ease of doing business, focus should shift to easing operations, dispute resolution, and regulatory predictability, especially for large manufacturing units.
- Address Capacity Utilisation and Capital Misallocation: Investigations into why TFP declined sharply in some industrially advanced states could reveal issues of overcapacity, outdated technology, or misdirected capital investments. Policies might need to address these through sector-specific analyses and potential re-skilling programs.

3. Addressing Inter-State Divergence and Promoting Balanced Regional Growth: The bifurcation of performance between "industrialised" and "emerging" states (e.g., TFP surges in UP, MP, Bihar vs. declines in Gujarat, Maharashtra) signals a potential shift in India's industrial core.

- Infrastructure-Led Development in Emerging Hubs: States with high TFP growth in either sector (like Uttar Pradesh, Madhya Pradesh, Bihar, Kerala, Himachal Pradesh) should receive continued strategic public investment in industrial infrastructure (power, logistics, connectivity) to sustain momentum and attract further private capital.
- Learning from Success Stories: States showing converging sectoral growth (e.g., Karnataka, Tamil Nadu, Uttarakhand) offer valuable lessons. Policies should analyse their strategies, potentially related to cluster development, MSME linkages, and human capital development, and promote their replication in other states.
- Correcting Historical Imbalances: For traditionally industrialised states showing TFP decline, policies must diagnose underlying causes — be it labour market rigidities, environmental regulations, or infrastructural bottlenecks—and implement corrective measures. This may include focused efforts on re-skilling the workforce for new industries.

4. Navigating Industry-Specific Challenges and Opportunities: The "sharp bifurcation" and "mixed fortunes" at the industry level highlight the need for sector-specific policy considerations.

- Nurturing High-Growth Industries: Continue supporting high-performing sectors like chemicals, pharmaceuticals, textiles, and leather in the organised sector, and machinery & equipment, rubber & plastics, and pharmaceuticals in the unorganised sector, possibly through Production Linked Incentive (PLI) schemes and export promotion.
- Strategic Revival for Lagging Industries: For industries experiencing long-term contraction (e.g., motor vehicles, tobacco, printing in organised; tobacco, motor vehicles, beverages in unorganised), policymakers must critically assess the drivers—whether it's technological obsolescence, changing consumer preferences, or regulatory challenges. This might require diversification strategies, re-skilling initiatives, or even managed restructuring for industries facing irreversible declines.

Appendix

Table A1: Data Sources and their Key Features

Data Source	*Sector Covered*	*Survey Type*	*Years Covered*	*Key Features*
Annual Survey of Industries (ASI) (NSO)	Formal/Organised Manufacturing	Census (for large units), Sample (for smaller units)	2000-01 to 2022-23 (Annual)	Covers registered factories under the Factory Act 1948 (10+ workers with electricity, 20+ without).
Unorganised Manufacturing and Service Enterprises (UMSE) (NSS)	Informal/Unorganised Manufacturing	Sample Survey	2000-01, 2005-06, 2010-11, 2015-16	Covers non-agricultural establishments, primarily MSMEs not registered under the Factory Act.
Annual Survey of Unincorporated Sector Enterprises (ASUSE) (NSS)	Informal/Unorganised Manufacturing	Sample Survey	2021-22, 2022-23 (Annual from 2021-22)	Continues coverage of informal units.

Source: Author's compilation

Table A2: Descriptive Statistics of Variables by NIC 2-digit industries in the Organised Manufacturing Sector.

