Industry Level Analysis of Productivity Growth under Market Implications

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Industry Level Analysis of Productivity Growth under Market Imperfections

Ramaa Arun Kumar[*] *& Mahua Paul*[**]

[***Abstract***: *The study estimated TFP growth for the post-2008 period for selected industries in the manufacturing sector at NIC 3-digit. TFPG estimates are based on the theoretical framework provided by studies such Hall (1988), Abraham et al. (2009), Crepon et al. (2005) that incorporate market imperfection in labour and product market, thereby, modifying the traditional TFP estimation as Solow Residual. The study finds three distinct trends: firstly, there is considerable industrial disparities in productivity growth in terms of TFP. The estimates have been found to be higher than the conventional Solow Residual for most industries indicating the role played by market imperfections in affecting the conventional measure of productivity growth. Secondly, estimates of bargaining power are found to be lower than those compared to the earlier estimates in Maiti (2013) for the Indian organised manufacturing case for 1998-2005. This observation is commensurate with the observation in recent years of a falling share in labour wage in total output in organized manufacturing sector. Lastly, the study also found a statistically significant contribution of greater mechanization on TFPG while an adverse effect of the rising dependence of organised manufacturing on contractual labour*]

Keywords: Total Factor Productivity, Bargaining Power, Mark-up, Market Imperfection.

JEL Classifications: 047, J520, D24, D43

1. Introduction

Productivity measures are based on the analysis of residual remaining after accounting for output growth due to the growth in basic inputs of labour and capital. Total factor productivity (TFP) is seen as the result of the change in technology that explains the residual output growth. Since firm level inputs are measureable, but the residual is not, total factor productivity is that part of output growth that cannot be explained using the growth in other observable inputs. In analyzing the residual growth, the underlying

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dynamics in the economy such that may influence the output growth are ignored by the traditional methods of estimation of TFP such as the Solow residual.

We refer to the influence that deregulation (such as reduction in trade barriers) has on productivity levels which affects competitiveness in the national and international market, and also generate effects within the liberalized environment in the economy. The reforms, therefore, may change the productivity levels or residual growth without changing the technology which should be accounted for while estimating residual growth as productivity.

The pioneering discussion started in late 1980s when it was found that prices in several US industries were higher than the marginal costs in the study by Hall (1988). The study found that the twin assumptions of constant returns to scale and perfect competition did not hold for several industries under the Solow Residual model. Further, studies like Levinsohn (1993), Harrison (1994), Konings et al. (2001, 2005) developed a theoretical model under the conventional growth accounting model (or Solow Residual framework) taking in to account market imperfections in the product market. However, more recent studies found a limitation in this earlier literature that only considered market imperfections in the product market (Crepon (2007), Blanchard and Giavazzi (2000), Abraham et al. (2009)). The effect of market imperfections in the labour market along with that in the product market has been considered in the recent literature.

The theoretical model developed in this literature enables to not only consider the effect of market imperfections on the productivity estimates, but also measure the bargaining power and the industry mark-up. Based on this literature, the paper poses two questions:

1. Have market imperfections played a role in influencing the total factor productivity for the Indian manufacturing sector?
2. Secondly, what is the role of Information and Computer Technology (ICT) and the rising contractual employment in influencing productivity levels?

The study estimates mark-up and bargaining power for 27 industry groups in the organized part of manufacturing sector in India for 2008-09 to 2015-16. The findings show that estimated total factor productivity growth (TFPG) is much higher than the conventional Solow Residual estimates for the Indian data, indicating the role played by the imperfections in product and labour market. The study found a reduction in bargaining power when similar estimates are compared to that in Maiti (2013) which also used the same database for pre-2008 period (1999-2005). Fall in bargaining power is commensurate when one considers the falling share of labour wage in total output in organised manufacturing sector in the recent years. Reduction in bargaining power raises the firm's profitability, thereby, leading to a rise in productivity.

Secondly, in some industries such as the electronic goods and components, rubber products, special purpose machinery etc. bargaining power is higher along with the mark

up. This means that labour in these industries have been able to bargain well for the rising economic rents through higher markups by the producers.

The rest of the study is organised in to five parts: the second section discusses the literature in detail; section three explains the theoretical model and the methodology used in estimating total factor productivity. Section four deals with the data explanation and variables used. Section five discusses the empirical results, followed by the conclusion in section six.

The study is important in two respects. One is that the productivity measures that are traditionally estimated are modified to take into account the imperfections in product and labour market that may influence productivity growth which may not be explained by the changes in technology as traditionally understood. Secondly, there is a need to study the firm/industry level factors that affect sectoral productivity in the organized manufacturing sector which this study has undertaken.

2. Literature Review

This paper is based on the theoretical models that go back to Hall (1988) which took note of the variation in price away from the marginal cost for a number of industries and examined the production function in the presence of imperfect competition leading to a price-cost margin. The basic premise was that the Solow's residual or total factor productivity growth (TFPG) not only measures the rate of technical change, but also includes an element of mark-up arising from the imperfection in the product market. The effect of trade liberalization in the product market has been analysed in the literature which build a theoretical model under the conventional growth accounting model (Levinsohn (1993), Harrison (1994), Konings et al. (2001, 2005)) taking in to account market imperfections in the product market. The study by Levinsohn (1993) found that trade liberalisation in Turkey in early 1980s led to a decline in the mark-ups in industries that were imperfectly competitive before liberalisation, while mark-ups rose for industries with perfect competition which saw a rise in protectionism (increasing tariffs or non-tariff barriers). This is similar to the findings Harrison (1994) which looked at the effect of trade policy reforms in Cote d'Ivoire for the period 1979-87. The firm level panel estimations revealed that the most protected sectors, such as food products, which were oriented towards domestic markets had the highest mark-ups. While textile industry which was opened up to imports witnessed a fall in mark up in the post-reform period.

Studies have further considered the role of imperfection in labour market as well to explain the role of market imperfections in measuring productivity (Abraham et al. (2009), Crepon et al. (2005), Blanchard and Giavazzi (2003) and Rodrik (1997)). These studies considered the link between globalisation and product and labour market, simultaneously. Globalisation has played a very important role in bringing a change in the levels of competition. The above mentioned literature provides a link between productivity growth

and trade reforms through two opposing forces emerging from the product and labour market that may affect the residual growth. The model developed in the literature is based on two assumptions:

1. Imperfect product market: that determines the size of rents, and
2. Labour market that allows for bargaining and therefore, the distribution of the rents.

Trade reforms that lead to liberalizing and deregulating the external market usually lead to reduction and redistribution of rent among the economic players. For example, trade liberalization leading to increased foreign competition brings the product market prices down for the import competing sectors whereby residual growth would be affected. However, a spillover effect of this may take place in the labour market that would change the bargaining power of workers. The net effect of these forces would depend on the relative strength of the two forces. Hence, such reforms may change the residual growth artificially without having any influence on technology. That is, the effect of competition due to trade reforms may overestimate TFPG if the loss from reduction in prices (and therefore, mark-up in the product market) is more than the gain occurring from a reduction in bargaining power in the labour market leading to a decline in productivity growth.

In the Indian case, Maiti (2013) has recently examined the role of imperfections for a panel of industries in the organized manufacturing sector in India using the ASI data for 1998-2005. The study found a positive and significant impact of openness on the productivity growth when the market imperfections are eliminated.

