Input Elasticity of Output & Returns to Scale of Indian Manufacturing During Pre & Post Financial Crisis

Surendranath Mandi, Devkumar Nayek, Maromiya Das, Ipsita Mitra, Shreya Samui & Shrestha Dutta

The study estimates input elasticities of output and returns to scale of the organized Indian manufacturing industries during 1998-99 to 2017-18, during the pre-economic crisis period (1998-99 to 2007-08) and the post-economic crisis period (2008-09 to 2017-18) using the familiar Cobb-Douglas type production function. The results show that there is an upward trend in the labor elasticity of output (e_L) and returns to scale parameter during the study period (1998-99 to 2017-18) and labor elasticity of output is lying above the capital elasticity of output during the post-economic crisis period (2008-09 to 2017-18) while the same was lying below the capital elasticity of output (e_K) during the pre-economic crisis period (1998-99 to 2007-08).

Surendranath Mandi(E-mail: mandisurendranath @gmail.com), ***Devkumar Nayek, Maromiya Das, Ipsita Mitra, Shreya Samui & Shrestha Dutta*** are from Midnapore College (Autonomous), Midnapore, Dist. Paschim Medinipur (W.B.), India, 721101

Introduction

India's organized manufacturing sector was indeed a bright spot in country's economic growth during a good part of the 2000s.Rapid growth was registered in this sector, particularly in the manufacture of metal products, machinery equipment and automobiles. But the global financial crisis (world economic crisis) of the 2007-08 hit the industrial sector of the countrydrastically. However, India's organized manufacturing sector re bounded impressively after it slowed down during 2007-2008 at the height of the global economic crisis. The recovery was led in particular by the automobile industry, with the domestic production of passenger cars rising from 1.5 million in 2008-09 to 1.9 million in 2009-10. But the employment and unemployment surveys conducted by the National Sample Survey Organization (NSSO) shows that the total manufacturing employment in the country declined absolutely dur-

ing the last decade although the level of output has grown significantly. In this scenario of the organized manufacturing sector in India we seek to investigate the conditions of the input elasticities of output and the returns to scale parameter operating in this sector in India during the last few decades.

Review of Literature

Narayana (2010) attempts to study input elasticity of output and nature of returns to scale in the manufacturing sector of Andhra Pradesh. In his study, he tries to find out the elasticity of substitution between the two factor inputs, if it is unity or not by using unrestricted Cobb-Douglas, restricted log-linear and CES production functions between the periods of 1985-86 and 2005-06. His study found that the output elasticity of that particular state manufacturing sector is greater than unity with respect to capital and returns to scale were increasing which indicates the operation of increasing returns to scale in that state. The elasticity of output per labor with respect to capital per labor also found to be more than unity which states about the higher productivity of accumulation of capital per labor in the manufacturing sector of the state.

Liu Anguo, Gao Ge, and Yang Kaizhong (2011) gave a brief introduction to the theoretical background and conceptualization of returns to scale and differences in theoretical and policy implications due to different assumptions of returns to scale. We know the importance of the assumption of increasing returns to scale in the manufacturing sectors, which was the basis to adopt the New Economic Policy. The study used the data of 17 selected sectors within manufacturing industry in China for the purpose of empirical investigation and they found increasing returns to scale in each of the 17 selected manufacturing sectors, which lend empirical support for the assumption of increasing returns to scale within the New Economic Policy framework. On the contrary, they have found zero or very low or even negative technological change, experienced by most of the selected 17 manufacturing sectors. They came to the tentative conclusion that the economic growth in Chinese manufacturing sector over the recent two decades has largely been driven by increasing returns to scale rather than technological progress.

Muniyandi and Vadivel (2016) found various changes in the industrial sector due to the new industrial policy in India and stressed on the need of increasing industrial productivity for achieving higher efficiency in the use of resources in the coming years. They have studied the returns to scale of the manufacturing industries in Tamil Nadu. Their study is fully based on the secondary data sources taken from Annual Survey of Industry (ASI) between 1980-81 and 2007-08. Their study has found the operation of increasing returns to scale in the manufacturing industries of Tamil Nadu and have also found the contribution of the manufacturing industries in the total state income of Tamil Nadu in a sizeable percentage. Authors suggested the essentiality to induce manufacturing industrial growth of the state,

proper execution, efficient administration and optimum use of scarce resources for attaining sustainable growth of the country.

