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A STUDY ON FACTOR EMPLOYMENT, SOURCES AND SUSTAINABILITY OF OUTPUT GROWTH

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ABSTRACT

The manufacturing sector in India is crucial for two main reasons: It has significant potential to provide modern employment to a growing labor force, especially that of less skilled type and second by its own healthy growth, stimulate and provide a foundation for, organic growth in other sectors of the economy. On both these counts, however, the manufacturing sector has so far not performed to its potential. In an attempt to identify the factors responsible for this phenomenon, the present study examines in detail the main determinants of factor employment, their shares, and output growth.

The findings on the determinants of employment of labor indicate that wages have started playing an equally important role as that of technology With regard to the sources of output growth, it was found that much of the growth in output had come from capital (82%), followed by labor (12%), and productivity (6%) The low contribution of productivity can be attributed mainly to the heavy decline in capacity utilization following the 1990s reforms as a result of a time lag between investment and output growth. But pure productivity, devoid of the effects of capacity utilization, must have improved post-reforms. Output growth then is not sustainable with suppression of labor demand. But if stringent labor laws did force firms to do so, firms may continue to suppress demand for labor and sacrifice the growth in output. Hence adequate reforms in labor laws are necessary to ensure sustainability of output growth which in turn would also unshackle the employment potential.

KEYWORD: manufacturing, employment, factor intensity, productivity

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1. INTRODUCTION

The world over the manufacturing sector is recognized for creating mass employment for low skilled workers in the modern sector. With a rapid decline in the capacity of agriculture to offer jobs and the limited scope of the modern services sector to absorb relatively unskilled labour that has been displaced from agriculture, expectations are that the manufacturing sector will create mass employment for this displaced lot. In India also the role of the manufacturing sector is recognised to be critical not only for facilitating large-scale employment but also for enabling high GDP growth.

However, in India the performance of manufacturing sector in creating employment has always been unsatisfactory, especially when compared to other Asian economies. During 1980–90, employment in the organized manufacturing sector grew by a miniscule 0.5% p.a, while during 1990–97 it improved marginally to 2.7% per annum. Slower growth in employment in the manufacturing sector has resulted in sharp decline of share of labour in the value added. It came down to a level of only 25% in the late 1990s, from about 40% in the early 1980s. Special policy attention to the creation of employment in manufacturing is necessary as evidence suggests that a

high growth in output itself may not be a guarantee to creation of sufficient employment. This is best exemplified with the experience of the 1980s, when growth in output of manufacturing at 7% per annum generated only 0.5% increase in employment. This came as a surprise to economists because in the previous decade (1970s) a 5% growth in manufacturing output had generated a 3.8% increase in employment [Goldar (2000)]. Structural rigidities associated with the normal process of shift of labour from agriculture to organized manufacturing could be partly blamed for this.

The performance of manufacturing in terms of output has not been impressive for much of the past. Between 1994–95 and 2002–03, the output in this sector grew at the average annual rate of only 6.2%, despite receiving many doses of economic reforms. It was only during 2003-04 to 2007-08 that the manufacturing sector grew at around 10% average annual rate. Further, its share in GDP at around 16%, compares unfavourably with many Asian and Southeast Asian countries including Thailand (35%), China (32%), Malaysia (31%), South Korea (29%), Singapore (28%), the Philippines (23%), and Vietnam (20%). Raising and sustaining total factor productivity (TFP) growth in manufacturing will play an important role in raising manufacturing growth on a sustained basis. It is evident from empirical studies that productivity growth is an important factor that determines the pace of industrial growth. For instance, in China, out of the 10% growth in industrial production during 1978– 2004, as much as 4.4% came from productivity factor alone. In India, during the same period industrial output grew by 5.9% with a support of mere 0.6% from productivity improvement (Bosworth and Collins, 2007). If it was not for the differences in productivity growth, the difference in growth of industrial output of China and India would have been much less.

2. REVIEW OF LITERATURE

Although considerable debate has taken place on issues related to factor employment (especially labour) and sources of output growth, the discussion on the sustainability of output growth in Indian organised manufacturing industry is quite meager. Further the issue of employment has been mostly addressed with reference to jobless growth during the 1980s. Similarly, discussion on sources of output growth in recent years has mostly revolved around the productivity growth in post-reforms period. On both these issues, two different views exist. Explaining the jobless growth of the 1980s, one school blames it on the tightening of job security regulations, the other group blames it on the sharp increase in real wages. Similarly, on the direction of productivity growth in the post-reforms era, one school believes that it has increased whereas the other believes that it has declined. Further, while explaining the jobless growth as well as productivity growth, majority of the studies have assumed Cobb-Douglas structure of production function, entailing elasticity of substitution between labour and capital to be one. In order to emphasize on the main objectives of the present study, it would be necessary to review the relevant existing literature on each of these issues.

