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Analysis of Elasticities in the Agro-Based Consumer Goods Industries of India in the Pre and Post Liberalization Period

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ABSTRACT

This study was undertaken with the objective of analyzing elasticities such as output, employment and wage in the agro-based consumer goods industries of India in the pre and post liberalization period. The pre liberalization period covers between 1974-75 and 1990-91 and post liberalization period covers between 1991-92 and 2007-08. ASI data were used for purpose of the analysis. Multiple regression model was applied to analyse the data relating to employment elasticity, output elasticity and wage elasticity. It was found that all the selected industries have shown both positive and negative elasticities with respect to output, wage and employment.

Introduction

During the last decade, major developing countries including India began to integrate much more with the global economy. The countries that are aggressively integrating have grown significantly faster than those that are not. The measures to liberalize India's industrial policy frame work begun in the late 1970s consisted of deregulation and delicensing in certain industries, assigning a greater role to the private sector and a gradual shift from direct physical controls to indirect controls (Raj, 1986 and Chandresekhar, 1988).

For India's industrial economy, the 1990s has been a period of transition and structural change. This process of liberalization was further accelerated in 1991. Since the launching of the economic reforms in 1991 and the gradual opening up to external competition, the economic environment transformed dramatically. Following the virtual dismantling of licensing and easing of production, pricing and distribution controls, there has been a transition from a controlled to a market-oriented economy. With the greater participation of Indian economy with the rest of the world, India has experienced large inflows of investment from abroad, a vital source of economic growth. The impact of increased capital inflows into the Indian economy can well

be measured in terms of the growth of GDP, employment, output, wage rate, investment, export, production and productivity of various sectors of the economy, in particular, the industrial sector.

Participation in the world trade is essential for India as it can yield multiple advantages. Rising exports can augment the availability of much-needed imports while also bridging the trade deficit. As a spin off, the concomitant requirements of productivity and quality of exportable manufactured goods would raise our own standard of living through the improved availability of diverse high quality products. Globally trade is emerging as a powerful engine of economic growth and development. Manufactured products are generally traded goods. Their demand also shows price and income elasticity as a result of which the export industry, unlike agriculture, do not face major market constraint. Raising India's share in the world exports of manufactured products is, therefore, the second important objective for the industrial sector in the Tenth Plan. Bringing about a balanced industrial development in the country is therefore, proposed to be major objective for the sector.

Industrial development is the key factor for the rapid economic development of any country. It is more true in the case of developing countries, since, it would be helpful in combating many economic ills, which they have been

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facing. Economic reforms introduced in India, particularly since 1991, are aimed at making its economy and industry more competitive. Liberalization and globalization have provided opportunity for the growth and expansion of the industry, and the manufacturing sector in particular

In this context it is significant to note that consumption of manufactured consumer goods is recognized as one of the most widely accepted measures of standard of living and of quality of life. Manufacturing industry provides the driving force for stimulating rapid economic growth. The growth rate of the manufacturing industry normally surpasses that of the agriculture and the service sectors. It is for this reason that industry is considered the backbone of the economy. It is in recognition of this special importance that raising industry's share in GDP is being ranked as the foremost objective for this sector in various Plans. The manufacturing sector has long been recognized as the main engine of economic growth and certainty of wealth, and accordingly emphasis was placed on the growth of industry in most of our five-year plans. One of the major reduced levels of contribution by manufacturing has been the inability to build and maintain competitiveness needed to meet global challenges as well as to develop a large domestic market through low cost of production. The negative impact of protection given to Indian industry through licensing until 1991 has not worn off. Over the last two decades powerful development, globally as well as within the country, have had an adverse impact on the Indian manufacturing sector. These include substantial reduction in trade barriers across the globe and in India, particularly in respect of manufactured good; the technology revolution that is impacting on productivity and lowering of costs; and the emergence of low-cost manufacturing hubs-China and other South-East Asian countries.