Industry/Variables		*Obs*	*Mean*	*Std. dev.*	*Min*	*Max*
nic2 = 10	Log gva	985	20.6	2.1	10.3	24.6
	Log labour	985	7.7	1.8	1.6	11.9
	Log capital	985	21.1	2.2	13.0	26.4
	Log material	985	22.3	2.3	12.3	26.8
nic2 = 11	Log gva	305	20.4	1.8	14.4	23.8
	Log labour	305	6.9	1.4	2.6	9.5
	Log capital	305	20.9	1.9	10.6	24.7
	Log material	305	21.2	1.8	13.2	24.6
nic2 = 12	Log gva	90	20.8	2.5	12.9	24.2
	Log labour	90	8.0	2.2	1.4	12.6
	Log capital	90	19.8	2.3	13.5	23.2
	Log material	90	21.1	2.4	12.6	24.8
nic2 = 13	Log gva	526	20.1	2.6	10.8	25.6
	Log labour	526	7.5	2.3	0.7	12.6
	Log capital	526	20.6	2.8	10.2	26.3
	Log material	526	21.1	2.9	6.1	26.9
nic2 = 14	Log gva	100	20.8	3.1	13.2	25.4
	Log labour	100	8.5	2.8	2.1	13.0
	Log capital	100	20.7	3.1	11.9	25.3
	Log material	100	21.4	3.4	10.8	26.2
nic2 = 15	Log gva	204	19.6	2.5	12.9	24.2
	Log labour	204	7.1	2.3	1.6	11.6
	Log capital	204	19.7	2.5	12.9	23.9
	Log material	204	20.7	2.6	9.6	24.9
nic2 = 16	Log gva	373	17.9	2.3	10.8	22.5
	Log labour	373	5.6	1.8	1.4	9.3
	Log capital	373	18.1	2.5	10.5	23.0

Industry/Variables		*Obs*	*Mean*	*Std. dev.*	*Min*	*Max*
	Log material	373	19.0	2.7	7.0	23.9
nic2 = 17	Log gva	265	20.1	2.2	13.3	23.5
	Log labour	265	7.4	1.8	1.4	10.2
	Log capital	265	20.9	2.3	12.6	24.7
	Log material	265	21.5	2.2	12.9	25.2
nic2 = 18	Log gva	166	19.8	2.3	14.1	24.1
	Log labour	166	6.9	1.9	1.8	10.3
	Log capital	166	19.9	2.5	13.3	24.4
	Log material	166	20.4	2.4	12.9	24.3
nic2 = 19	Log gva	160	21.2	3.0	13.9	27.3
	Log labour	160	7.1	1.8	2.4	10.4
	Log capital	160	21.9	3.3	13.8	28.3
	Log material	160	23.0	3.4	13.1	29.0
nic2 = 20	Log gva	652	20.9	2.4	11.5	26.1
	Log labour	652	7.4	1.8	1.1	11.9
	Log capital	652	21.3	2.6	12.3	27.1
	Log material	652	22.1	2.4	8.0	27.2
nic2 = 21	Log gva	89	22.3	2.9	14.3	26.3
	Log labour	89	9.0	2.2	3.3	12.0
	Log capital	89	22.5	2.9	14.1	26.3
	Log material	89	22.9	2.8	14.8	26.4
nic2 = 22	Log gva	259	21.2	2.4	12.5	25.3
	Log labour	259	8.1	1.9	1.8	11.7
	Log capital	259	21.7	2.5	12.1	25.8
	Log material	259	22.4	2.4	13.7	26.6
nic2 = 23	Log gva	608	20.7	2.1	13.4	25.1
	Log labour	608	7.7	1.6	1.6	11.4
	Log capital	608	21.1	2.3	12.2	26.0
	Log material	608	21.2	2.1	13.4	25.7
nic2 = 24	Log gva	342	21.6	2.6	12.3	26.6
	Log labour	342	8.3	2.0	1.1	12.0
	Log capital	342	22.2	2.9	12.2	27.9
	Log material	342	23.3	2.7	12.2	27.8
nic2 = 25	Log gva	609	19.9	2.4	12.0	24.8
	Log labour	609	7.1	2.0	1.1	11.2
	Log capital	609	20.0	2.6	10.8	25.2
	Log material	609	20.9	2.6	10.1	25.7
nic2 = 26	Log gva	509	19.6	2.3	11.9	24.8
	Log labour	509	6.5	1.8	1.1	10.3
	Log capital	509	19.5	2.4	12.7	24.8
	Log material	509	20.4	2.5	10.7	25.6
nic2 = 27	Log gva	504	20.1	2.8	8.7	25.4
	Log labour	504	7.1	2.2	0.7	11.2
	Log capital	504	20.2	2.8	9.8	25.2
	Log material	504	21.4	2.9	10.8	26.0
nic2 = 28	Log gva	967	19.9	2.5	12.0	25.0
	Log labour	967	6.9	2.0	1.1	11.1
	Log capital	967	19.9	2.6	10.0	24.6
	Log material	967	20.9	2.6	10.4	25.6

