Growing Services, Stagnant Manufacturing: Sectoral Resource Misallocation in India

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Abstract

While India’s services sector output per worker is high and growing rapidly over the past two decades, manufacturing output per worker has remained stagnant at a relatively low level. This is puzzling because both sectors operate in similar economic and institutional environments and the pattern is not replicated in other developing countries. Using firm-level data for India, this paper shows that the extent of resource misallocation is significantly higher in manufacturing than in services. We also run counterfactual experiments to evaluate TFP gains in manufacturing when misallocation in the sector is reduced to the level of services.

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1 Introduction

Between 1970 and 2013, Indian services share of the country's GDP grew from 34% to 53% while that of manufacturing grew from 19% to only 23% (see Figure 1(a)). Yet, employment has risen faster in manufacturing than in services; it grew 9 percentage points over 1994-2012 compared to 4 percentage points in services (see Figure 1(b)). The result, as Figure 2 shows, is that the aggregate labor productivity (output/employment) has grown rapidly in services while stagnating in manufacturing.

The pattern of growth in services simultaneously with stagnation in manufacturing is puzzling because both sectors operate in the same economic environments and under similar government regulations. Moreover, the high productivity of services relative to manufacturing makes India an outlier in international comparisons. Figure 3 contrasts the relative productivity of services in India to that in several other Asian, Latin American and OECD countries. While other Asian and Latin American countries have lower relative service productivities than OECD countries, none of them sees either the levels or the growth of relative service productivity as witnessed in India, where services are nearly four times as productive as manufacturing in 2012.

This paper examines why structural transformation in India has followed this pattern. Clearly, there are factors conducive to productivity growth in services while manufacturing growth remains sluggish. We argue that the remarkable differences between services and manufacturing productivity levels and growth are attributable to significantly greater resource misallocation in manufacturing than in services. It is possible that similar laws, lack of credit, and poor infrastructure prove to be more severe impediments to manufacturing firms than to service firms. We provide intuition for the mechanisms underlying this asymmetric influence of regulations and structural factors.

We build our argument in two steps. First we carry out a basic accounting exercise to measure the distortions in the two sectors and examine the TFP gains when the distortions are equalized in both sectors. While this exercise does not inform us about the role of specific
policies, it quantifies the importance of several distortions in causing misallocation of resources across and within manufacturing and services sectors. To the best of our knowledge, this is the
first study to measure the degree to which resource misallocation differs between services and manufacturing in India.

Results from the accounting exercise then motivate a quantitative general equilibrium model which we use to examine why similar regulatory and structural environments have unequal effects in the two sectors and why workers move relatively more into the less productive manufacturing sector.

While a large number of studies have examined the causes behind the sluggish growth of Indian manufacturing, there is little previous work seeking to explain why services have grown so fast in comparison, even though they operated in a similar environment as manufacturing firms. Gupta (2008) and Dehejia and Panagariya (2012) are two noteworthy exceptions. Gupta (2008) argues that pro-labor laws combined with input quota regulations reduced productivity growth considerably more in manufacturing than in services as the former were more dependent on intermediate inputs. These laws combined with high inflation and lack of credit availability lead to non-optimal factor combinations being used in manufacturing firms, but not so much in services firms. Dehejia and Panagariya (2012) instead attribute the spectacular growth in services to input demand from a growing, albeit not as fast, manufacturing sector. Neither of these studies, however, measures the extent of misallocation in the two sectors. Hsieh and Klenow (2009) do measure the extent of resource misallocation in Indian manufacturing and compare it to that in Chinese manufacturing. They find that reallocating resources to match the benchmark allocation in the United States lead to 40-60% TFP gains. By measuring the potential misallocation in both services and manufacturing, our study advances our understanding of how the same economic distortions can contribute differently to dampen productivity and its growth in the two sectors.

Among those that focus solely on the manufacturing sector (see, for example, Aghion et. al. (2008), Besley and Burgess (2004) and Hasan, Mitra, and Ramaswamy (2007)), the most commonly cited underlying cause is the stringent labor regulations that make hiring and firing workers very difficult for businesses. However, these laws, also apply to services. Thus, while they may explain low productivity in manufacturing, they cannot explain why services that are also under the same laws, are thriving in terms of productivity.

A few studies also do growth accounting and find that India’s TFP growth is driven mainly by services (see Bosworth, Collins, and Virmani (2007) and Verma(2012)). This paper complements these studies by examining why services have driven India’s growth.