All these mean that the Indian economy, and the manufacturing sector in particular has to necessarily adjust to the challenges of economic reforms introduced in Indian economy and Indian industry. Liberalization and globalization have provided unprecedented opportunity for

growth and expansion of industry, and the manufacturing sector in particular. At the same time, industry is also faced with stiff competition from imports due to progressive tariff reduction.

In order to attain a higher level of growth in manufacturing, it is essential that the enterprises produce goods at globally competitive prices and quality and at national level, an appropriate condition needs to be created for fostering competitiveness. India had followed in the first four decades after independence an inward-oriented, heavy industrialization to be self-reliant. This strategy on the positive side helped the country to build a large and diverse industrial base. Over time, the industry sector also accumulated impressive technological capabilities. However, because of lack of competition and restriction on imports, the growth was accompanied by widespread technical lags and inefficiencies. In addition, this sector also suffered from a number of policy-induced constraints. These included limited access to new technologies and capital goods, restricted foreign investment, limiting the size of private domestic companies reservation in favour of public enterprises, government direction of investments, inadequate investment in infrastructure and the stifling culture or red tape.

The trade and industrial regime followed by India unfortunately resulted in a situation where it lost its position as the leading exporter of manufactures in the developing world which it once enjoyed. India was largely by passed by the globalization that drove industrial development and exports in many other industrializing countries. The fact that during certain years, the growth rate of manufacturing was much above the average rate indicates that it is possible to achieve not only those rates of 10 per cent plus consistently but also improve upon the same by formulating and implementing appropriate policies. In order to improve the living conditions of Indian people, it is necessary to achieve a GDP growth rate of 8-10 percent consistently over a long period. The mid-term appraisal of the 10th plan (2005-07) by the planning commission observed that

the overall GDP growth rate for the plan is unlikely to exceed seven percent during this period.

India has entered certain highly complex areas of industrial technology and even become an exporter of technology to other countries. However, the percentage of people dependent on agriculture has remained virtually the same since independence and employment opportunities, capital scarcity, falling industrial output created in the industrial sector have made much impact on the unemployment problem. The disappointing performance of Indian agro-based industry may be attributed partly to the pace of industrial growth which has not been fast enough and more importantly, to the fact that the growth rates of industrial employment, investment, output and wages have seriously lagged. In this context, it is imperative to look into the forces which influenced the rate of industrial growth especially agro-based industries in India during pre-and post liberalization period.

Agro-based industry refers to the subset of manufacturing that process raw materials obtained from agriculture and associated sectors such as animal husbandary, forestry and logging and intermediate products derived from other industries such as semi-processed hides and skins for manufacturing leather and leather products, edible oils for manufacturing hydrogenated oil. The agro-industry provides crucial farm-industry linkages which helps accelerate agricultural development by creating backward linkages (supply of credit, inputs, farm production enhancement services) and forward linkages (processing and marketing) adding value to the farmer's produce, generating employment opportunities and increasing the farmers income. Therefore, development of agro-industries implies the development of agriculture on one hand and the entire set of industries. Thus the agro-industry is a distinct off shoot of forward linkage. Agro-processing industries have a prominent place in the Indian economy in terms of income, employment generation, poverty alleviation, improving agricultural productivity, reducing post harvest losses, availability of better nutrition, export promotion and

foreign exchange earnings. In view of the above points, this paper analyses three major elasticities-employment, output and wages.

Methodology

Period of Study

The reference period chosen for the study covers both pre and post liberalization periods. The pre liberalization period covers between 1974-75 and 1990-91 and post liberalization period between 1991-92 and 2007-08.