2.1 TFPG in the Indian Context

Productivity is a very well-studied concept and there is a plethora of studies by scholars which have looked at the productivity growth patterns of the Indian manufacturing sector in the pre- and post-1991 reform period of liberalization (Das et al., 2017; Saibal Ghosh, 2010; Deb and Ray, 2013; Virmani and Hashim, 2011; Kathuria et al., 2010). Some of these studies found that the Indian organized manufacturing was performing well before the reforms than after reforms. Das et al. explain that 1990s was a period of factor accumulation and a gradual diffusion of technology may have fed the higher TFPG in the 2000s. Virmani and Hashim explain that the fall in productivity in post-reform era was the result of technological obsolescence, gradual adoption of new technology and slow effect of learning-by-doing.

Table 1 gives a glimpse of the various studies on trends in productivity for the Indian manufacturing sector. Most of these studies have considered the pre- and post-liberalisation era for analyzing the TFPG trends.

Table 1
Summary of Selected Studies on TFPG on Indian Manufacturing Sector

Study	*Time Period*	*TFPG*	*Methodology Used*	*Industry*	*Region of Study*
Das et al (2017)*	1980-2011	1.6	Growth Accounting	26 Industries at NIC 2	All India
	1980s	2.7			
	1990s	-1.4			
	2000s	2.6			
Goldar (2015)	1999-2011	1.77	Tornqvist index		All-India
Saibal Ghosh (2013)	1981-2004	0.68	Levinson-Petrin	All Industries	All-India
	Pre-reform	1.22			
	Post-Reform	0.34			
Deb and Ray (2013)	1970-2007	1.98	DEA	All Industries	20 Indian States
	Pre-Reforms	1.064			
	Post-Reforms	2.737			
Viramani and Hashim (2011)	Pre-Reforms	0.61	Growth Accounting	All Industries	All India
	Post-Reforms	0.58			
Kathuria et al. (2010)	1994-2004	--	Levinson-Petrin	All Industries	15 Indian States
	Organised Sector	0.64			
	Unorganised Sector	-10.1			
Kumar (2010)	1993-96	0.14	Malmquist Index	All Industries	14 Indian States
	1997-2002	0.78			
	2003-04	3.95			

Note: * http://www.worldklems.net/conferences/worldklems2014/worldklems2014_Das_slides.pdf
Source: Various studies mentioned, compiled by authors.

While there is a general consensus that output growth in the post-reforms period had actually stagnated or even fallen, the magnitude reported varies by different scholars. For example, Ghosh (2010) found that industrial growth in India was 6.5 per cent in 1980s which fell to 6 per cent in the period 1991-2004. While Goldar (2015) found the manufacturing sector growth to be around 5.6 per cent in 1980-90 which increased marginally to 5.8 per cent in 1990-99, followed by a jump to 7.6 per cent growth in 1999-2011. The study attributes growth in industrial output in the 2000s era to a commensurate growth in exports and imports that grew at more than the growth rate of the industrial sector.

Related to this observation is that of the growth of TFP in these years. As can be seen from Table 1, TFP growth was higher in the pre-liberalisation era in 1980s than in 1990s as noted

by studies like Das et al (2017), Ghosh (2010), Virmani and Hashim (2011). The J-curve trend in manufacturing productivity has been discussed by Virmani and Hashim. They argue that the Indian manufacturing productivity followed a J-curve path of output growth which fell initially in the post-reforms era and picked up steam in the late 1990s and 2000s. This trend is explained as a result of technological obsolescence, gradual adoption of new technology and slow effect of learning-by-doing.

Das et al. (2017) have calculated productivity for the Indian organized manufacturing sector, in addition to non-manufacturing sector like mining, electricity and gas and construction sector and also services sector. They explain that 1990s was a period of factor accumulation and a gradual diffusion of technology may have fed the higher TFPG in the 2000s which they found was close to 2.6 per cent which is almost equal to the pre-reform era, whereas, they found a negative growth rate of TFP in the post reform period.

The period of post-2008 financial crisis that affected almost entire world also had an impact on Indian industrial growth. Industrial growth slowed down in the post-2008 period from 7.2 per cent in 2008-11 to 6.8 per cent in 2012-15[1]. There have very few studies that have analysed the productivity trends of Indian manufacturing in the after years of the global crisis (Das et al., 2017; Singh, 2017; Goldar, 2017; Goldar, 2015). Das et al. found the reversal of TFP growth to the levels of 1980s to around 2.6 per cent in 2000s. However, for the post-2008 period, they consider a period of 2008-11 which is also the case with Goldar (2015). However, Goldar (2017) estimated TFPG under the India KLEMS project to find that the hike in TFP (of 0.9 percentage points) during 2003-2014 was achieved by manufacturing, market services and agriculture sectors.

The literature on TFPG in the Indian context, however, has been silent on the role played by market forces in influencing productivity growth. India has witnessed a series of trade reforms since 1991 that have opened up the economy to foreign competition. A series of Free Trade Agreements have also allowed tariffs to fall overtime and the liberal FDI policy has allowed foreign firms to set up shop in the Indian Subcontinent. The average MFN applied import tariffs of India were 13.4[2] per cent in 2018 as compared to 125[3] per cent in 1991. The rise in FDI from $ 2.4 billion in 2000-01 to $ 43.5 billion in 2016-17 is also indicative of the changing dynamics in the Indian market conditions. The effect of the change in competition on market power and the spillover in labour bargaining power needs to be analysed in the context of total factor productivity.

This paper has addressed the issue of market imperfections in the Indian organised manufacturing sector by using the theoretical model developed under the growth accounting framework. The data allows us to calculate TFPG at NIC 3-digit level. The

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[1] Source: Economic Survey Data

[2] https://www.export.gov/article?id=India-Import-Tariffs

[3] Singh, Harsha Vardhana. "Trade Policy Reform in India Since 1991," Brookings India Working Paper 02, March 2017

focus of the paper is 2008-09 to 2015-16 for the Indian organized manufacturing sector. For the industry estimations, 17 Indian states have been considered which represent around 93 per cent of total organized manufacturing GVA and around 91 per cent of total number of factories. These states are: Maharashtra, Gujarat, Tamil Nadu, Karnataka, Uttar Pradesh, Haryana, Uttarakhand, Andhra Pradesh (including Telangana 2012-13 onwards), Rajasthan, Madhya Pradesh, Himachal Pradesh, West Bengal, Punjab, Odisha, Kerala, Jharkhand and Goa. The reason for including data from 17 states is because data availability has been consistent over the period under consideration.

3. Estimation Model

The estimations are based on the theoretical framework that considers the effects of labour market and product market dynamics in influencing productivity of a firm as a result of regulatory changes like trade reforms leading to a change in the levels of competition in the industry. The model assumes a simple Cobb Douglas production function with value added Qijt of firm *i* and year *t* is produced using two inputs, namely labor L and capital K:

$$Q_{it} = A_{it}\, F(L_{it}, K_{it})$$

Taking total differentials and log values, we get:

$$(q_{it} - k_{it}) - \varepsilon_{L,it}(l_{it} - k_{it}) = \gamma_{it} k_{it} + a_{it} \qquad (1)$$

here, q_{it}, k_{it}, l_{it} and a_{it} are the log forms of Q_{it}, K_{it}, L_{it} and A_{it}.

The LHS captures the residual growth given by the Solow Residual (SR) which is equal to the sum of capital growth explaining returns to scale γ_{it} and unexplained random term which can be used as a proxy for total factor productivity.