Wei Gao and Matthias Kehrig (2017) have built a model on the entry and exit of firms and have shown how returns to scale shape firm survival, the equilibrium productivity, size distribution, and firm concentration. In their model, they found, "High productivity dispersion and high concentration ratios need not reflect inefficiencies when returns to scale are strongly decreasing". They used U.S. Census of Construction and Manufacturing, for applying a broad set of structural and reduced form of estimation techniques to establish data and to assess returns to scale and productivity dispersion across establishments. Industries with lower returns to scale are characterized by higher productivity dispersion and lower concentration ratios are predicted in the model. They have concluded from their research that the returns to scale are 0.96 on an average, but range from 0.86 in non-metallic minerals to 1.3 in semiconductors. It tends to be the highest in the case of the durable manufacturing, medium in non-durable manufacturing and lowest in the production of housing. According to them "an economy characterized by such differences in its sectoral production structure will exhibit long-run structural change away from construction and non-durable manufacturing, as in the data, and endogenously replicate the cyclical behavior of relative prices in the U.S. relative durable prices are countercyclical while relative housing prices are procyclical".

Abraham and Sasikumar (2017) show the continuous fall in labor share due to various factors like income equality, contraction of demand, and slowdown of economic growth in many developed and developing economies in the world since the 1980s. Their study mainly focuses on to understand the reasons of such declining labor shares in India. They used Annual Survey of Industries data which determines the patterns, trends and the determinants of declining labor shares in the organized manufacturing industries in India from 1980-81 to 2012-13. Three major issues have been raised from their study. They are:(1) 'It undertakes a comprehensive analysis of the trends and patterns in factor payments in the organized manufacturing sector. Long term trends are explored across dimensions such as states, size classification and industrial classification'. (2) 'The various sources contributing to these declines in wage shares are identified through decomposition and shift share analyses; and (3) 'Factors that explain the change in wage shares are identified through a first-difference regression analysis'.

Sectoral aggregate data and plant level data are two datasets taken by Arjun Jayadev and Amay Narayan (2018) to show the decline in labor share in every sector especially in developed countries between 1983 and 2014. They have shown no stability in labor share, though it started from 2005, the rate of stabilization was very low (around 8 to 10 percent). So, when they started to identify the reason of such a situation, they found some solid points like–increased capital intensity, greater in-formalization, greater

privatization, and increasing productivity in larger firms. They found these reasons were so strong that others like regional variations in the labor share etc. were of little influencing in comparison.

They found some solid points like– increased capital intensity, greater in-formalization, greater privatization, and increasing productivity in larger firms.

Another research by Soumita Chakraborty (2018) makes us aware of the relationship between real wage and labor productivity and also included India's manufacturing sector's wage share and labor's terms of trade at both aggregated and disaggregated levels, during the post reform period. Her empirical analysis revealed the neutralization of the effect of increasing labor productivity due to declining wage share, which was resulting in stagnant wage rate growth in the organized manufacturing industry. The absence of link between productivity and real wage might be largely because of bargaining power and structural problems, including high unemployment, low wages, growing contractualization of labor force and larger share of the informal sector in the Indian manufacturing sector. She suggested that some government policy measures to link productivity with real wage growth would bring the economy bounce back.

The study by Dibyendu Maiti, (2019) showed the sharp decline in the labor share of Indian formal industries due to trade; from around 30% in 1980 to less than 10% in 2014. The study shows how the bargaining power has reduced because of increased use of contract workers in all major states in India, due to decline in strikes and lockouts and reduced labor time lost from disputes per factory. He derived the mark-up and bargaining power affecting the labor share and the resultant productivity in his research paper to estimate the influence of trade. He has applied on a 3-digit level of industrial data over major states between 1998 and 2014 to regress the proxy for productivity on trade share along with its interaction terms capturing market imperfections. The research confirmed the dampening of bargaining power of labor, due to which the labor share has reduced and productivity raised. The adverse effect of specialization in the presence of unions will remain the same and won't be dominated even if the joint effects of market size and competition arise out of trade. He found, "The degree of specialization or comparative advantage that appeared due to the increased market share of the most productive firms, who require fewer workers, thereby reducing the demand for workers with the trade". The paper showed the weakening of bargaining power because of dropping in demand and the shifting away of distributive share from workers. But according to him, one thing that can combat such adverse effects of trade to a large extent, is the competitive policy encouraging entry.