Fallon and Lucas (1991) studied the employment situation in India (and that of Zimbabwe) by deriving the labour demand equation. They found that stringent job-security provisions adversely affected the employment. They estimated a CES cost minimization function using 64 manufacturing industries from 1959–60 through1981–82. The empirical estimation showed that there was no comparable reduction in labour demand in those small-scale plants that were not covered by job–security regulations. On the other hand, among the larger plants with stringent job-security provisions, the drop in labour demand was significant. The estimation of wage equation revealed that out of 67 industries, only in 3 witnessed a drop in real wages with the imposition of job security regulations. There was no evidence of employers being able to offset the effects of new regulations by offering lower real wages to workers. It is evident from this study that employment growth in the organized segment would have been higher by 17.5% if rigid job-security provisions were not there.

Virmani (2004) and Virmani (2006) too believed that tighter job security regulations were responsible for lower job growth during seventies and eighties. According to him, stringent labour laws make employers wary of increasing employment even when the economy is passing through a boom period for fear of not being able to shed the additional employment when there is a downturn. This in turn creates bias toward using capital intensive technology. In order to narrow down on the specific labour laws, he divides the basic objectives of labour laws under two broad categories. First objective of labour laws is to ensure that workers work in a healthy working environment without having to compromise on the safety and health standards. In case of any damage to health, laws provide for appropriate compensation. Additionally it also prohibits children to be employed and ensures safety of women at work. Virmani suggests the need for broadening such provision of labour laws to include the workers even from unorganised sector. Second objective of labour laws is to provide for security of employment through various provisions such as the ones relating to the contract labour, closure of units and lay-off of workers. In view of high trade-off between higher security of employees and higher costs to employers, Virmani suggest to introduce flexibility in such provisions of labour laws in the interest of creating large employment. He favours the amendment of contract labour act to allow for non-core activities to be procured from specialized service companies. Further, the need for employer seeking permissions of the Courts before closing business units or laying off workers for economic reasons has suggested to be done away with.

Nagaraj (1994) and Bhalotra (1998) pointed out that though employment growth turned negative in the 1980s, the total man-days in registered manufacturing units went up significantly, and hence, man-days per worker recorded a positive growth rate. They argued that the observed increase in earnings per worker could (at least partly) represent greater effort and may not necessarily imply an increase in the wage rate. Nagaraj found that while real earning per worker increased at 3.6% per annum, the growth rate of real earnings per man-day was only 1.6% per annum. This view, however, did not find favour with Goldar (2000) who argued that growth in man-days per employee was not a major cause of decelerating employment growth during the 1980s. It is pertinent to note here that Goldar and Banga (2005) while analyzing the wage–productivity relation in organized manufacturing industry in India found that labour market conditions influence the wage structure. The stronger the unions, the higher would be the wages of industrial workers. And, on the other hand, greater the labour market flexibility, the stronger would be the pressure to push wages down. They added that from the mid-1980s growth in real wages has lagged behind growth in labour productivity. According to them only a small part of the gain in labour productivity gets translated into wage increase. Like the divergent opinion on jobless growth, one witnesses no unanimity among economists on the direction of growth in manufacturing productivity in the post-reforms period. A majority of the studies, including Goldar (2000a & 2004), Trivedi et al. (2000), Goldar and Kumari (2003), and Das (2003), have found a fall in productivity growth in the post-reforms period. Against these findings, a few other studies, including Unel (2003), and Tata Services Limited (2003), contend that productivity growth in the post-reforms period improved. The approaches to measure productivity have also varied a great deal. While some studies have estimated productivity growth assuming Cobb-Douglas structure of production (Das 2003), others, including (Goldar 2004), have assumed relatively flexible form for the estimate. Goldar (2004) has shown that more than the assumption of production function, the methodology of measuring input and output could be crucial to the estimation of productivity.