Industry/Variables		Obs	Mean	Std. dev.	Min	Max
nic2 = 29	Log gva	229	21.3	3.0	11.8	26.0
	Log labour	229	8.1	2.3	1.6	12.4
	Log capital	229	21.7	3.1	10.8	26.2
	Log material	229	22.6	3.1	10.0	27.4
nic2 = 30	Log gva	360	19.2	2.9	11.3	25.3
	Log labour	360	6.3	2.3	0.7	11.0
	Log capital	360	19.3	3.1	10.8	25.0
	Log material	360	20.1	3.1	10.5	26.5
nic2 = 31	Log gva	89	19.8	2.1	13.9	23.3
	Log labour	89	7.1	1.8	1.9	10.2
	Log capital	89	20.1	2.3	12.2	24.3
	Log material	89	21.0	2.1	13.8	24.4
nic2 = 32	Log gva	348	19.2	2.7	12.0	24.8
	Log labour	348	6.4	2.3	1.1	11.9
	Log capital	348	19.0	2.9	9.3	24.1
	Log material	348	20.0	3.0	10.7	27.2

Source: Author's computation

Table A3: Descriptive Statistics of Variables by NIC 2 digit industries in the Un-Organised Manufacturing Sector

Industries/Variables		Obs	Mean	Std. dev.	Min	Max
nic2 = 10	Log gva	1,026	19.2	2.2	9.8	23.8
	Log labour	1,026	8.1	2.1	0.8	13.0
	Log capital	1,026	19.6	2.3	8.1	24.5
	Log material	1,026	17.7	2.6	7.2	24.3
nic2 = 11	Log gva	140	18.6	2.0	13.4	21.8
	Log labour	140	7.8	1.9	2.2	12.1
	Log capital	140	19.1	2.3	12.0	23.0
	Log material	140	15.5	2.3	6.7	22.3
nic2 = 12	Log gva	80	19.3	2.3	13.2	23.7
	Log labour	80	9.1	2.5	2.8	13.9
	Log capital	80	19.7	2.4	13.7	24.0
	Log material	80	16.1	3.0	8.1	21.5
nic2 = 13	Log gva	541	18.9	2.5	11.6	25.0
	Log labour	541	8.1	2.2	2.0	13.2
	Log capital	541	19.4	2.6	10.4	25.4
	Log material	541	16.5	3.0	7.0	25.1
nic2 = 14	Log gva	139	20.5	3.5	10.9	24.7
	Log labour	139	10.0	3.3	1.5	14.0
	Log capital	139	21.3	3.5	11.7	26.3
	Log material	139	17.4	3.5	7.7	23.8