Objective of the Study

The principal objectives of our study are:

1. To estimate input elasticities of output, i.e., labor elasticity of output (e_L)

and capital elasticity of output (e_K) during the period from 1998-99 to 2017-18 where we have considered labor (L) and capital (K) as the only two factors in our study;

2. To estimate returns to scale (RTS) parameter (e_L+e_K) and to examine whether there exists constant returns to scale (CRS) in the Indian manufacturing sector during the study period (1998-99 to 2017-18);

3. To show the movement of labor elasticity of output (e_L) and capital elasticity of output (e_K) vis-a-vis returns to scale (RTS) during the entire study period (1998-99 to 2017-18), pre-economic crises period (1998-99 to 2007-08) and post-economic crises period (2008-09 to 2017-18) and to make a comparative study of them during these periods.

Data & Variable

The study is based on the data collected from various issues of Annual Survey of Industries (ASI) published by Central Statistical Organization (CSO), Ministry of Statistics and Program Implementation, Government of India, New Delhi for the period 1998-99 to 2017-18. The variables used in this exercise are output and labor and capital inputs. Gross value added has been taken as the measure of output. The use of gross value added as output encouraged the exclusion of raw materials as input variables in the model that might enhance the role of labor and capital in the growth of manufacturing industries. It may appear that net value added might have been a better measure of output, but since the depreciation figures are not reliable as the entrepreneurs often provide us with inflated figures in order to evade tax-laws, or, to take advantage of tax exemptions in the form of depreciation allowances, we preferred gross value added as a measure of output to net value added. Number of workers is used as the measure of labor input. Since the workers have a significant contribution on the production of output of the manufacturing industries number of workers is preferred to number of employees. Gross fixed capital stock has been taken as the measure of capital input in this study.

Methodology

The results are obtained by estimating a production function which is of Cobb-Douglas type. The Cobb–Douglas production function, in its stochastic form, is expressed as

$$Y_i = \beta_1 L_i \beta_2 K_i \beta_3 e^{u}{}_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where

Y= output

L= labor input

K= capital input

u = stochastic disturbance term

e = base of natural logarithm

From equation (1) it is clear that the relationship between output (Y) and the two inputs (L & K) is nonlinear.

However, if we log-transform this model, we obtain

$$\ln Y_i = \ln \beta_1 + \beta_2 \ln L_i + \beta_3 \ln K_i + u_i = \beta_0 + \beta_2 \ln L_i + \beta_3 \ln K_i + u_i \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

where $\beta_0 = \ln \beta_1$.

Thus written, the model is linear in the parameters β_0, β_2, and β_3 and is therefore a linear regression model. Note that, though, it is nonlinear in the variables output (Y) and inputs (L& K) but linear in the logs of these variables. In short, equation (2) is a log-log, double-log, or log–linear model, the multiple regression counterpart of the two-variable log–linear model.

Further, β_2 is the (partial) elasticity of output with respect to the labor input, that is, it measures the percentage change in output for, say, a 1 percent change in the labor input, holding the capital input constant. It is also known as labor share of output if the said factor of production is paid according to its productivity .Likewise, β_3 is the (partial) elasticity of output with respect to the capital input, holding the labor input constant. It is also known as capital share of output when the said factor is paid according to its productivity.

Further, the sum $(\beta_2 + \beta_3)$ gives information about the returns to scale, that is, the response of output to a proportionate change in the inputs. If this sum is 1, then there are constant returns to scale (CRS),that is, doubling the inputs will double the output, tripling the inputs will triple the output, and so on. If the sum is less than 1, there are decreasing returns to scale (DRS)-doubling the inputs will less than double the output. Finally, if the sum is greater than 1, there are increasing returns to scale (IRS)-doubling the inputs will more than double the output.

Analyses of Results

We have estimated the Cobb–Douglas production function in order to obtain labor elasticity of output, capital elasticity of output and returns to scale and the results are presented in Table 1.These are the results for the data of the Indian manufacturing sector of 25 states and Union Territories for the years 1998-99 to 2017-18.Assuming that the model (2) satisfies the conditions of the classical linear regression model, we have obtained the estimated regression by the familiar OLS method.