Hsieh (2000) showed that when elasticity of substitution between labour and capital is lower than 1, standard growth accounting exercises tend to understate the role of productivity growth as a determinant of economic growth. In view of this, the present study, while analyzing the trends in sources of output growth, attempts to throw light on the direction of productivity change in pre- and postreform periods after accounting for biased technical change and non-unitary elasticity of substitution between labour and capital. It needs to be mentioned here that the debates on both employment and productivity growth have largely been based on the assumption that the manufacturing industry exhibits a Cobb-Douglas production function, restricting the technical change to Hicks-neutral and the elasticity of substitution between labour and capital to 1. Evidence, however, suggests that neither of the two assumptions is valid for manufacturing. There has been a biased technical change as is evident from a sharp decline in the share of labour in the gross value added over the last few decades. Goldar (2004) attributes this decline to the labour-saving feature of technical change. Using a translog production (value added) function for Indian manufacturing and a panel data of 17 twodigit industries from 1981–82 through 1997–1998, Goldar showed that the downward trend in the income share of labour (in value added) in manufacturing in the 1990s was largely a result of labour-saving technologies.8 One of the main intents of the present study is to estimate the elasticity of substitution after allowing for biased technical change.

Antras (2004) by considering the example of U.S. aggregate production function showed that assumption of Hicks-neutral technical change could produce a biased estimate of elasticity of substitution between labour and capital. After accounting for biased technical change, he found the value of elasticity of substitution to be considerably below 1. In contrast to this, Berndt (1976), assuming Hicks-neutral technical change, had found that the elasticity of substitution was not significantly different from 1.

OBJECTIVES:

- To find out the determinants of employment
- To determine the sources of output growth including productivity,
- To econometrically examine whether the high growth in output of manufacturing sector is sustainable.

3. METHODOLOGY

The value added production function for capital and labour with non-Hicks neutral technical change can be expressed in terms statistical equations.

4. DATA AND VARIABLES

Sources of data

To estimate the parameters of production function for aggregate manufacturing, the data for period from 1973–74 through 2001–02 has been utilized.14 The entire period has been subdivided into three period viz. 1973-79, 1980-91 and1992-01, roughly corresponding to pre and post reforms period. The data has been drawn mainly from the Annual Survey of Industries (ASI). In addition, data have also been drawn from other sources including Chandhok (1990), various publications of National Accounts Statistics, and the RBI bulletins.

Construction of variables

Inputs: For estimating parameters of value added production function, total expenses have been divided into two broad categories: labour (l), and capital (K). The price index of labour has been derived by dividing the ―total emoluments' by the ―total persons engaged.' Assuming that the flow of services is proportional to stock, ‗perpetual inventory method' has been used to create a time series on real capital stock [Christensen and Jorgenson 1969]:

$$1\ (1) - = + - K\ I\ d\ K$$

To apply the ‗perpetual inventory method', one requires: (i) benchmark capital stock, (ii) annual investment, (iii) life of capital assets, and (iv) price of capital assets. The benchmark capital stock (1989–90) has been calculated by applying the ‗all-India' ratio of fixed capital stock (constant prices) to the net fixed capital stock (current prices) for 1973–74. To arrive at the benchmark capital stock (constant prices) for 1973–74, 'gross net ratio' was calculated from the RBI bulletin (1976), and the gross fixed capital stock was divided by the average price of capital assets from 1958 through 1973. The annual gross investment series was constructed by adding depreciation to the net fixed capital stock. By deflating the annual gross investment series with the index of capital price, annual real investment for each year was calculated. To deflate the annual investment series, following Goldar (1986) and Das (2003), a weighted wholesale price index of construction and machinery was constructed; weights being the proportion of their share in capital stock during 1973–74. An implicit price deflator for investment in construction was prepared from the National Account Statistics. Price index of machinery was used as a proxy of machinery price index. Life of capital stock was assumed to be 25 years, depreciating at the constant rate of 4 per cent per annum. The price of each capital input was computed to reflect ―user cost of capital.' Because a well-developed rental market for capital does not exist, the price of capital service ‗i' – (*Pki*) – was derived indirectly as:

Stationarity and co integration of variables

Because the analysis is based on time series data, it was necessary to ensure that the variables used in the model be cointegrated. For variables to be cointegrated, it was necessary that the variables used in the model be either stationary or integrated of the same order. An attempt was made to test the stationarity of each variable with the help of ‗augmented Dickey-Fuller' unit root test.15 The results show that the time series of all variables are non-stationary because the ADF Test statistics exceeds the 5% critical value in all the cases (Table 1). But all the time series were found to be integrated of order one (at first difference), i.e., I (1). Since all the times series are integrated of the same order, they are expected to be cointegrated as well. To confirm that the variables of a regression are cointegrated16, we performed the Johansen's (1995) test.17 The null hypothesis of no-cointegration was tested with the help of trace statistics. In all the cases, the null hypotheses of no-cointegration was rejected as the trace statistics turned out to be greater than 5% critical value (Table 2). This implies that there exists a cointegration vector, and hence a long-term relation between the variables of a given regression.