Replacing labour elasticity $\varepsilon_{L,ijt}$ by relative labour share to total value addition, we can incorporate two types of market distortions into the residual growth due to product and labour market imperfections. In case of product market imperfection, the price mark-up is given by $\mu = P/MC$ and if s_L is the cost share of labour, then elasticity of labour can be represented as:

$$\varepsilon_{L,ijt} = \mu s_L \qquad (2)$$

Secondly, if we consider the Nash bargaining equation for the labour market, the equilibrium condition (one can refer to Abraham et al. (2009) and Maiti (2013) for detailed derivation) would result in explaining the elasticity of labour in terms of the bargaining power assumed to be θ (under imperfect labour market), the price mark-up μ and labour cost share s_L, given by:

$$\varepsilon_{L,ijt} = \mu s_L + \mu(s_L - 1)\left(\frac{\theta}{1-\theta}\right) \qquad (3)$$

The first term of the LHS captures labour market imperfections and the second term indicates the influence of bargaining power in the labour market.

By combining equations 1, 2 and 3 we obtain the following equation:

$$SR_{it} = \beta_{it} LER_{it} + \frac{\lambda_{it}}{\mu_{it}} k_{it} + \frac{\theta_{it}}{1-\theta_{it}} BAR_{it} + (1-\beta_{it}) a_{it} \qquad (4)$$

here,

$$SR_{it} = (q_{it} - k_{it}) - \varepsilon_{it}(l_{it} - k_{it})$$

$$LER_{it} = (q_{it} - k_{it}),$$

$\beta_{it} = \dfrac{p_{it} - MC}{p_{it}} = 1 - \dfrac{1}{\mu_{it}}$ is the Lerner's Index describing the firm's market power $BAR_{it} = (s_L - 1)(l_{it} - k_{it})$.

Equation (4) is the basic equation which is used for further empirical analysis. In estimating this equation, we are also able to estimate the bargaining power in the labour market as well as the market power at the industry level.

3.1 Methodology

The conventional approach to estimating total factor productivity through an ordinary least squares is said to yield biased estimates of the production function, thereby, the productivity measures. This is because productivity shocks lead firms to respond by altering choice of inputs. There have been many studies that have proposed alternative ways to overcome the endogeneity bias, however, the most referred to, are those studies by Olley and Pakes (1996) and Levinsohn and Petrin (2003). The Olley and Pakes (OP from now) method used investment of firms as a proxy for productivity shocks. However, Levinsohn-Petrin (LP from now) considered using intermediate input proxies instead of investment (as in OP) as it avoids truncating all the zero investment firms. To the extent that adjustment costs are an important issue, intermediate inputs may confer another benefit. If it is less costly to adjust the intermediate input, it may respond more fully to the entire productivity term than investment.

To link the LP framework with the theoretical model followed in this paper, the starting point of the estimation is given by equation (4). The disturbance term of the equation can be divided into two parts: ω_{it} is the observed part and u_{it} is the random disturbance part. ω_{it} being a state variable affects the firm's decision.

$$SR_{it} = \beta_{it} LER_{it} + \frac{\lambda_{it}}{\mu_{it}} k_{it} + \frac{\theta_{it}}{1-\theta_{it}} BAR_{it} + \omega_{it} + u_{it} \qquad (5)$$

Increase in expected future values of ω_{it} brings about an increase in current levels of capital and proxy variables (intermediate input use and fuel used, ι_{it}). ι_{it} can be written as $\iota_{it} = \iota_{it}(\omega_{it}, k_{it})$ which is monotonically increasing function, which therefore, can be inverted to be written as: $\omega_{it} = \omega_t(\iota_{it}, k_{it})$. One can write equation (5) as:

$$SR_{it} = \beta_{it} LER_{it} + \frac{\theta_{it}}{1-\theta_{it}} BAR_{it} + \phi_{it} + u_{it} \qquad (6)$$

where,

$$\phi_{it} = \frac{\lambda_{it}}{\mu_{it}} k_{it} + \omega_{it}(\iota_{it}, k_{it})$$

In the first stage of estimation, the linear variable BAR and LER and non-parametric ϕ_{it} can obtain a consistent estimate of β_{it} and $\frac{\theta_{it}}{1-\theta_{it}}$. Assuming a first-order Markov process for ω_{it} we get $\vartheta_t = \omega_t - E[\omega_t \mid \omega_{t-1}]$. The equation transforms in the second stage to

$$SR^* = SR_{it} - \beta_{it}\, LER_{it} - \frac{\theta_{it}}{1-\theta_{it}} BAR_{it} = \frac{\lambda_{it}}{\mu_{it}} k_{it} + E[\omega_t \mid \omega_{t-1}] + \vartheta_t + u_{it}$$

The second stage regression of SR* on k_{it} and a consistent estimate of $E[\omega_t \mid \omega_{t-1}]$ gives a consistent estimate of k_{it} (that is, $\frac{\lambda_{it}}{\mu_{it}}$).

Using the estimates of ϑ_t as TFP modified to take into account the market imperfections in labour and product market, the industry level estimations have been done.

4. Data Sources and Construction of Variables

Based on the explanation above, the study estimated total factor productivity growth using equation 4 as the base and applied econometric technique of Levinson-Petrin using the panel of 61 NIC 3-digit industries. The estimates for TFP are calculated as a time series from 2008 to 2015. Using intermediate input proxies instead of investment (as Olley and Pakes (1996)) avoids truncating all the zero investment firms. The study also estimates the bargaining effects and the price-cost margin effects from the model. Further, the study makes use of the TFPG estimates to analyse the industry level factors that affect productivity.

Data at industry level and on firm characteristics has been compiled at NIC-3 digit level using Annual Survey of Industries (ASI) reports since 2008-09 to 2015-16. Industry characteristics such as gross value added, fixed capital assets, inputs, number of workers etc. at NIC 3 digit level have been included. The study made use of the following variables from the ASI data:

Output Measure: Gross value added measure is calculated as the difference between total output and total intermediate input. The total or gross output measure contains, as per the definition provided by ASI, total products and by-products manufactured by the unit (that includes total subsidies and excludes taxes on sale) and other output or receipts such as, variation in stock of semi-finished goods, value of own construction, value of electricity generated/sold. On the other hand, total input measure includes *fuels consumed* by the factory except those which directly enter into the production process, *materials consumed* which are important and of key nature to the industry, on which the manufacturing process is based and other expenses including operating and non-operating expenses, insurance, rent paid of fixed assets etc.

For estimating TFP, real values of GVA have been constructed by deflating the nominal values at NIC 3-digit level using the Wholesale Price Index at 2011-12 base. Detailed concordance has been done between NIC 2008 and the WPI codes using the description of the commodities to ensure one-to-one concordance. Wherever the WPI description did not match that of the NIC, the aggregate WPI was considered as the price deflator. Wholesale Price Index for various commodities at a disaggregated level has been sourced from the Office of the Economic Adviser.

Capital input: Measure of capital input is taken as fixed capital without land. Fixed capital includes the depreciated value of fixed assets owned by the factory and covers all type of assets, new or used or own constructed, deployed for productions, transportation, living or recreational facilities, hospitals, schools, etc. for factory personnel. We consider all fixed assets except land in measuring capital for the production function. The authors are aware of measuring capital input in an inter-temporal perspective using the Perpetual Inventory Method (PIM). According to this method, capital input is perceived as an accumulation of capital assets overtime, accounting for the depreciation in last period's capital value. The applicability of PIM is relevant at the firm level, whereas, our data has been constructed from the NIC 3-digit level which may render the use of PIM irrelevant for our exercise. Therefore, we consider the net closing value of fixed assets as a measure of capital input.