Sources of Data

The data for the study was collected from secondary sources. They were collected from the following sources:

- (i) Annual Survey of Industries, various issues
- (ii) Reserve Bank of India Bulletin, various issues
- (iii) Economic Survey, various issues
- (iv) Websites

Statistical Tools

a. Employment Elasticity

Employment elasticity was estimated as follows, where employment is regressed on the net value added and fixed capital.

$$\ln L_t = \alpha_0 + \alpha_1 \ln Y_t + \alpha_2 \ln K_t$$

Where, L_t = Number of person engaged in the current period

Y_t = Net value added in the current period

K_t = Fixed capital in the current period

α_0 = Constant co-efficient

α_1 = Elasticity of employment with respect to net value added

α_2 = Elasticity of employment with respect to fixed capital

$\alpha_2 > 0$ = implies employment and capital are complements

$\alpha_2 < 0$ = implies employment and capital are substitutes.

b. Output Elasticity

The elasticity of output with respect to employment of labour and fixed capital measures the change in output due to change in one unit of labour or change in one unit of capital. The output elasticities was estimated as follows:

$$\text{Where, } \ln Y_t = \alpha_0 + \alpha_1 \ln L_t + \alpha_2 \ln K_t$$

L_t = Number of person engaged in the current period

Y_t = Net value added in the current period

K_t = Fixed capital in the current period

α_0 = Constant co-efficient

α_1 = Elasticity of employment with respect to labour

α_2 = Elasticity of employment with respect to capital

c. Wage Elasticity

The wage elasticity with respect to labour productivity and net value added measures the change in wage rate due to change in one unit of the above mentioned variables. The elasticity can be estimated as follows:

$$W_t = \alpha_0 + \alpha_1 \ln L_p + \alpha_2 \ln y$$

W_t = Wage rate in the current period

L_p = Labour productivity in the current period

Y_t = Net value added in the current period

α_0 = Constant Co-efficient

α_1 = Elasticity of wage with respect to labour productivity

α_2 = Elasticity of wage with respect to net value added

Employment elasticity with respect to net value added in all the industries during pre-liberalisation were negative. On the other hand the elasticity co-efficient in relation to fixed capital was positive in all the industries in the

post-liberalisation period. Insignificant co-efficients were observed in the manufacture of wood and wood products in pre-liberalisation period and in the manufacture of textile products and manufacture of paper and paper products in the post-liberalisation period. From the Table-3 it is very clear that the factor which influences employment in these industries is capital. Negative elasticities with respect to fixed capital implies that fixed capital used to be substitute for labour to a larger extent in both pre and post liberalization period. This trend was more in the pre-liberalisation period in case of manufacture of all industries in relation to employment. The co-efficient of employment and net value added was found to be negative and statistically significant at 5 percent level.

2. Output Elasticity

The output elasticity measures output with respect to employment of labour and fixed capital measures the change in output due to change in one unit of capital. The output elasticity of the industries was worked out taking net value added as dependent variable and fixed capital and employment as independent variables. The co-efficients are shown in the following Table-2.

The output elasticity with respect to employment showed that more than a unit decline was brought in the manufacture of food products, beverages and tobacco and in the manufacture of leather and leather products which was considered to be statistically significant in the pre-liberalisation period and less than a unit change was observed in all the industries in the post-liberalisation period.

Output elasticity with respect to fixed capital reveals that though in the pre-liberalisation period more than double units positive change was observed in the manufacture of textile products, but it was statistically insignificant. In the post liberalization period the elasticity co-efficient was small except in the manufacture of leather and leather products.

TABLE - 1
EMPLOYMENT ELASTICITY CO-EFFICIENTS

S. No	Industry	Net value added		Fixed capital	
		B.L	A.L	B.L	A.L
1	Manufacture of food products, beverages and tobacco	-1.5591 (-2.7046) **	-0.6044 (-10.6844) ***	2.9199 (8.8816)*	0.5740 (1.7519)
2	Manufacture of textile products	-2.2278 (-1.7005)	0.2845 (0.2962)	3.9180 (5.6045)*	1.4729 (3.5002)*
3	Manufacture of wood and wood products	-0.2869 (-0.4954)	0.3982 (2.0895)***	1.7539 (5.1995)*	0.8969 (7.5774)*
4	Manufacture of paper and paper products	-0.7021 (-4.1721)**	0.4142 (0.5763)	0.8969 (7.577)*	1.1536 (2.4037)**
5	Manufacture of leather and leather products	-0.5992 (-4.7743)**	-0.5570 (-1.8269)	3.1318 (7.5149)*	1.7726 (8.9061)*