To obtain labor elasticity of output (β_2), capital elasticity of output (β_3) and returns to scale $(\beta_2 + \beta_3)$, we differentiate equation (2) partially with respect to the log of each input variable.

Therefore, $\delta \ln Y / \delta \ln L = (\delta Y / \delta L)(L/Y) = \beta_2$, which, by definition, is the elasticity of Y with respect to $L(e_L)$ and $\delta \ln Y / \delta \ln K = (\delta Y / \delta K)(K/Y) = \beta_3$, which is the elasticity of Y with respect to $K(e_K)$.

The estimated result for the year 1998-99 is summarized as

$$\begin{array}{lccc} \ln Y_i = & 3.445 + & 0.503 \ln L_i + & 0.368 \ln K_i \\ & (0.768) & (0.120) & (0.117) \\ t = & (4.483) & (4.204) & (3.137) \end{array}$$

$R^2 = 0.91$ ..... (3)

From Equation (3) we see that in the Indian manufacturing sector for the year 1998-99, the output elasticities of labor and capital were 0.503 and 0.368respectively. In other words, in the 25 Indian states and Union Territories, holding the capital input constant, a 1 percent increase in the labor input, led on the average to about a 0.50 percent increase in the output. Similarly, holding the labor input constant, a 1 percent increase in the capital input led on the average to about a 0.37 percent increase in the output. Adding the two output elasticities, we obtain 0.87, which gives the value of the returns to scale parameter. However, we are not sure whether 0.87 is approximately equal to one, i.e., whether there exist CRS in the Indian manufacturing sector during this year.

From a purely statistical viewpoint, the estimated regression line fits the data quite well. The R^2 value of 0.909 means that about 91 percent of the variation in the (log of) output is explained by the (logs of) labor and capital. The estimated standard errors were used to test hypotheses about the "true" values of the parameters of the Cobb–Douglas production function for the manufacturing sector of the Indian economy.In the same way we obtained the estimated results for the remaining19 years also. The estimated results are found to be statistically significant too. The results are summarized in Table 1.

Table 1: Input Elasticity of Output & Returns to Scale

YEAR	e_L	Sig.	e_K	Sig.	(RTS=e_L+e_K)	Nature of RTS
1998-1999	0.503	0.000	0.368	0.005	0.871	DRS
1999-2000	0.378	0.009	0.477	0.001	0.855	DRS
2000-2001	0.389	0.002	0.507	0.000	0.896	DRS
2001-2002	0.425	0.002	0.466	0.000	0.891	CRS
2002-2003	0.401	0.002	0.516	0.000	0.917	CRS
2003-2004	0.409	0.001	0.497	0.000	0.906	CRS
2004-2005	0.367	0.004	0.542	0.000	0.909	CRS
2005-2006	0.444	0.000	0.422	0.000	0.866	DRS
2006-2007	0.523	0.000	0.359	0.000	0.882	DRS
2007-2008	0.529	0.000	0.350	0.000	0.879	DRS
2008-2009	0.445	0.000	0.411	0.000	0.856	DRS
2009-2010	0.343	0.001	0.509	0.000	0.852	DRS
2010-2011	0.558	0.000	0.326	0.001	0.884	DRS
2011-2012	0.642	0.000	0.284	0.002	0.926	CRS
2012-2013	0.612	0.000	0.316	0.000	0.928	CRS
2013-2014	0.659	0.000	0.287	0.001	0.946	CRS
2014-2015	0.629	0.000	0.311	0.003	0.940	CRS
2015-2016	0.715	0.000	0.212	0.029	0.927	CRS
2016-2017	0.740	0.000	0.201	0.019	0.941	CRS
2017-2018	0.618	0.000	0.307	0.000	0.925	CRS

Source: Authors' calculation

Fig.1 Movement of e_L, e_K & RTS During the Entire Study Period (1998-99 to 2017-18D)