The WPI for all kinds of machinery and equipment has been used to deflate the capital input series. Since the data has been compiled from the ASI reports and not the unit level data, the measure of total capital used here does not take account of the inter-temporal changes in the use or addition of capital. However, the net value of fixed assets included in the study is a closer approximation to the capital input.

Labour input: Number of workers at NIC 3-digit level is considered as the indicator of labour. It includes all persons engaged by the factory whether for wages or not, in work connected directly or indirectly with the manufacturing process and include all administrative, technical and clerical staff as also labour in production of capital assets for factory's own use.

For empirical estimation under the Levinson-Petrin framework, value of materials consumed in the production process has been taken as a proxy for intermediate input consumption while the value of fuels consumed as the fuel cost. There are several intermediate inputs that go into the production process such as the primary raw materials used for value addition (termed as materials used in this study) and fuels consumed such as lubricants, electricity, coal and gas that augment the production process rather than directly been used as raw materials.

The estimations also include calculating the labour wage share in total output for which wages and salaries at industry level have been taken as a ratio of value of output.

Aggregate TFPG estimates are based on 75 NIC 3-digit codes. For the sake of comparison and a broader view of industry trends, we have categorized the NIC codes into 27 industry groups. For this purpose, 62 NIC codes with data for all 8 years have been considered. Table 2 shows the NIC codes under each of the 27 industry groups.

Table 2
NIC codes under each Industry Group

Industry groups									
Food Processing and Beverages	101	102	103	104	105	106	107	108	110
Tobacco products	120								
Leather and Leather products including footwear	151	152							
Textiles	131	139	141	143					
Wood and Products	161	162	170						
Printing and service activities related to printing	181								
Coke and oven products	191								
Refined petroleum products	192								
Chemicals	201	202	203						
Pharmaceuticals	210								
Rubber products	221								
Plastic and Products	222								
Glass and Glass products	231								
Non-metallic mineral products n.e.c.	239								
Basic Metals and Products	241	242	243	251	259				
Electronic components and equipment	261	262	263	264					
Instruments and measuring devices	265	266	267						
Electric components and equipments	271	272	273	274	275	279			

Industry groups									
General purpose machinery	281								
Special-purpose machinery	282								
Automobiles and components	291	292	293	301	302	309			
Furniture	310								
Jewellery	321								
Sports Goods	323								
Medical and dental instruments and supplies	325								
Other manufacturing	329								
Repair of fabricated metal prds, machinery and equipment	331								

The industry group level bargaining power, mark-up and TFPG has been calculated at the industry group level. However, the estimates of TFPG at NIC 3-digit level have been included for the regression estimations. Summary statistics for the variables used in the TFP estimations are given below in Table 3.

Table 3
Summary Statistics for Variables used in Estimation (Values/numbers in '000s)

Variable	*Mean*	*Std. Dev.*	*Min*	*Max*
GVA	93	297	4	9,629
No. of Workers	9	22	0	297
Fixed Capital	173	649	1	16,500
Fuels Consumed	23	74	0	1,138
Materials Consumed	338	1,258	3	45,500

Source: Authors' calculations based on ASI data.

5. Results and Discussion

The estimates of TFPG have been calculated at NIC 3-digit and aggregated to the industry group level taking simple average of the productivity measures at NIC 3-digit level. There are few observations from the empirical estimations that will be discussed at length in the following sub-sections:

1. The TFPG estimates calculated from theoretical model incorporating market imperfections are higher than the traditional TFPG estimates for most industries.
2. At the industry group level, bargaining power in some industries like electronic products, rubber products, special purpose machinery etc. is higher along with the mark up.

3. The effect of ICT capital at the NIC 3-digit level on productivity growth is significantly positive, while contractual labour share that has been rising over time in the organised part of manufacturing has shown a negative impact on productivity at industrial level.

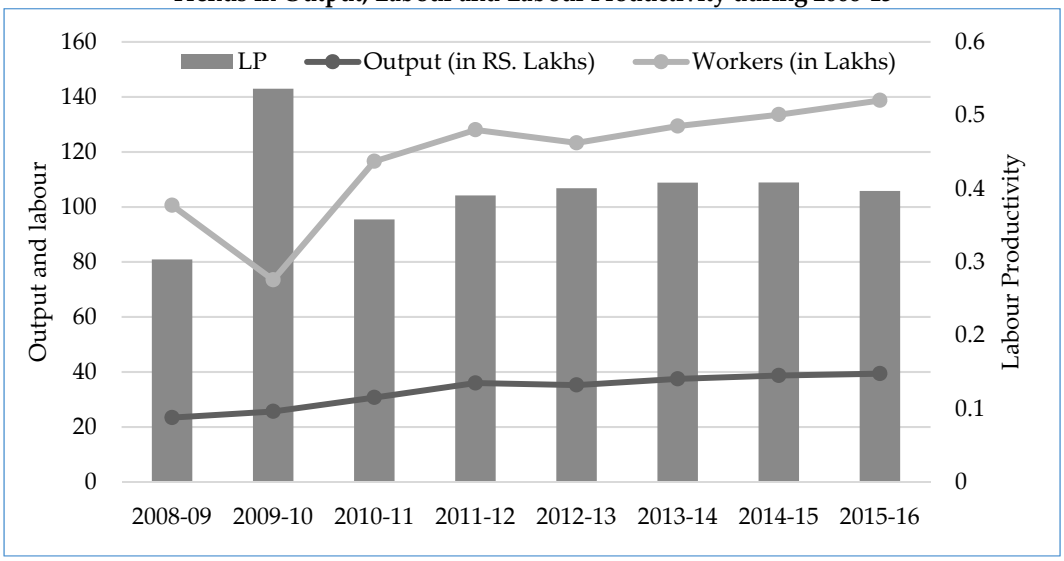
5.1 TFPG: Industry Wise results

The TFPG for the organized manufacturing sector was found to be 4.2 per cent per year, while the growth rate of labour productivity (total GVA divided by total workers employed) was close to 11 per cent. A fall in employment in 2009-10 following the financial crisis could have been the reason for labour productivity to have increased as a commensurate fall in total GVA did not follow. TFPG, however, was negative in 2009-10 showing an immediate effect of the ongoing global crisis due to which industries were adversely impacted the TFP. This observation is reinforced in our empirical estimation where the effect of the year dummy for 2009 had a negative and statistically significant relation.

Figure 1a and 1b reflect the trends in total output, number of workers and TFPG for the organised manufacturing sector during 2008-09 to 2015-16.

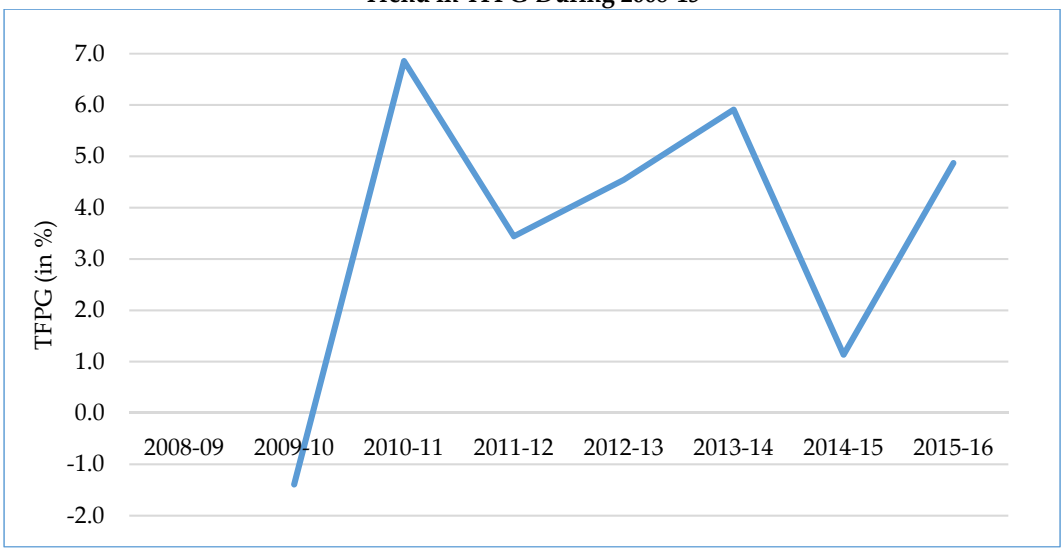
The impact of market imperfections shows that the modified TFPG calculated at the industry level is higher for most industries than the conventional measure of TFPG based on Solow residual. At NIC 3-digit level, 39 out of the 62 codes included in the study have higher TFPG with market imperfections incorporated than the conventional estimates of TFPG. Taking the industry groups, we find that 15 out of the 27 groups included have higher TFPG when market imperfections are taken into account. Figure 2 plots these 15