Table1: Augmented Dickey-Fuller test of stationarity

Variables	ADF Test Statistics	Level 5% Critical Value	First Difference ADF Test Statistics	First Difference 5% Critical Value
Ln(Y/L)	-2.78	-3.60	-3.68	-3.60
Ln(Y/K)	-1.87	-3.60	-5.11	-3.56
Ln(w/p)	-2.27	-3.61	-4.45	-3.45
Ln(r/p)	-2.56	-2.61	-3.34	-2.54
LN(K/L)	-2.53	-3.59	-4.34	-3.59
Ln(w/r)	-0.95	-3.58	-6.14	-3.45

Note: (i) The lag-length is based on ‗Schwarz Information Criterion'. (ii) Except in case of Ln (Pk/Py), the
regressions are with constant and linear trend. For Ln (Pk/Py), however, the regression is without trend.

Chart:1 Augmented Dickey-Fuller test of stationarity

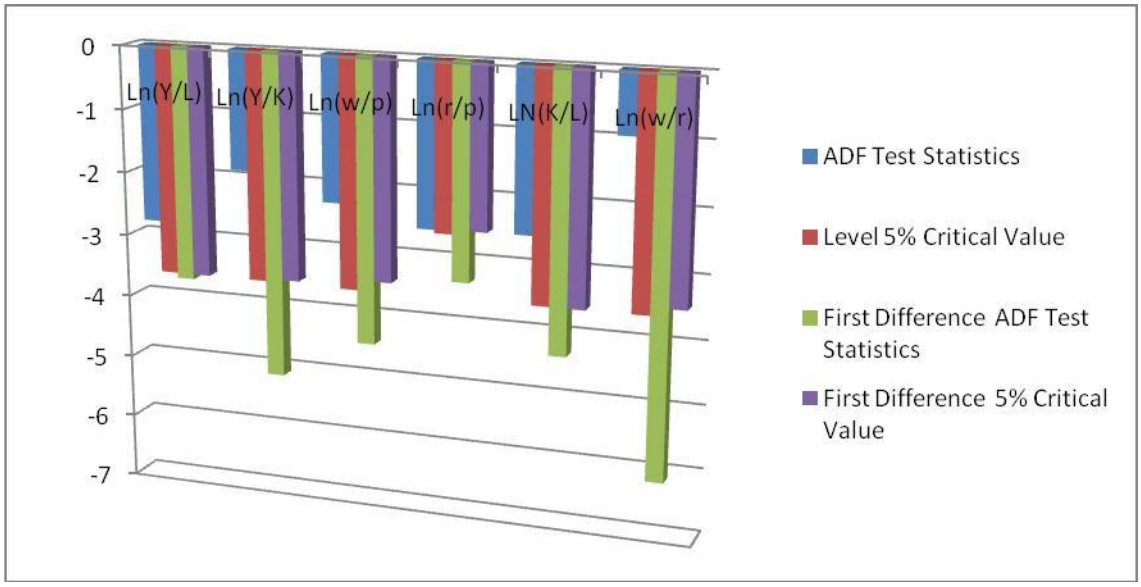
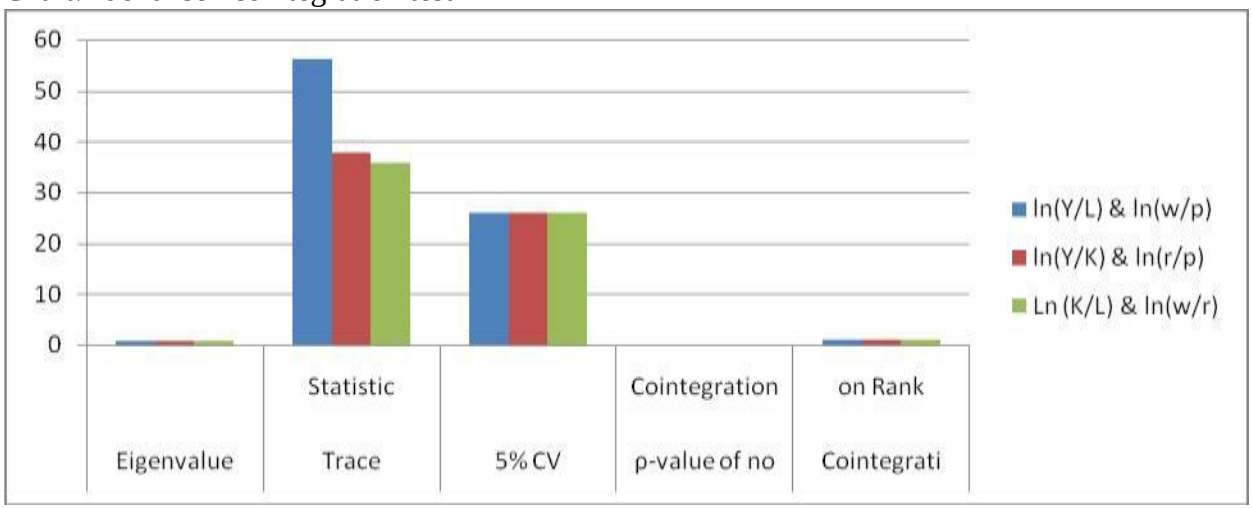