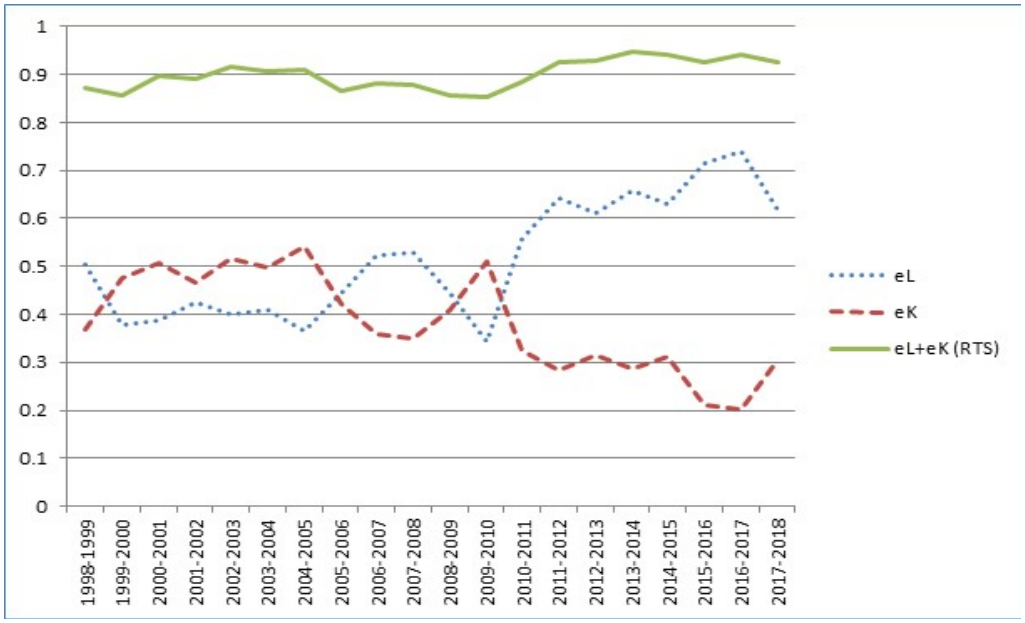

Fig.2 Movement of e_L, e_K & RTS During the Pre-economic Crisis Period (1998-99 to 2007-08)

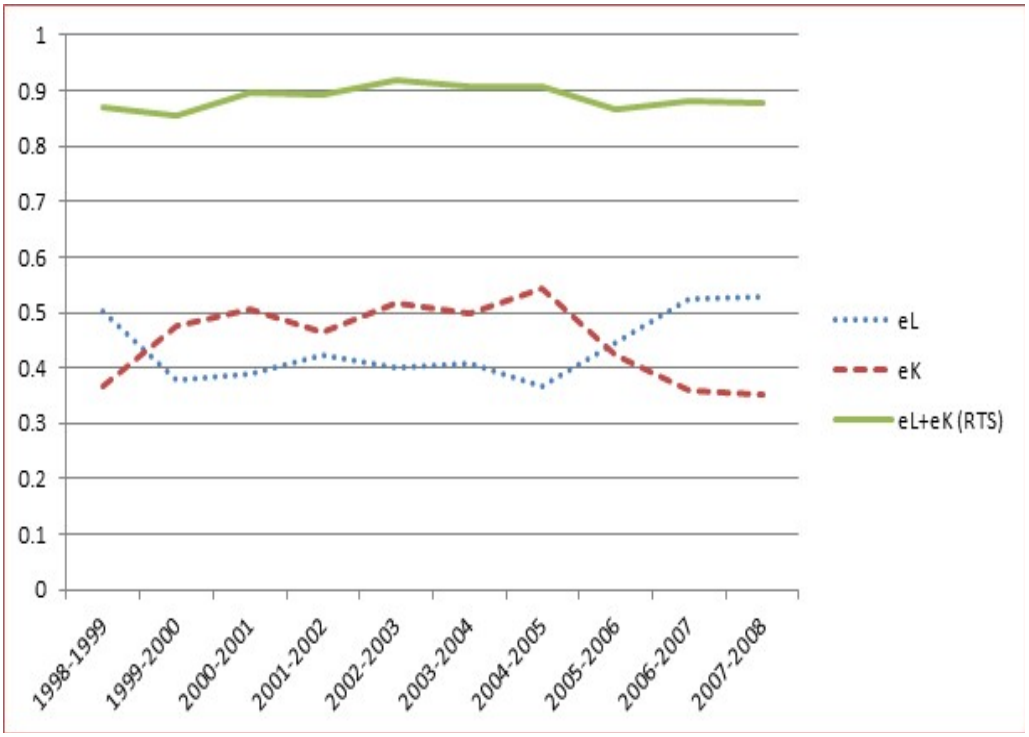

Fig.3 Movement of e_L, e_K & RTS During the Post-economic Crisis Period (2008-09 to 2017-18)