Figure 1a
Trends in Output, Labour and Labour Productivity during 2008-15



Source: Authors' calculations based on ASI data.

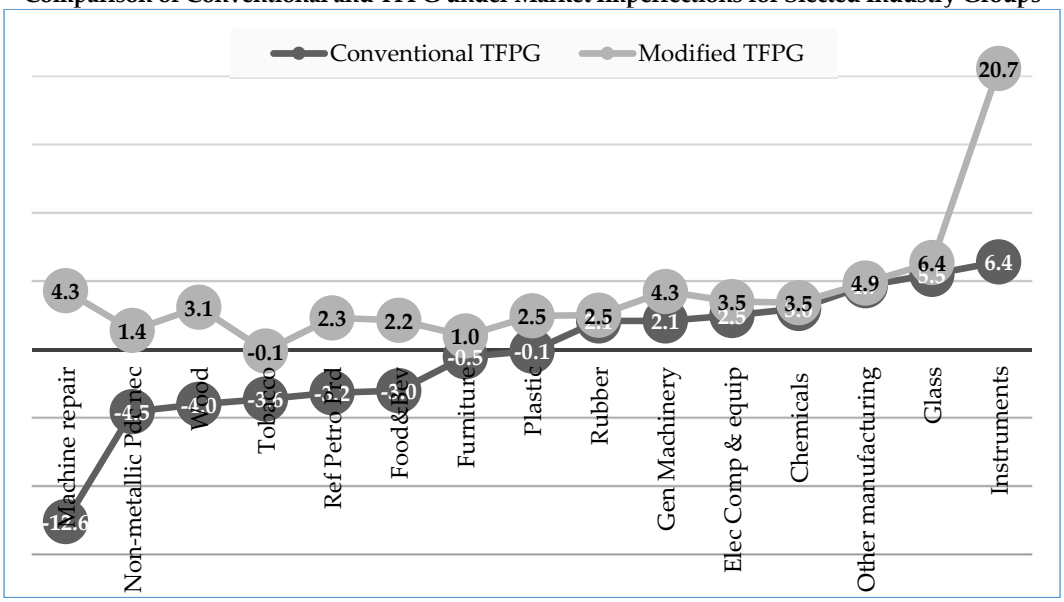
Figure 1b
Trend in TFPG During 2008-15



Source: Authors' calculations based on ASI data.

industry groups. Therefore, the higher TFPG after accounting for the market imperfections may either be due to the reduction in bargaining power overtime or that the mark up has risen to make firms more productive. A detailed discussion follows in the next sub-section.

Figure 2
Comparison of Conventional and TFPG under Market Imperfections for Slected Industry Groups



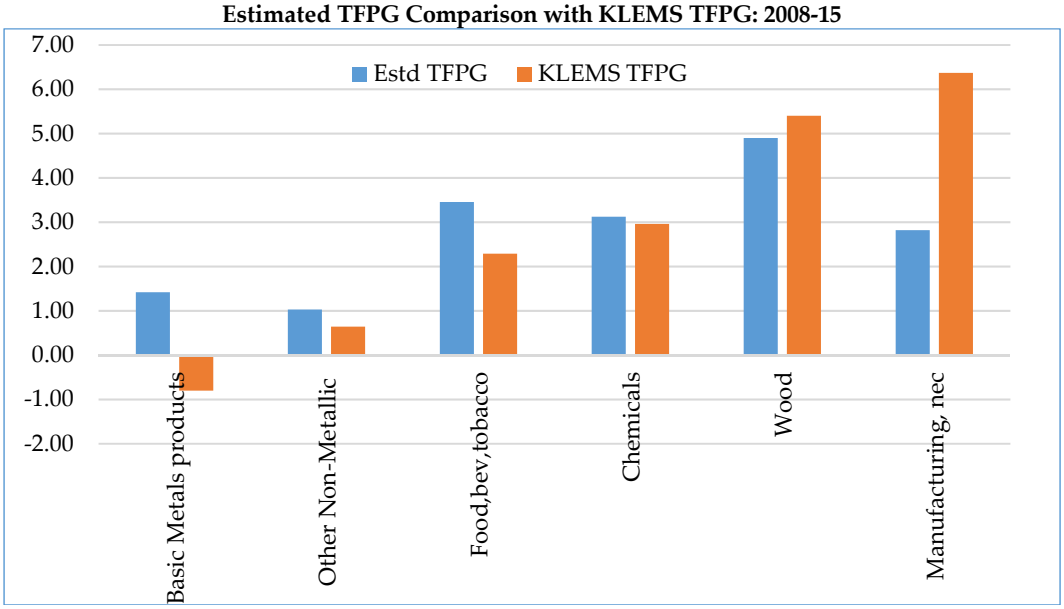
Source: Authors' calculations based on ASI data.

A similar comparison at industry level with some industry groups under the India KLEMS framework have been compared to using the TFPG estimated using growth accounting. India KLEMS database is a research project funded by the Reserve Bank of India (RBI) to analyse the productivity performance in Indian economy at a disaggregated level (Das et al., 2017).

The study has divided the economy into 27 disaggregated industry groups covering agriculture and allied sectors, mining & quarrying, manufacturing, electricity, gas and water supply, construction and services. Some of the industry groups within manufacturing sector in our study have been matched to that in KLEMS to make a comparison of their TFPG estimates with that of our study. Six groups, namely, basic metal products, other non-metallic products, food, beverages and tobacco, chemicals, wood, manufacturing nec.

Figure 3 shows that for four out of six industry groups, our estimates are higher than the conventional TFPG estimates under perfect competition assumption. The study has noted a fall in the bargaining power that may explain the TFPG estimates being higher than the conventional TFPG estimates.

