



Contents lists available at ScienceDirect

## Economic Modelling

journal homepage: [www.elsevier.com/locate/econmod](http://www.elsevier.com/locate/econmod)

# Productivity growth and efficiency change: Comparing manufacturing- and service-based firms in India<sup>☆</sup>

Badri Narayan Rath

Department of Liberal Arts, Indian Institute of Technology, Hyderabad, India

## ARTICLE INFO

### JEL codes:

L60  
L80  
O47  
C33

### Keywords:

TFP growth  
Technical change  
Technical efficiency change  
DEA  
Cross-sectional dependence  
Feasible generalised least square

## ABSTRACT

This paper compares total factor productivity (TFP) growth and its components for both manufacturing- and service-based firms in India for the period 2008 to 2014. TFP growth based on data envelopment analysis shows higher productivity for the service sector as compared to the manufacturing sector. Further, decomposition of TFP growth results indicates that both the manufacturing and services sectors are driven mainly by technical change. Comparing TFP growth at the sub-sectoral level shows that mean TFP growth is highest in the case of IT firms as compared to the chemical, textile and trade industries. Further, the determinants of TFP growth using a feasible generalised least squares model indicate that capital intensity, capital turnover ratio and debt significantly affect productivity growth in the case of manufacturing. However, none of the determinants except capital intensity affect productivity growth in the services sector. From a policy standpoint, this paper suggests greater emphasis on both the service and manufacturing sectors despite some variability among firms.

## 1. Introduction

This paper examines total factor productivity (TFP) growth by comparing manufacturing- versus service-based firms in India. My approach is threefold. In the first stage, I estimate TFP growth using a firm-level data set spanning 2008–2014. The annual data cover 876 Indian firms, of which 666 firms are from the manufacturing sector and 210 firms are from the services sector. Further, this paper broadly divides the 876 sample firms into four sub-categories – chemical, textile, IT and trade – based on their contribution of output, employment and trade shares, and compares their productivity growth.

In the second stage, I decompose TFP growth into technical change and technical efficiency change using data envelopment analysis (DEA) and examine whether TFP growth in manufacturing- and service-based firms in India is driven mainly by technical change or technical efficiency change. The advantage of the DEA technique is that it not only decomposes TFP growth into technical change or technical efficiency change, but also shows whether the firm's technical efficiency is due mainly to pure technical efficiency or scale efficiency. Since these four sub-sectors are heterogeneous in nature, the procedure of using the inputs as well as producing output will vary among these four sub-

sectors.

My third approach examines the determinants of TFP growth for both manufacturing- and services-based firms. Examination of the determinants of TFP growth is an important step toward understanding the significant factors that affect the productivity of manufacturing firms vis-à-vis services firms.

I compare TFP growth between manufacturing and services sector firms for the following reasons. First, comparisons of productivity growth across countries, industries and firms are central to achieving high economic growth (see, for example Costello, 1993; Bernard and Jones, 1996; Bee et al., 2003; Tomiura, 2007). Since there is increasing awareness that services and manufacturing sectors are strongly inter-related (see, Baumol, 1967; Stollinger et al., 2013), examination of productivity growth and its composition not only help in understanding which sector (manufacturing or services) performs better, but also tests whether the hypothesis of 'Baumol disease' is valid for the Indian services sector. According to Baumol (1967), increasing services intensity leads to lower productivity and increases the share of services in GDP, causing overall productivity growth to stagnate, known as 'Baumol disease'. Though the present paper does not examine whether lower productivity in the services sector causes declining overall

<sup>☆</sup> The author gratefully acknowledges the suggestions of Professor Russell Smyth, Professor Paresh Kumar Narayan and other participants of Economic Modelling Special Issue Conference, Melbourne, June 2017. This manuscript is a part of the project entitled 'Productivity, efficiency and economic growth: comparing manufacturing-and-service-based firms in India' sponsored by the ICSSR, MHRD, Government of India. The author acknowledges financial support from ICSSR. The assistance provided by Mr. Pradipta Kumar Sahoo is gratefully acknowledged.