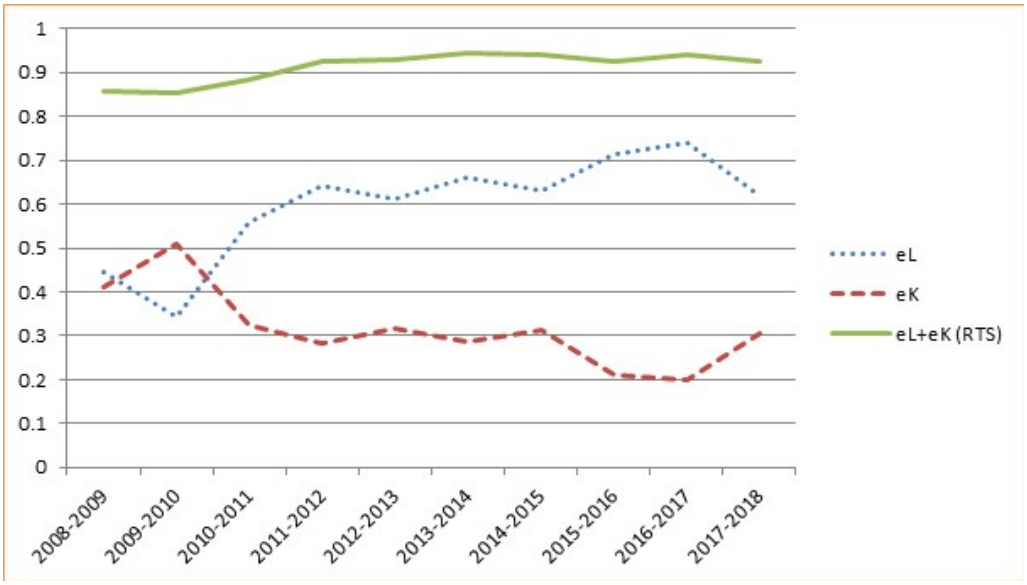

Table 1 shows that there is an upward trend in the labor elasticity of output (or labor share of output if workers are paid according to their productivities) and a downward trend of the capital elasticity of output (or capital share of output if capitalists are paid according to their productivities) over the study period (1998-99 to 2017-18). This indicates that marginal productivity of labor enhanced and that of capital deteriorated over the study period and it may be shown that in nine out of twenty years there operate DRS in the organized manufacturing industries in India and most of the years are within the pre-economic crises period (1998-99 to 2007-08). The results are also found to be statistically significant. Whereas in eleven out of twenty years there exist CRS in the Indian manufacturing and most of the years are under the post-economic crisis period (2008-09 to 2017-18). The results are also found to be statistically significant. The findings are presented in Fig. 1 through Fig. 3.

Marginal productivity of labor enhanced and that of capital deterioratedover the study period and it may be.

Figs. 1 - 3 show that capital elasticities of output are lying above the labor elasticities of output in almost all the years during the pre-economic crisis period (1998-99 to 2007-08). It is probably due to lower capital intensive mode of technology applied during this phase of production. It is further noticed that RTS remains more or less same during this phase of production andDRS operated in almost all the years during this phase. Whereas labor elasticities of output are lying above capi-

There arose no scarcity of capital in the Indian manufacturing sector during the post-economic crisis period.

tal elasticities in almost all the years during post-economic crisis period (2008-09 to 2017-18) and it may be due to the application of capital intensive mode of technology during this period of production. This indicates that there arose no scarcity of capital in the Indian manufacturing sector during the post-economic crisis period in spite of there being a massive financial crisis in the world economy during this period. Although, there may arose some shortage of employment in that sector of the economy during the aforementioned study period (2008-09 to 2017-18).

Restricted Least Squares: Testing Returns to Scale

If there exist constant returns to scale (CRS) technology in the Indian manufacturing industries [i.e., equi-proportional change in output of the manufacturing industries for an equi-proportional change in inputs of the same], economic theory suggests that

$$\beta_2 + \beta_3 = 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

which is example of a linear equality restriction. Now the question is how can we find out if there exists CRS in the Indian manufacturing industries over the study period, i.e., if the restriction is valid for Indian manufacturing industries over the years?