Figure 3
Estimated TFPG Comparison with KLEMS TFPG: 2008-15

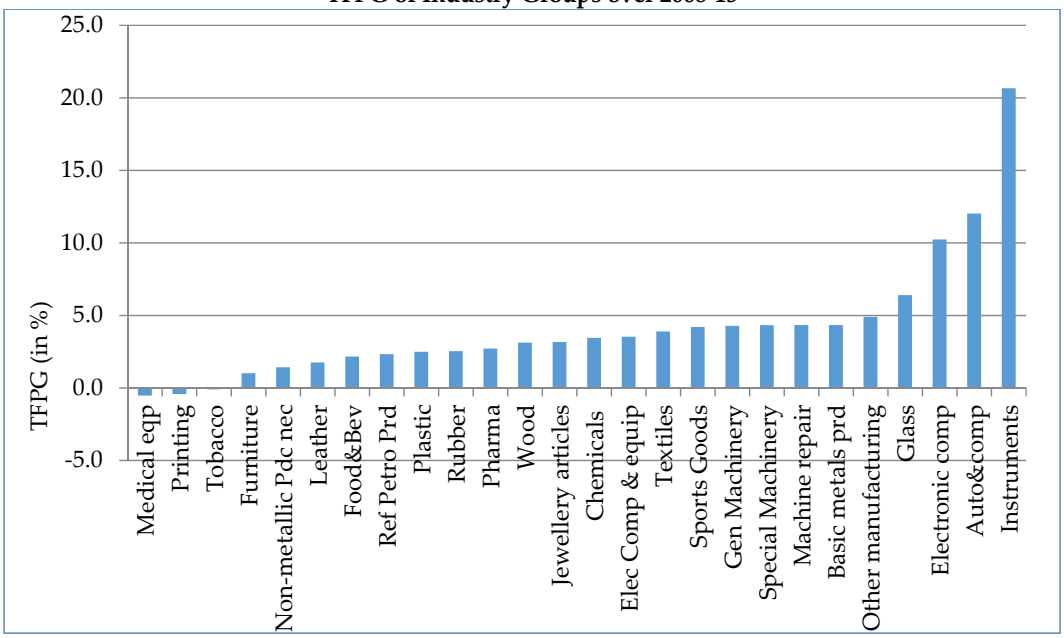


Source: KLEMS Database and authors' calculations.

According to our estimates, automobile and components sector, electronic components and instruments and measuring devices witnessed high productivity growth during the post-2008 period. Figure 4 shows the 7-year aggregate TFPG for the 27 industry groups. Productivity in the relatively labour intensive industry groups such as the textiles, food processing and beverages, leather etc. grew at less than the aggregate manufacturing

growth rate of 4.2 per cent during the 7-year period. Industries like special purpose machinery, electronic components and equipment, automobiles and components, basic metal products displayed a TFPG of more than the aggregate growth.

Figure 4
TFPG of Industry Groups over 2008-15



Source: Authors' calculations based on ASI data.

Electronic industry in particular has shown tremendous growth in technology over the recent years. With the number of mobile subscribers on the rise over the years, the electronics market in India is set to rise manifold. According to India Brand Equity Foundation (IBEF)[4], by 2020 the electronics market in India is expected to increase with a CAGR of 24.4 per cent to $ 400 billion from $ 69.6 billion in 2012. The outlook of the Government of India has, therefore, been to promote domestic production of electronic products and components under a Phased Manufacturing Programme[5] launched in 2015. It plans to cut down the heavy reliance of India's electronic market on imports from China which account for second highest share in the total import bill after oil imports.

The other industry that has shown impressive performance in terms of TFPG is the automobile and auto components sector in India. The automobile industry entails the application of sophisticated technology that results from huge investments in research and development and this, combined with the availability of cheap labour, has led the automobile sector to perform consistently well. Steel industry, which is the key input for

[4] https://www.ibef.org/download/Electronics-March-2015.pdf
[5] https://meity.gov.in/writereaddata/files/Notification_PMP_Cellular%20Mobile%20Handsets_28.04.2017.pdf

the auto sector has also shown impressive productivity growth, reinforcing our observation of the latter performing in the post-2008 period.

5.2 Bargaining Power and Mark-up

Table 4 shows the estimation results using both OLS and Levinson-Petrin (LP) for the equation (4). As can be seen, mark-up in the Indian organized manufacturing sector was 3 under the LP framework whereas with OLS estimation it was 2.4 in aggregate. While bargaining power in the post-financial crisis has come down substantially as compared to that found by Maiti (2013) in the pre-crisis period of 1998-2005. The study has used the same database for organised manufacturing sector and found a strong bargaining power of labour in the earlier period of close to 0.5 which has declined in our findings to 0.15 in the post-2008 period. This is indicative of declining bargaining power of labour as compared to the employer. Thus, a fall in the bargaining power may explain the TFPG estimates being higher than the conventional estimates as noted in Figures 2 and 3.

Table 4
Estimation Results Showing Mark-up and Bargaining Power in Indian Manufacturing for 2008-15

Variables	*OLS*	*LP*
BAR	-0.22***	-0.13***
LER	0.59***	0.66***
LogK	0.12***	0.059***
	9.37 (F-stat)	*290.7 (Wald Statistics)*
No. of Observations	7124	7122
Mark-up	2.4	3
Bargaining Power	0.27	0.15

Note: ***, **,* signify statistical significance at 1%, 2% and 5% level.

This trend may be explained by the falling share of wages in total output pointing to the growing mechanization taking place in different industries, as well as, the rising share of contractual employment in the organised manufacturing sector which has substantially brought down the bargaining power in the organized sector. Recent literature (Gupta and Helble, 2018; Abraham and Sasikumar, 2017 and Goldar and Aggarwal, 2012) has indicated the factors for falling labour share. Total wages as a share of total revenue or GVA have been falling, while the share of profits was on the rise since 1980 (Abraham and Sasikumar, 2017). The closest to our study period is the study by Abraham and Sasikumar which found that during 1980–2012, the share of total emoluments to workers declined from 51.1 per cent to 27.9 per cent and the share of wages declined from 33 per cent to 13 per cent.

To be able to see the sectoral differences in bargaining power and markup, we estimate the equation (4) for the 23 industry groups separately. The four industries, namely, jewellery,

coke and oven products, sports goods and plastic products have been excluded due to lack of sufficient observations for the panel estimations. Table 5 shows the industry group wise bargaining power and mark-up for the 7-year period from the LP framework estimation. There is considerable variation in bargaining power across industries as can be noticed from the table, while that in mark-up is much less when we compare the coefficient of variation. Industry groups such as special-purpose machinery sector, automobile and components, furniture and electronic component and equipment have witnessed mark-up above the overall average mark-up for all industries together of 2.7. It is easy to explain that

Table 5
Industry Group-wise Bargaining Power and Mark-up

Industry groups	*Bargaining*	*Mark-up*
Glass and Glass products	0.20	1.7
Pharmaceutical	0.23	2.1
Manufacture of refined petroleum products	0.54	2.1
Printing and service activities related to printing	0.23	2.2
Wood and Products	0.22	2.2
Basic Metals and Products	0.26	2.4
Food Processing and Beverages	0.19	2.4
Manufacture of tobacco products	0.28	2.4
Textiles	0.05	2.5
Chemicals	0.27	2.5
Instruments and measuring devices	0.19	2.5
Manufacture of non-metallic mineral products n.e.c.	0.08	2.5
Repair of fabricated metal products, machinery and equipment	0.10	2.7
Automobiles and components	0.31	2.8
Manufacture of general purpose machinery	0.22	2.8
Manufacture of rubber products	0.33	2.9
Electric components and equipments	0.25	2.9
Manufacture of medical and dental instruments and supplies	0.16	2.9
Manufacture of special-purpose machinery	0.30	3.0
Other manufacturing	0.07	3.1
Leather and Leather products including footwear	0.08	3.3
Furniture	0.17	4.4
Electronic components and equipment	0.41	4.7
Coefficient of Variation	0.51	0.25

Source: Authors' calculations based on ASI data.

a higher mark up is witnessed in industries like electronics and machinery which are characterized by high technology with substantial investments in research and development (R&D). The explanation is that such sectors require higher markups to recover the costs involved in the R&D (Konings at al. 2001). For the furniture industry, the entry of many global brands into this sector in India from countries like Finland and Italy along with the rising construction sector may have played a vital role in enhancing the mark-up in this sector with technology enhancements.