Table 2: Johansen cointegration test

		Trace Statistic	**5% CV**	**ρ -valueof no Cointegration**	**Variables**	**Eigenvalue**
ln(Y/L) & ln(w/p)	0.82	56.26	25.87	0	1	
ln(Y/K) & ln(r/p)	0.78	37.93	25.87	0	1	
Ln (K/L) & ln(w/r)	0.70	35.84	25.87	0	1	

(Own calculation)

Chart:2 Johansen cointegration test



Trends in variables

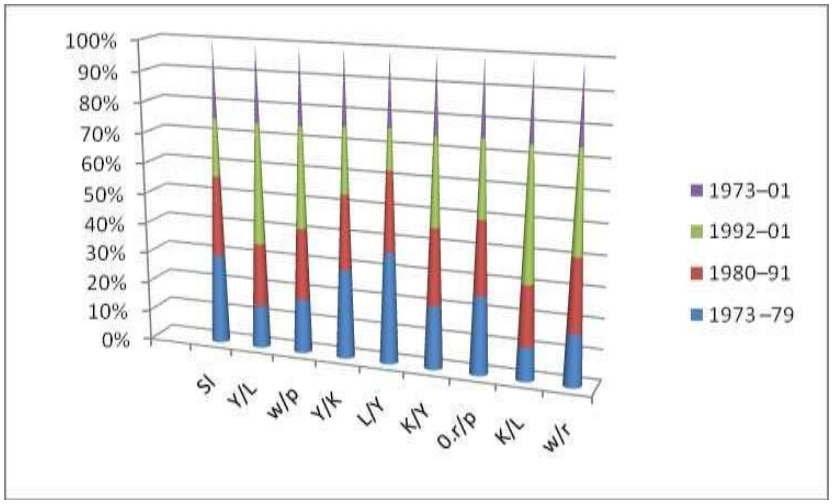
On the basis of major changes in the economic policy over the years, the present study, besides analysing the trends over the study period, also analyses and compares the trends across the following three sub-periods: 1973/74–79/80, 1980/81–91/92, and 1992/93–01/02.

Table 3: Trends in Select Indicators

Period	1973 –79	1980–91	1992–01	1973–01
Sl	0.44	0.39	0.28	0.37
Y/L	2.00	2.93	5.56	3.61
w/p	1.01	1.32	1.86	1.43
Y/K	1.77	1.47	1.29	1.48
L/Y	0.50	0.36	0.18	0.33
K/Y	0.57	0.68	0.78	0.69
0.r/p	1.12	1.06	1.10	1.09
K/L	1.13	2.01	4.39	2.62
w/r	0.90	1.24	1.73	1.33

Source: own calculations based on ASI data.