Industries/Variables		*Obs*	*Mean*	*Std. dev.*	*Min*	*Max*
nic2 = 15	Log gva	221	18.3	2.0	12.7	22.6
	Log labour	221	7.2	1.9	1.8	11.4
	Log capital	221	18.7	2.1	12.8	24.4
	Log material	221	15.8	2.4	8.6	21.9
nic2 = 16	Log gva	434	19.5	1.8	10.2	23.6
	Log labour	434	8.6	1.9	1.6	13.2
	Log capital	434	19.8	1.9	8.2	25.1
	Log material	434	17.4	2.1	5.3	25.4
nic2 = 17	Log gva	241	18.1	2.0	11.3	22.3
	Log labour	241	7.1	1.7	1.9	10.9
	Log capital	241	18.8	2.0	12.4	23.5
	Log material	241	16.3	2.5	8.8	23.1
nic2 = 18	Log gva	196	19.2	1.9	12.9	23.4
	Log labour	196	8.0	1.8	2.1	11.1
	Log capital	196	20.3	2.0	12.4	24.7
	Log material	196	17.0	2.3	10.6	23.0
nic2 = 19	Log gva	67	17.1	1.9	12.4	21.3
	Log labour	67	6.0	1.6	2.5	10.2
	Log capital	67	17.6	2.1	11.9	22.0
	Log material	67	15.6	2.5	8.3	22.2
nic2 = 20	Log gva	322	17.6	2.0	12.3	22.9
	Log labour	322	6.4	2.0	0.9	11.1
	Log capital	322	18.1	2.1	12.4	23.5
	Log material	322	16.2	2.7	6.9	22.4
nic2 = 21	Log gva	70	17.2	2.1	12.1	20.8
	Log labour	70	5.9	1.8	0.9	9.2
	Log capital	70	17.9	2.2	11.2	21.4
	Log material	70	15.4	2.6	7.7	20.6
nic2 = 22	Log gva	238	18.3	2.3	11.3	23.5
	Log labour	238	6.9	2.1	1.8	11.6
	Log capital	238	19.1	2.4	12.3	24.7
	Log material	238	16.7	2.9	8.9	25.1
nic2 = 23	Log gva	527	19.1	2.2	12.3	24.8
	Log labour	527	7.8	2.2	1.5	13.2
	Log capital	527	19.3	2.2	10.1	24.4
	Log material	527	17.0	2.5	8.1	24.4

Industries/Variables		*Obs*	*Mean*	*Std. dev.*	*Min*	*Max*
nic2 = 24	Log gva	254	18.2	2.0	10.7	23.2
	Log labour	254	6.6	1.8	0.7	10.8
	Log capital	254	18.5	2.1	10.9	24.6
	Log material	254	16.5	2.6	8.2	23.7
nic2 = 25	Log gva	496	19.4	2.3	12.0	23.7
	Log labour	496	8.0	2.1	0.8	11.8
	Log capital	496	19.8	2.4	12.0	24.9
	Log material	496	17.3	2.7	8.2	23.1
nic2 = 26	Log gva	181	16.9	1.9	11.1	21.1
	Log labour	181	5.4	1.8	0.3	9.6
	Log capital	181	17.4	2.0	9.7	22.2
	Log material	181	14.8	2.5	7.9	21.7
nic2 = 27	Log gva	330	17.6	1.9	10.7	22.8
	Log labour	330	6.1	1.7	0.7	10.6
	Log capital	330	18.0	2.1	9.7	24.1
	Log material	330	15.8	2.4	5.3	23.3
nic2 = 28	Log gva	455	18.0	2.0	11.6	23.5
	Log labour	455	6.3	1.8	0.7	11.2
	Log capital	455	18.5	2.2	10.7	25.4
	Log material	455	16.1	2.7	7.7	23.6
nic2 = 29	Log gva	168	17.9	1.9	11.7	22.1
	Log labour	168	6.2	1.6	0.9	10.1
	Log capital	168	18.2	2.0	13.2	23.2
	Log material	168	16.0	2.3	8.2	21.8
nic2 = 30	Log gva	130	17.1	1.9	11.8	21.6
	Log labour	130	5.6	1.6	1.6	10.8
	Log capital	130	17.4	2.1	11.4	23.1
	Log material	130	15.2	2.3	9.7	20.8
nic2 = 31	Log gva	90	21.7	1.1	19.2	23.7
	Log labour	90	10.4	1.0	8.3	12.4
	Log capital	90	22.1	1.1	19.4	24.3
	Log material	90	19.9	1.1	17.0	22.0
nic2 = 32	Log gva	373	18.8	2.5	12.7	25.7
	Log labour	373	7.6	2.3	2.0	12.3
	Log capital	373	19.2	2.5	11.9	24.3
	Log material	373	16.8	3.2	4.9	26.3