On the other hand, bargaining power in only one industry, namely, manufacture of refined petroleum products was seen to be very high close to 0.5 which implies that workers are almost equally powerful as the employer. Electronic component and equipment and rubber products were other two industries that witnessed a bargaining power of 0.41 and 0.33, respectively. It is noted that industry groups with more than aggregate bargaining power of 0.15 are also identified with higher mark-up. These industries are electric components, rubber, automobile, electronic equipments and special purpose machinery. It implies that labour is able to bargain and get a better wage deal in industries that have relatively higher economic rents in terms of higher markups than in industries that are operating under more competitive environment.

5.3 Impact of Industry Level Factors on TFPG

Information and Communication in industries has played a very crucial role in transforming the growth strategy and performance over time in the Indian industry. The effect of ICT investments can have two ways of affecting the firm's performance (Erumban and Das, 2010): one is the direct effect of ICT on economic growth which includes manufacturing growth. The second is of an indirect nature by affecting the total factor productivity. Studies based on Indian industry have found significant impact of ICT capital on TFPG (Mitra et al., 2016; Erumban and Das, 2016).

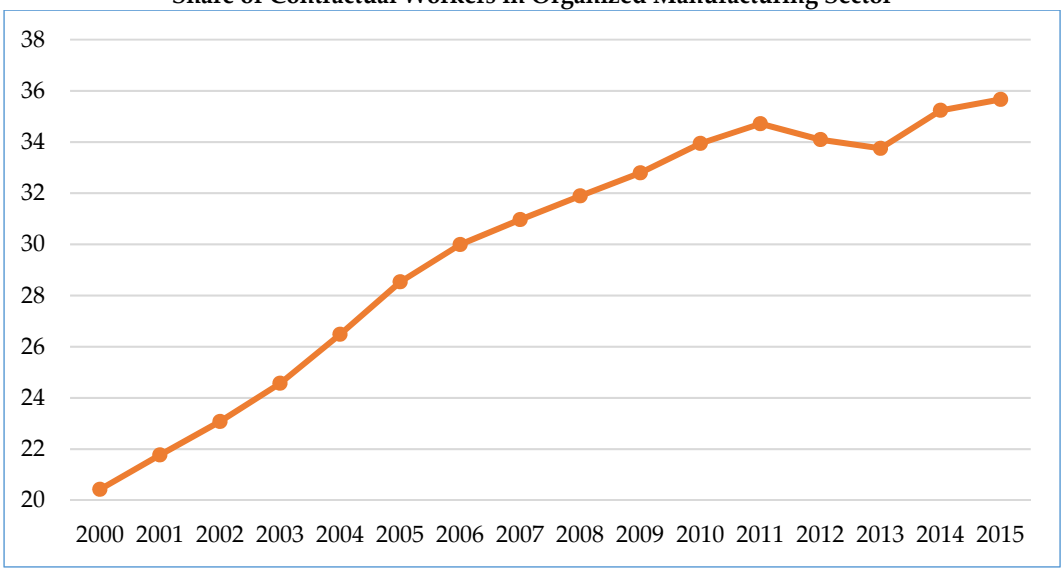
The other aspect that may impact TFPG is the growing reliance of the organised manufacturing sector on informal/contractual workers. It has been observed that the share of contractual workers in total number of employees has risen over time. Figure 5 clearly shows that the share has risen from a low of 20.4 per cent in 2000-01 to around 36 per cent in 2015-16.

Based on this, it may be examined if such a trend has actually helped industries to gain in terms of raising the total factor productivity. We assert that greater contractualisation may have been detrimental to the overall productivity as informalisation of employment leads to a number of challenges for both employees and employers in the following ways:

1. Greater share of contracted labour finds very less scope for skill enhancement within the organization as employers would rather invest in the regular employees than contract workers.

2. For the employee, a contracted worker would have less incentive to put in regular or overtime for the work than a regular worker as the remuneration to the former does not contain the element of social security and job security that is provided to the latter.

Figure 5
Share of Contractual Workers in Organized Manufacturing Sector



Source: Authors' calculations based on ASI data.

These factors may have a bearing on the overall productivity of the firm. Some reflections of growing contractualisation have been noted in our results of lowered bargaining power in the post-2008 period that we have considered.

Panel data estimation at NIC 3-digit level is done for the period 2009-10 to 2015-16. Table 6 presents the summary statistics for the variables included in the empirical estimations. The estimations have been done for 62[6] NIC 3-digit industries. Hence, number of observations for seven years is 434.

Table 7 shows the estimation results for the industry level factors affecting TFPG. The rise in the ICT capital has shown a significantly positive impact on the total factor productivity at NIC 3-digit level. This implies that the indirect effect of growing ICT capital is helping the industries to perform better. This result is consistent with the findings of literature which has looked at the effect of ICT on output growth and productivity, both in Indian

[6] Aggregate TFPG for 7 years was 4.2 per cent based on 75 NIC codes. However, for the purpose of regression, only 62 codes have been included in the analysis that have data for all the years. This is the reason that the mean TFPG in Table 6 is higher than the aggregate TFPG of 4.2 per cent reported earlier.

context (Mitra et al, 2016 and Erumban and Das, 2016) and in cross-country context (Biagi, 2013; Venturini, 2009; Mahony and Vecchi, 2003).

Table 6
Summary Statistics of Variables used in Empirical Estimation

Variable	*No. of Observations*	*Mean*	*Std. Dev.*
TFPG	434	5.05	31.1
Contractual Labour Share	434	35.58	14.8
Imported Input Share	434	20.69	18.1
ICT Capital share	434	3.47	6.1

Source: Authors' calculations based on ASI data.

Table 7
Empirical Results of Effect on Estimated TFPG under Market Imperfection at Industry Level

Variables	*Dep. Var.: TFPG*	
	Model 1	*Model 2*
Contract Share	-0.43* (0.309)	-0.43* (0.310)
ICT Capital	1.46*** (0.371)	1.44*** (0.373)
Imported Inputs share	--	0.16 (0.262)
Year 2009	-6.38** (4.21)	-6.55** (4.22)
Constant	16.36* (11.4)	12.70* (12.7)
No. of Observations	434	434
R-Squared: Within	0.0546	0.0556
R-Squared: Between	0.061	0.1208

Note: Std. errors in parentheses.
***, **,* signify statistical significance at 1%, 2% and 5% level

Whereas, the rising share of contractual workers is adversely affecting the productivity with a significant negative coefficient. Our results are consistent with Sofi and Sharma (2015) who have explored the effect of contractualisation of workers in the Indian organized manufacturing sector for the period 1999-2008 at NIC 3-digit level for 28 industries.

We have also considered the share of imported inputs in total inputs as an explanatory variable. Global value chains in production which is a fallout of globalization and trade liberalization that has occurred over the years has enabled firms to source inputs from foreign suppliers. In our sample, industries such as electronic and electrical equipments,

measuring, testing and navigating instruments etc., motor vehicle parts etc, have a significant share of imported inputs in their production process.

6. Conclusion

The study estimated TFP growth for the post-2008 period for selected industries in the manufacturing sector at NIC 3-digit. Based on the theoretical framework provided by studies such as Abraham et al. (2009), Crepon et al. (2005), Blanchard and Giavazzi (2003) and Rodrik (1997) and Maiti (2013), the empirical estimation of TFPG and the industry level factors affecting TFPG have been undertaken in this paper. The theoretical models have incorporated market imperfection in labour and product market, thereby, modifying the traditional TFP estimation as Solow Residual. Any regulatory change that leads to distortions in the market needs to be taken account of as it would alter the total factor productivity growth.