From (4) we may write

$$\beta_2 = 1 - \beta_3 \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

Thus, if we use Equation (5), we can write the Cobb–Douglas production function as

$$\ln Y_i = \beta_0 + (1-\beta_3) \ln L_i + \beta_3 \ln K_i + u_i = \beta_0 + \ln L_i + \beta_3 (\ln K_i - \ln L_{i)} + u_i$$

or

$$(\ln Y_i - \ln L_i) = \beta_0 + \beta_3 (\ln K_i - \ln L_i) + u_i$$

or

$$\ln (Y_i/L_i) = \beta_0 + \beta_3 \ln (K_i/L_i) + u_i \ldots\ldots (6)$$

Where (Y_i/L_i) = output/labor ratio and (K_i/L_i) = capital labor ratio, quantities of great economic importance. Once we estimate β_3 from equation (6), β_2 can be easily estimated from the relation (5). Needless to say, this procedure will guarantee that the sum of the estimated coefficients of the two inputs will be equal 1. The procedure outlined in equation (6) is known as restricted least squares (RLS).

How do we know that the restriction (4) is valid? This question can be answered by applying the *F* test as follows:

Let

$\Sigma \hat{u}^2_{UR}$ = RSS of the unrestricted regression (2)

$\Sigma \hat{u}^2_{R}$ = RSS of the restricted regression (6)

m = number of linear restrictions (1 in the present study)

k = number of parameters in the unrestricted regression

n = number of observations

Then,

$$F= \{(RSS_R-RSS_{UR})/m\}/\{RSS_{UR}/ (n-k)\} \quad \ldots\ldots(7)$$

$$=\{(\Sigma\hat{u}^2_R-\Sigma\hat{u}^2_{UR})/m\}/ \{\Sigma\hat{u}^2_R/(n-k)\}$$

follows the F distribution with m, $(n-k)$ df. (*Note:* UR and R stand for unrestricted and restricted, respectively.)

The F test above can also be expressed in terms of R^2 as follows:

$$F= \{R^2_{UR}-R^2_R)/m\}/\{(1-R^2_{UR})/(n-k)\}$$

where R^2_{UR} and R^2_R are, respectively, the R^2 values obtained from the unrestricted and restricted regressions, that is, from the regressions (2) and (6), respectively.

By way of illustrating the preceding discussion, consider the data of the Indian manufacturing industries given for the year 1998-99.

Attempting to fit the Cobb–Douglas production function to these data yielded the following results:

$$\ln Y_i = 3.445 + 0.503 \ln L_i + 0.368 \ln K_i$$
$$(0.768) \quad (0.120) \quad (0.117)$$
$$t = (4.483) \quad (4.204) \quad (3.137)$$
$$R^2=0.91 \quad RSS_{UR}= 2.746$$

where RSS_{UR} is the unrestricted RSS, as we have put no restriction on estimating equation (3).

As we can see, the output/labor elasticity is about 0.50 and the output/capital elasticity is about 0.37. If we add these coefficients, we obtain 0.87, suggesting that perhaps the Indian manufacturing industries during the stated time period was experiencing constant returns to scale (as 0.87 is approximately equal to one). Of course, we do not know if 0.87is statistically different from 1.

To see if that was the case, let us impose the restriction of constant returns to scale, which gives the following regression:

$$\ln (Y_i/L_i) = 1.827 + 0.423 \ln (K_i/L_i)$$
$$t = (7.922) \quad (3.413) \quad R^2= 0.336 \quad RSS_R= 3.346$$

Where RSS_R is the restricted RSS, for we have imposed the restriction that there are constant returns to scale (CRS).

Since the dependent variable in the preceding two regressions is different, we have to use the F test given in equation (7). We have the necessary data to obtain the F value. That is

$$F = \{(RSS_R–RSS_{UR})/m\}/ \{RSS_{UR}/ (n–k)\}$$
$$= \{(3.346–2.746)/1\}/\{(2.746)/(25–3)\}$$
$$= 4.81$$

Note in the present case m = 1, as we have imposed only one restriction ($\beta_2 + \beta_3=1$) and $(n–k)$ is 22, since we have 25 observations (25 states & union territories) and three parameters in the unrestricted regression.