Chart: 3 Trends in Select Indicators



All the variables exhibit a mark changes in their magnitudes over the study period (see Table 3 and Figure 1). The share of labour (capital) has declined (increased) sharply over the years. Starting with 0.44 for the first period (1973-79), it has come down to just 0.28 for the last sub period (1992-01). Similar sharp change is noticeable for factor intensities. While labour intensity (L/Y) has declined persistently, capital intensity has moved up. In other words, average productivity of labour in Indian manufacturing bears an increasing trend in contrast to the falling trend in capital intensity. This has resulted an increase in the average real wage rate (w/p) and fall in the cost of capital (r/p). There exists a gap between the average productivity of factors and their real cost. The productivity of labour (Y/L) exceeds the wage rate (w/p) by more than two and a half times over the study period. The gap between the two has been widening over the years, which could be an indication that marginal productivity is increasing faster than the wage rate. Likewise, productivity of capital exceeds its real price (r/p), but to much lesser extent than in case of labour and the difference is falling over the years. To capture and compare the magnitude of change in the variables over years, growth figures of the select variables are shown in Table 4. All the variables demonstrate mark and distinct change. Growth in output shows a slight decline from 7.4% in first sub period to 5.2% in the third sub period. This has been accompanied by a weak growth in employment of labour and strong growth in use of capital. After registering an impressive growth of 4.6% per annum during the first sub-period, labour

employment during the second sub-period grew by a mere 0.2% (causing the jobless growth of the 1980s) and picked up slightly (0.9%) during the last sub period. Capital, on the other hand, recorded a strong growth at 8.4% over the entire study period, showing more consistency across the sub-periods. Due to differences in growth of labour and capital, growth in factor intensities of the two factors have moved differently. Labour intensity which declined at the rate of 2.6% during first sub period (1973–79) accelerated to a decline of 6.3% during the second sub-period (1980–91) on account of an increase in wages and job security regulations. The rate of decline during the third sub-period (1992–01) moderated to 4% even when relative price of labour was increasing at much faster rate than in the 1980s and job security regulations by and large remained the same. Much of the improvement in the decline in labour intensity during the last sub-period could be due to weakening technological bias. Unlike labour intensity, capital intensity changed noticeably only during the third sub-period. In the first sub-period and the second sub-period capital intensity increased at the rate of 0.8%, whereas in the third sub-period it increased at the rate of 3.2% per annum. A rapid increase in capital intensity during last sub-period could mainly be attributed to the decline in price of capital in the post-liberalization era.

Table 4: Growth rates of select indicators (%)

Variables	1973–1979	1980–1991	1992–2001	1973–2001
Qy	7.40	6.87	5.15	6.76
Ql	4.61	0.15	0.90	1.45
Qk	8.30	7.69	8.49	8.40
Y/L	2.67	6.71	4.22	5.23
Y/K	-0.83	-0.76	-3.08	-1.52
L/Y	-2.60	-6.29	4.05	-0.76
K/Y	0.84	0.77	3.18	1.54
K/L	3.53	7.53	7.53	6.85
Sk	0.99	1.78	-0.07	1.25
Sl -	1,20	-2.87	0.08	2.21
w/p	1.48	4.15	5.03	3.13
r/p	0.20	1.49	-2.49	0.07

(Source: Authors‘ own calculations based on ASI data)

Reflecting the mirror image of the growth in factor intensities, growth in productivity of labour and capital have moved in opposite directions. There has been a negative growth in labour intensity (L/Y) and a positive growth in capital intensity (K/Y), indicating labour-saving and capital-using technological bias in the production process. Productivity growth of both capital and labour witnessed a sharper fall during the third sub-period when compared with the second.

For capital, cheaper and easier access in the post-reforms period facilitated its larger use than earlier, but output did not increase proportionately. Decline in growth of labour productivity was because of improvements in employment in the 1990s, following the _jobless growth‘ of the

1980s (Goldar 2000). The downtrend in productivity of labour and capital in the post-reforms period could be among the chief reasons for the slowdown in productivity growth in the postreforms period as reported by many studies, including Das (2003) and Goldar (2004). The growths in relative factor use in response to the changes in relative factor prices of labour and capital have also been quite different. In response to labour growing relatively expensive (in comparison to capital) at the rate of 3.2% per annum, relative use of capital grew by 6.9%,

indicating a bias towards application of capital. There is, however, an indication that the difference between the two growth rates is declining. During the third sub-period (1992–01), relative use of capital grew by 6.9% in response to an increase in relative price of labour by 7.7%. Comparison of growth in productivity of factors with the corresponding growth in factors' prices reveals different pictures for labour and capital. Over the study period, productivity of labour grew much faster (5.2%) than the wage rate (3.1%). This is in conformity with the findings of Goldar and Banga (2005) that stated that the increase in productivity of labour in the organized manufacturing has been higher (5.8%) than the increase in the wage rate (3.1%) during 1975–99. Unlike the case of labour, the productivity of capital during the study period declined at the average annual rate of 1.5%, greater than the decline in its price at 0.1% per annum, thus indicating a bias towards capital use.