Based on the empirical estimates, the study finds considerable industrial disparities in productivity growth in terms of TFP. Moreover, the modified TFPG estimates indicate the role played by market imperfections in affecting the conventional growth rates. In particular, the estimates have been found to be higher than the conventional Solow Residual at the industry group level in a number of cases. The estimates of bargaining power are found to be lower than those compared to the earlier estimates in Maiti (2013) for the Indian organised manufacturing case for 1998-2005. This observation is commensurate with the observation in recent years of a falling share in labour wage in total output in organized manufacturing sector. The study also found a statistically significant contribution of greater mechanization on TFPG while an adverse effect of the rising dependence of organised manufacturing on contractual labour.

Therefore, the role played by imperfections in labour and product market has important implications on determining the TFPG estimates. Secondly, the industry variation of productivity can be explained by the positive contribution of ICT in raising productivity and the adverse effect of growing contractualisation

References

Abraham F, Konings J, Vanormelingen S. (2009), "The effect of globalization on union bargaining and price-cost margins of firms", *Review of World Economy*, 145(1):13–36.

Abraham, Vinoj. & Sasikumar, S.K. (2017), "Declining wage share in India's organized manufacturing sector trends, patterns and determinants," *ILO Working Papers* 994975392702676, International Labour Organization.

Arup Mitra & Chandan Sharma & Marie-Ange Veganzones-Varoudakis, (2016), "Infrastructure, ICT and Firms' Productivity and Efficiency: An Application to the Indian Manufacturing," Post-Print halshs-01241639, HAL.

Biagi, F. (2013), 'ICT and Productivity: A Review of the Literature", *JRC Institute for Prospective Technological Studies,* Digital Economy Working Paper, 9.

Blanchard Olivier, Giavazzi Francesco (2003), "The macroeconomic effects of regulation and deregulation in goods and labor markets", *The Quarterly Journal of Economics*, 118(3):879–909.

Crépon, B., R. Desplatz, and J. Mairesse, 2010, "Price-Cost Margins and Rent Sharing: Evidence from a Panel of French Manufacturing Firms" (unpublished; CREST-ENSAE, France)

Das, Deb Kusum, Erumban, Abdul Azeez, Aggarwal, Suresh & Sengupta, Sreerupa. (2016), "Productivity Growth in India under Different policy regimes: 1980-2012", Dale W. Jorgenson, Kyogi Fukao and Marcel P. Timmer, *The World Economy: Growth or Stagnation?,* Cambridge University Press.

Deb, Arnab K. and Ray, Subhash C. (2013), "Economic Reforms and Total Factor Productivity Growth of Indian Manufacturing: An Inter-State Analysis", *University of Connecticut, Department of Economics Working Paper* 2013-04R.

Erumban, Abdul Azeez, & Das, Deb Kusum. (2016), "Information and communication technology and economic growth in India", *Telecommunications Policy*, *40*(5), 412-431.

Ghosh, Saibal (2010), "Economic reforms and manufacturing productivity: Evidence from India", *EERI Research Paper Series,* No. 32/2010, Economics and Econometrics Research Institute (EERI), Brussels

Goldar, B., Krishna, K.L., Aggarwal, S.C. Deb Kusum Das, Abdul Azeez Erumban, Pilu Chandra Das, (2017), "Productivity growth in India since the 1980s: the KLEMS approach", *Indian Economic Review,* 52: 37. https://doi.org/10.1007/s41775-017-0002-y

Goldar, Bishwanath and Suresh Chand Aggarwal (2010), "Informalization of Industrial Labour in India: Are labour market rigidities and growing import competition to blame?" *Working Papers id:3125*, eSocialSciences. Available at: https://www.isid.ac.in/~pu/conference/dec_10_conf/Papers/BishwanathGoldar.pdf

Goldar, Biswanath (2015), 'Productivity in Indian Manufacturing (1999–2011) Accounting for Imported Materials Input", *Economic and Political Weekly*, 50(35).

Gupta, Prachi. and Matthias Helble (2018), "Adjustment to Trade Opening: The Case of Labor Share in India's Manufacturing Industry" *ADBI Working Paper 845*. Tokyo: Asian Development Bank Institute. Available: https://www.adb.org/publications/adjustment-trade-opening-labor-share-india-manufacturing-industry

Hall, R.E. (1988), "The relation between price and marginal cost in U.S. industry", *Journal of Political Economy,* 96(5), 921-94.

Harrison, A.E. (1994), "Productivity, imperfect competition and trade reform. Theory and evidence", *Journal of International Economics,* 36, 53

Kathuria, V., Raj S.N., Rajesh, & Sen, K. (2010), "Organised versus unorganised manufacturing performance in the post-reform period", *Economic and Political Weekly*, 55-64.

Konings J., P. Van Cayseele and F. Warzynski (2001), "The Dynamics of Industrial Mark-ups in Two Small Open Economies: Does National Competition Policy Matter?" *International Journal of Industrial Organization* vol.19, pp. 841-859.

Konings J., P. Van Cayseele and F. Warzynski (2005), "The Effects of Privatization and Competitive Pressure on Firms' Price-cost Margins: Micro Evidence from Emerging Economies"; *Review of Economics and Statistics* vol.87(1), pp.124-134.

Kumar, Surender and Shunsuke Managi (2009), "Productivity and Convergence in India: State Level Analysis", *MPRA Paper*, Paper No. 23738, University Library of Munich, Germany.

Levinsohn, J. (1993), "Testing the imports-as-market-discipline hypothesis", *Journal of International Economics*, 35, 1-22.

Levinsohn J, Petrin A (2003), "Estimating production functions using inputs to control for unobservables", *The Review of Economic Studies,* Vol. 70, No. 2 (Apr., 2003), pp. 317-341.

Maiti, Dibyendu (2013), "Market imperfections, trade reform and total factor productivity growth: theory and practices from India", *Journal of Productivity Analysis*, Springer, vol. 40(2), pages 207-218, October.

Mitra, Arup (2016), "Productivity growth in India: determinants and policy initiatives based on the existing literature", *MPFD Working Paper* WP/16/08.

Olley S, Pakes A (1996), "The dynamics of productivity in the telecommunication equipment industry", *Econometrica* 64(5): 1263–1297

Rodrik, Dani (1997), "Has globalization gone too far?", Institute for International Economics, Washington D.C., Columbia University Press.

Singh, Harsha Vardhana (2017), "Trade Policy Reform in India Since 1991," B*rookings India Working Paper* 02, March 2017.

Sofi, I.A., & Sharma, P. (2015), "Labour Regulations, Contractualization and Industrial Performance: Three-dimensional Panel Evidences from Indian Manufacturing Sector", *South Asia Economic Journal*, *16*(1), 122-144.

Venturini F. (2009), "The Long-Run Impact of ICT", Empirical Economics, Springer, vol. 37(3), pp. 497- 515. O'Mahony, M., & Vecchi, M. (2003). *Is There an ICT Impact on TFP? A Heterogeneous Dynamic Panel Approach* (No. 219). London: National Institute of Economic and Social Research.

Virmani, Arvind and Danish A. Hashim (2011), "J-Curve of Productivity and Growth: Indian Manufacturing Post-Liberalisation," *IMF Working Paper* No. WP/11/163, International Monetary Fund.

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