The F value follows the F distribution with 1 df in the numerator and 22 df

in the denominator. We can easily check whether the *F* value is statistically significant at less than 5% probability level.

Now as the estimated value of F statistic (4.81) is greater than its tabulated value (4.30) at less than 5% probability level it is clear that the Indian manufacturing sector is characterized by decreasing returns to scale (DRS) during the year 1998-99. This means that if capital/labor ratio is increased by 1 percent then on average labor productivity will increase by less than 1 percent.

It is clear that the Indian manufacturing sector is characterized by decreasing returns to scale (DRS) during the year 1998-99.

In the same way we examined the nature of returns to scale of the Indian manufacturing sector for the other 19 years too and we found that although capital elasticity of output remained higher in most of the years under the pre-economic crisis period (1998-99 to 2007-08), labor elasticity of output as well as returns to scale remained higher in almost all the years under the post-economic crisis period (2008-09 to 2017-18) and further, even if there exist DRS in most of the years in the pre-economic crisis period, there exists CRS in almost all the years during the post-economic crisis period.

There exists CRS in almost all the years during the post-economic crisis period.

Conclusion

We may therefore conclude that:

1. Labor elasticity of output (or labor share of output) as well as returns to scale factor have increased over the study period (1998-99 to 2017-18). This may be due to the fact that capital intensity increased in the production process of the organized manufacturing sector in India during the aforementioned study period.
2. Capital elasticity of output (or capital share of output) remained higher in most of the years under the pre-economic crisis period (1998-99 to 2007-08) and it remained statistically significant too in most of the years.
3. Labor elasticity of output (or labor share of output) remained higher in almost all the years during the post-economic crisis period (2008-09 to 2017-18) and it also remained statistically significant in most of the years. This may be due to the fact that capital intensity went up in the production process during this period.
4. Constant returns to scale (CRS) in the production process operated during almost all the years under the post-economic crisis period (2008-09 to 2017-18), whereas there existed decreasing returns to scale (DRS) in the production process of the organized manufacturing sector in India in most of the years under the pre-economic crisis period (1998-99 to 2007-08).

It is, therefore, clear that labor elasticity of output (or labor share of output) of the Indian manufacturing industries went up during the post-economic crisis period (2008-09 to 2017-18) which may be due to the employment of lower proportion of labor compared to capital in the production process during that period. So, policies should be geared to utilize both the factor inputs (labor and capital) optimally in that sector of the economy of such a labor surplus country.

References

Abraham, Vinoj & John Rajan (2017), Declining Wage Share in India's Organized Manufacturing Sector: Trends, Patterns and Determinants, ILO Asia-Pacific Working Paper Series.

Anguo Liu, Gao Ge & Yang Kaizhong (2011), "Returns to Scale in the Production of Selected Manufacturing Sectors in China" Energy Procedia, Elsevier Ltd.,Vol.5: 604-12

Chakraborty, Soumita (2018), "Movement of Real Wage Rate & Labor Productivity in Manufacturing Sector in India: The Role of Contract Labor" *Economic Affairs,*. 63 (2) (June): 387-97

Gao, Wei & Matthias Kehrig (2017), "Returns to Scale, Productivity and Competition: Empirical Evidence from U.S. Manufacturing and Construction Establishments" Available at SSRN: https://ssrn.com/abstract=2731596. or http://dx.doi.org/10.2139/ssrn.2731596

Jayadev, Arjun & Amay Narayan (2018), The Evolution of India's Industrial Labor Share and its Correlates, Centre for Sustainable Employment, Working Paper #4, Azim Premji University, Bangalore.

Muniyandi, C. & L. Vadivel (2016), "An Economic Analysis of Returns to Scale of Manufacturing Industries in Tamil Nadu", *Indian Journal of Economics and Development*, 4 (3):1-3.

Maiti, Dibyendu (2019), Trade, Labor Share and Productivity in India's Industries, Asian Development Bank Institute, ADBI working paper 926.

Narayana, B. (2010), "Elasticity of Substitution and Returns to Scale in Manufacturing Sector of Andhra Pradesh: An Empirical Exercise", *SAGE Journals,* 35(4):419-27.

National Sample Survey Organization (NSSO) (2011-12), Employment and Unemployment Situation in India, Ministry of Statistics & Program Implementation, Government of India