Foot note : Calculations are based on ASI data; B.L-Before Liberalization; A.L- After Liberalization

* - Significant at 1 percent level; ** - Significant at 5 percent level;

*** -Significant at 10 percent level; Figures in brackets indicate 't'values

TABLE - 2 : OUTPUT ELASTICITY CO-EFFICIENTS

S.No	Industry	Employment		Fixed capital	
		B.L	A.L	B.L	A.L
1	Manufacture of food products, beverages and tobacco	-1.5591 (-2.7046)*	0.5740 (1.7519)	-0.6043 (-10.6844)*	2.9199 (8.8816)*
2	Manufacture of textile products	-2.2278 (-1.7005)	0.2845 (0.2962)	3.9180 (5.6045)*	-0.5302 (-3.8492)*
3	Manufacture of wood and wood products	-0.2859 (-0.4954)	0.3982 (2.0895)***	1.7539 (5.1995)*	0.8968 (7.5774)*
4	Manufacture of paper and paper products	0.3396 (0.5260)	0.4142 (0.5763)	1.4900 (4.6557)*	1.1536 (2.4037)**
5	Manufacture of leather and leather products	-1.9502 (-2.2814)**	-0.5570 (-1.8269)	3.1318 (7.5149)*	1.7726 (8.9061)*

Foot note : Calculations are based on ASI data; B.L-Before Liberalization; A.L- After Liberalization

* - Significant at 1 percent level; ** - Significant at 5 percent level;

*** -Significant at 10 percent level; Figures in brackets indicate 't'values

3. WAGE ELASTICITY

Wage elasticity of the manufacturing sector during pre and post liberalization period was calculated taking into account the wages as dependent variable and labour productivity and net value added as independent variables. The results are shown in Table -3

independent variables over influencing dependent variable was high. Only negligible percent of change would be brought about by related variables.

Conclusion

All the selected industries have shown positive and negative elasticities with respect to output, wage and employment.

TABLE - 3 : WAGE ELASTICITY CO-EFFICIENTS

S. No.	Industry	Labour productivity		Net value added	
		B.L	A.L	B.L	A.L
1	Manufacture of food products, beverages and tobacco	0.3970 (0.65536)	1.5697 (1.903)	1.4530 (6.1390)*	0.5006 (1.3801)
2	Manufacture of textile products	-1.3641 (-2.9746)**	-0.568 (-0.9946)	1.3611 (2.2437)**	1.7171 (4.8327)*
3	Manufacture of wood and wood products	-1.7814 (-0.014805)	-0.8187 (-0.83711)	-0.2262 (-0.51746)	0.6366 (3.6539)*
4	Manufacture of paper and paper products	1.4652 (0.19682)	-0.2501 (-0.6677)	1.3126 (4.5166)*	1.3126 (4.5166)*
5	Manufacture of leather and leather products	-1.5196 (-3.4725)**	-0.6970 (-1.4944)	1.8210 (6.1848)*	-0.6500 (-1.7651)

Foot note : Calculations are based on ASI data; B.L-Before Liberalization; A.L- After Liberalization

* - Significant at 1 percent level; ** - Significant at 5 percent level;

*** -Significant at 10 percent level; Figures in brackets indicate 't' values

Wage elasticity with respect to labour productivity showed that only before liberalization it was significant and more than a unit change with statistical significance could be observed in the manufacture of textile products and in the manufacture of leather and leather products where wage elasticity with respect to net value added showed that except for manufacture of wood and wood products in the pre-liberalisation period, all the industries showed significant relationship with mixed co-efficients.

The co-efficient determination R² calculated for both the periods for all the industries in all the periods for different elasticities recorded more than 95 percent which explains the fact that the fit was good. The contribution of the

In these industries, labour and capital acted as a substitute rather than complement. So, these industries should use capital and labour in such a proportion that more capital should generate more labour.

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*We are all inventors, each sailing out on a voyage of discovery,
guided each by a private chart, of which there is no duplicate.*

The world is all gates, all opportunities.

- Ralph Waldo Emerson