Source: Author’s computation

Table A4: State -Wise TFP of organised and Unorganised manufacturing sector

States	*Organised Manufacturing*			*Unorganised Manufacturing*		
	2000-01	*2010-11*	*2022-23*	*2000-01*	*2010-11*	*2022-23*
Andhra Pradesh	5.8	6.1	5.7	6.2	6.4	8.7
Bihar	8.0	7.1	10.7	5.9	5.9	9.8
Chhattisgarh	7.5	7.4	6.2	4.5	4.4	3.1
Gujarat	7.1	7.9	5.2	6.1	6.2	4.6
Haryana	5.5	5.9	5.4	5.4	5.3	8.5
Himachal Pradesh	8.5	9.7	11.3	3.5	3.4	1.6
Jharkhand	7.7	8.2	6.1	5.5	5.7	0.7
Karnataka	6.1	6.4	7.3	4.7	4.8	6.5
Kerala	5.6	5.8	5.0	4.3	4.4	8.7
Madhya Pradesh	6.9	7.2	11.6	5.4	5.3	3.4
Maharashtra	5.4	6.1	6.4	4.5	4.4	6.9
Odisha	8.1	7.7	10.6	5.5	5.8	9.3
Punjab	5.0	5.3	6.3	6.7	6.7	1.9
Rajasthan	8.1	8.4	8.8	5.8	5.8	2.3
Tamil Nadu	4.6	5.0	5.3	5.0	5.1	7.9
Uttar Pradesh	5.1	5.9	10.7	5.3	5.0	14.3
Uttarakhand	8.5	8.9	11.9	6.1	6.2	10.7
West Bengal	7.1	7.6	7.8	4.2	3.9	2.8
Mean	6.7	7.0	7.9	5.3	5.3	6.2

Source: Author's computation

Table A5: Sector -Wise TFP of organised and Unorganised manufacturing sector

Products	*Organised Manufacturing*			*Unorganised Manufacturing*		
	2000-01	*2010-11*	*2022-23*	*2000-01*	*2010-11*	*2022-23*
Food products	6.0	6.3	5.2	6.0	6.0	6.8
Beverages	10.9	11.5	9.7	6.6	6.9	4.8
Tobacco products	3.3	4.0	2.7	6.0	6.0	0.0
Textiles	5.8	6.2	10.0	4.7	4.9	6.5
Wearing apparel	7.5	7.6	0.0	0.0	0.0	6.6
Leather and related products	8.3	8.7	15.0	7.6	7.8	9.0
Wood and of products of wood and cork, except manufacture of articles of straw and plaiting materials furniture;	6.8	7.2	7.5	5.4	5.3	5.5
Paper and paper products	5.2	5.1	9.0	2.8	3.1	1.0
Printing and reproduction of recorded media	6.1	6.2	1.6	6.5	6.8	7.3

Products	*Organised Manufacturing*			*Unorganised Manufacturing*		
	2000-01	*2010-11*	*2022-23*	*2000-01*	*2010-11*	*2022-23*
Coke and refined petroleum products	9.1	10.0	3.3	5.2	5.1	0.0
Chemicals and chemical products	5.0	5.5	14.9	3.8	3.8	4.4
Pharmaceuticals, medicinal chemical and botanical products	3.1	3.4	6.0	2.0	2.4	3.9
Rubber and plastics products	4.0	4.6	6.1	5.7	5.8	9.4
Other non-metallic mineral products	5.3	5.4	3.4	7.4	7.3	10.4
Basic metals	7.6	7.6	6.0	0.0	0.0	9.9
Fabricated metal products, except machinery and equipment	6.5	6.7	9.9	5.5	5.4	7.3
Computer, electronic and optical products	8.8	9.6	8.9	7.1	7.5	0.0
Electrical equipment	10.7	11.3	10.4	7.1	7.1	6.7
Machinery and equipment n.e.c.	9.6	10.3	8.2	2.2	2.3	7.9
Motor vehicles, trailers and semi-trailers	6.8	7.4	2.9	11.4	12.2	0.0
Other transport equipment	4.3	5.4	7.8	6.4	6.3	11.0
Manufacture of furniture	9.1	9.4	8.6	8.3	8.7	6.0
Other manufacturing	6.6	6.7	10.1	4.8	5.0	5.7
Mean	**6.8**	**7.2**	**7.3**	5.3	5.5	5.7

Source: Author’s Computation

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4 Vasant Kunj Institutional Area, New Delhi - 110070, India
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