E-mail address: [badri@iith.ac.in](mailto:badri@iith.ac.in).

<http://dx.doi.org/10.1016/j.econmod.2017.08.024>

Received 16 August 2017; Received in revised form 23 August 2017; Accepted 23 August 2017  
0264-9993/ © 2017 Elsevier B.V. All rights reserved.

productivity in the Indian economy, it tests whether services sector firm TFP growth declines particularly after the global financial crisis, as services sector GDP share to total GDP for India kept increasing.

Second, there is ongoing debate among policy makers in India as to whether the services or manufacturing sector represents the real engine for economic growth (see, for example Amirapu and Subramanian, 2015; Dehejia and Panagariya, 2010; Yew, 2014–15). To determine which sector is the real engine of economic growth in the aggregate economy, it is important to examine the economic performance of disaggregated sectors at the micro level. The economic performance of any industry depends on various key indicators, like gross sales or output, employment, R & D, innovation, exports, productivity, technical efficiency and profitability. This paper measures the economic performance of firms by confining itself to productivity growth and its decomposition into technical change and technical efficiency change.

Though there is sparse literature comparing productivity growth between manufacturing and service sectors in other countries, there is empirical evidence that links R & D, innovation, exports and productivity growth (see, for example Griliches, 1958; Mansfield, 1965; Frantzen, 1998; Klette and Kortum, 2002). Forsman (2011) examines firm performance by looking at innovation capacity and innovation development in small enterprises, comparing manufacturing and services sectors. There are few other studies which compare manufacturing versus services firms with respect to innovation, firm value and business performance (see, for example Prajogo, 2006; Ehie and Olibe, 2010; Wang et al., 2016). There is a large body of literature examining productivity, wages and employment growth of Indian manufacturing (see Vashisht, 2016; Mitra et al., 2016; Goldar and Sadhukhan, 2015; Bhattacharya and Narayan, 2015; Bollard et al., 2013; Kathuria et al., 2013; Bhattacharya et al., 2011; Rath and Madheswaran, 2010; Madheswaran et al., 2007; Besley and Burgess, 2004). Other studies analyse issues pertaining to R & D spillovers, technological adoption and foreign direct investment (FDI), linking these factors with enhancing productivity growth of Indian manufacturing (see Siddharthan, 1992; Raut, 1995; Basant and Fikkert, 1996; Ray and Bhaduri, 2001; Hasan, 2002; Kathuria, 2002; Kumar and Aggarwal, 2005; Fronco and Sasidharan, 2010; Sasidharan and Kathuria, 2011). However, there are few studies on the productivity and growth prospects of the Indian services sector (see Das et al., 2013; Eichengreen and Gupta, 2011; Dehejia and Panagariya, 2010; Banga, 2006; and Gordon and Gupta, 2004). There are few studies comparing the manufacturing and services sectors in India (see Amirapu and Subramanian, 2015; Dehejia and Panagariya, 2010; Yew, 2014–15). A few studies measure the productivity growth of India using growth accounting and find that India's TFP growth is driven mainly by services (see Bosworth et al., 2007). Dasgupta and Singh (2005), by evaluating employment, examine whether the services sector is the real engine of economic growth.

However, to my knowledge, no existing study compares productivity growth and its decomposition between manufacturing and services sector firms. Our results based on productivity growth and technical efficiency identify the sectors at a disaggregated level; the government could then target these industries and provide special concessions to these firms in terms of subsidies for imported materials or tax rebates to encourage them to create more employment as well as more exports in the long run.