2 Accounting Framework

We begin with a basic accounting exercise. We first describe a simple profit maximization problem of a monopolistically competitive firm that we take to the data to measure and compare the degree of misallocation in the manufacturing and services sectors. The results of this exercise then motivate a general equilibrium model that we develop in section 5.
The economy consists of two sectors: services, with aggregate output $Y_s$, and manufacturing, with aggregate output $Y_m$. Let the total output in the economy be:

$$Y = Y_s^\theta Y_m^{1-\theta}$$  \hfill (2.1)

Each sector consists of firms and the sectoral output is a CES aggregate of the differentiated products of these monopolistically competitive firms:

$$Y_j = \left[ \sum_{i=1}^{N_j} Y_{ji}^\sigma \right]^{\frac{1}{\sigma}}$$  \hfill (2.2)

where $j = s, m$, $i = 1, ..., N_j$ denotes firms, and $N_j$ is the total number of firms in sector $j$. Firms produce output using capital, $k$, and labor, $l$, and the following production function:

$$Y_{ji} = A_{ji} l_{ji}^{\alpha_{ji}} l_{ji}^{1-\alpha_{ji}}$$  \hfill (2.3)

Assume $Y$ to be the numeraire good, so that its price, $P = 1$. Let the sectoral output prices be $P_s$ and $P_m$, and firm product prices be $P_{ji}$ for $i = 1, ..., N_j$ and $j = s, m$.

Optimization problem for the sector:

$$\max_{Y_{ji}} = P_j Y_j - P_{ji} Y_{ji}$$

subject to the sectoral aggregate output function, given by equation 3.1.2. This yields the following first order condition:

$$P_{ji} = P_j Y_j^{1-\sigma} Y_{ji}^{\sigma-1}$$  \hfill (2.4)

Firms face policy distortions in their operations:

We focus on two distortions by introducing wedges on output and labor ($\tau_{ji}^Y$ and $\tau_{ji}^l$, respectively). The output wedge can reflect such things as underdeveloped infrastructure and corruption. The labor wedge can reflect the complex set of labor regulations. As explained by Hsieh and Klenow (2009), including a wedge on labor also captures distortion on capital input as what matters is their relative marginal products.

The profit maximization problem faced by firms is:

$$\max_{l_{ji}, k_{ji}} \pi_{ji} = (1 - \tau_{ji}^Y) P_{ji} Y_{ji} - w(1 + \tau_{ji}^l) l_{ji} - r k_{ji}$$

subject to the production function in equation (3) and where $w$ represents labor wage and $r$ represents the rental rate on capital.

This yields the following two first order conditions:
\( w(1 + \tau_{ji}) = \sigma(1 - \alpha_j)(1 - \tau_{ji}Y)P_{ji}A_{ji}k_{ji}^{\alpha_j}l_{ji}^{-\alpha_j} \tag{2.5} \)

\[ r = \sigma\alpha_j(1 - \tau_{ji}Y)P_{ji}A_{ji}k_{ji}^{\alpha_j-1}l_{ji}^{1-\alpha_j} \tag{2.6} \]

Dividing the first FOC by the second, we get:

\[ (1 + \tau_{ji}) = \frac{1 - \alpha_j}{\alpha_j} \frac{rk_{ji}}{wl_{ji}} \tag{2.7} \]

Using the production function for firms (equation (3)) and rearranging the second FOC, we get:

\[ (1 - \tau_{ji}Y) = \frac{1}{\sigma\alpha_j} \frac{Rk_{ji}}{P_{ji}Y_{ji}} \tag{2.8} \]

These last two equations identify the labor and output wedges.

### 3 Data

Our main source of data on firms in the manufacturing and services sectors is the Prowess database provided by the Centre for Monitoring the Indian Economy (CMIE). These data include longitudinal financial information on all publicly listed and unlisted firms in India over the period 1989-2013. While these data do not cover informal sector firms, they do account for a large fraction of the economic activity; according to CMIE, these firms account for about 70% of the industrial output, 75% of corporate taxes, and 95% of excise taxes collected by the government.

For our purposes, we use information on the following variables from these data. To measure firm expenditure on labor, we use wage-bills.\(^1\) The value of the stock of plant, machinery, computers, and electrical equipment net of depreciation is our measure of capital. Setting the rental rate on capital as 0.10, we get firms’ expenditure on capital. We use sales as the measure of output of the firm. Share of labor is measured as wage-bill relative to sales, and the share of capital is measured as one minus the share of capital.

\(^1\)Data on number of employees is missing for a majority of the firms in the sample.
References