Third, the services sector in India plays an important role not only because of its high and growing share of total GDP of more than 60 per cent, but also because it makes an important contribution to India's total exports. In contrast, the Indian manufacturing sector has witnessed a stagnant share of total GDP of around 16 per cent and a declining share of employment creation over the past five decades (Economic Survey, Ministry of Finance, Government of India). Since there is a shift in the process of economic growth because of structural changes in the Indian economy, examining the determinants of productivity growth between manufacturing and services sectors is imperative. The rates of change in productivity are fundamental

measures of comparative economic performance and play a crucial role in competition (Tinbergen, 1942; Kendrick, 1956; Solow, 1957). Therefore, identifying the key factors for enhancement of productivity growth would help firms to emphasize those factors that boost their productivity to sustain higher growth in the long run.

To determine which sector (manufacturing versus services) is more productive, I measure productivity growth and decompose it into technical efficiency and technical progress using the DEA technique, by classifying firms on a sectoral basis (manufacturing versus services). This exercise helps uncover whether there is scope for increasing output by employing existing resources more effectively, or whether there is need for higher investment for the frontier to shift and accelerate growth in India. Further, this paper examines the key determinants of productivity growth for both the manufacturing and services sectors using a feasible generalised least squares (FGLS) model.

These approaches offer the following new insights. First, this study finds that mean TFP growth was higher for service-based firms as compared to manufacturing firms. Second, overall TFP growth in manufacturing declined over the period 2011–2014 as compared to the services sector. Third, TFP growth in both the manufacturing and services sectors is driven mainly by technical progress. Fourth, comparing TFP growth at the sub-sectoral level shows that mean TFP growth is highest for IT firms as compared to the chemical, textiles and trade industries. Finally, results based on determinants of TFP growth further indicate that capital intensity, capital turnover ratio and debt significantly affect TFP growth in the case of manufacturing. However, I find weak results for the services sector.

The remainder of this paper proceeds as follows. Section 2 describes and compares the overall trends and growth performance of the manufacturing and services sectors in India. Section 3 presents the methodology and data. Section 4 illustrates the econometric results, and finally, Section 5 sets forth the study conclusions.

## 2. Overview of India's manufacturing and services sectors

Post-independence development plans in India have emphasized industrialisation as a very important instrument for sustained growth. As a result, in the Eleventh Five Year Plan (2007–2012), the annual average growth rate of manufacturing (7.7 per cent) was lower than the country's overall economic growth rate (8 per cent), but the overall growth performance of the services sector was 9.7 per cent. Over the period 1965 to 2015, the share of gross value added by the services sector to India's GDP has consistently increased from 30 per cent in 1965 to 66.1 per cent in 2015–16 (Economic Survey, 2015–16). But at the same time, the manufacturing sector's share was only 14 per cent in 1965 and around 17 per cent in 2015–16, increasing by just 3 percentage points over a period of 50 years. Similarly, the share of manufacturing exports in India's total trade has declined, whereas the trade in services has increased substantially. Although India's economic growth is driven mainly by the services sector, the 'Make in India' programme launched by the Prime Minister Narendra Modi in 2014 further emphasizes the importance of the manufacturing sector. A knowledge-based economy may not be sustainable for a longer period unless it is reasonably supported by a growing manufacturing economy. Moreover, a services economy cannot continue to thrive on a long-term basis for a country like India, where over 80 per cent of the population is educated below matriculation. A UNIDO (United Nations Industrial Development Organization) study on Indian manufacturing estimates that India needs to create 7 to 8 million new jobs each year outside agriculture to remain at its current unemployment level of 7 per cent. Thus, manufacturing jobs are ideal for workers transitioning out of agriculture, as services jobs require high levels of education and professionalism. The National Manufacturing Policy (NMP) (2011) was announced by the government to enhance the global competitiveness of the Indian manufacturing sector. The NMP aims to increase manu-

Download English Version:

<https://daneshyari.com/en/article/7347311>

Download Persian Version:

<https://daneshyari.com/article/7347311>

[Daneshyari.com](https://daneshyari.com)