5. EMPIRICAL FINDINGS

Relation between price and marginal productivity

The estimates of marginal productivity of factors in the framework of CES production function show that they have significantly exceeded the respective factor prices for both labour and capital over the study. The extent of deviation for labour has been higher than that for capital. The high deviation between marginal productivity of labour and its price is an indication that firms have employed less labour than what would have been desirable for profit maximization. This could be the reason why employment in the organized manufacturing sector has not increased as fast as one expected. Analysis of deviation across periods shows that deviation between marginal productivity of labour and its price has been statistically significant during the first and third sub-periods, whereas during the second sub-period (what is called as the period of jobless growth), it has been statistically non-significant. For capital, the deviation has been statistically significant only during the third sub-period, indicating that capital in the post-reforms period (till the early 2000s)has been slightly under-deployed

Table:5 The marginal productivity of factors with their respective prices

Period	dY/dL	(w/p)	(dY/dL) - (w/p)	dY/dK	(r/p)	(dY/dK)-(r/p)
1973–79	1.19	1.01	0.18 (4.97)	1.12	1.12	0.0 (0.0)
1980–91	1.33	1.32	0.01 (0.34)*	1.09	1.06	0.02 (1.83)*
1992–01	2.23	1.86	0.37 (2.98)	1.20	1.10	0.10 (7.19)
1973–01	1.61	1.43	0.18	1.13	1.09	0.04 (3.95)

The above trace the marginal productivity of factors with their respective prices. For labour, the gap between marginal productivity and its price has widened significantly after 1989, with the exception of the last two years. Marginal productivity of labour in the post-reforms period increased considerably, possibly because of labour working with larger capital. Even though the price of labour increased too, it was much slower than the rise in productivity. The rising

gap between marginal productivity of labour and the wage rate can be pinned to rigid labour laws, which prevented firms from employing enough labour to equate its marginal productivity with price. In other words, in the post-reforms period, firms increasingly refrained from hiring labour, and sacrificed profit maximization. That labour was being paid less than their marginal products also indicates that their transfer price (wage) in the unorganized sector would be even smaller. is perhaps highlights the need for bringing a larger number of unorganized industries withinthe ambit of the organized ones to promote labour welfare further.

Though job security regulations have adversely affected employment growth in the 1990s, they don‘t seem to be the main reason for the jobless growth of the 1980s. The small gap between marginal productivity of labour and its price during the 1980s indicates that job security regulation had little role to play in jobless growth. If job security regulations had indeed caused jobless growth, marginal productivity of labour would have been higher than the wage rate because firms would have employed less labour than what would have been optimally desirable.

Elasticity of substitution and biased technical change

The estimations of elasticity of substitution with single and simultaneous equation models can be found in equations 17–20.19 Values of elasticity of substitution by all regressions were less than 1—ranging from 0.35 to 0.67—indicating non-applicability of the Cobb-Douglas production function for Indian aggregate manufacturing. In a single equation model, elasticity of substitution obtained through labour productivity equation was statistically non-significant at 5% level; whereas, the same obtained through capital productivity equation was statistically significant even at 1%.20 With SURE estimates, however, both equations resulted in statistically significant elasticity at 1%.21 Values of elasticity of substitution being less than 1, when K/L ratio has grown over the years, means that there would have been a decline in the share of capital if substantial labour-saving technical change had not taken place. Due to major labour-augmenting technical change, the share of capital increased over the study period.

Sources of Output Growth

The relative importance of different sources of output growth (value added in present study) - labour, capital, and productivity – have varied over time. The largest contribution over the study period came from capital (82%), followed by labour (12%) and productivity (6%). Wide variations are found in the sources of output growth across the study period. Share of capital increased from 55% in the first sub-period (1973-1979) to 89% in the second (1980-1991) to 95% in the third (1992-2001). The share of labour, on the other hand, came down from 28% in the first to only 2% in the second, and improved to 9% in the third. Reflecting a sense of worry, the contribution of productivity consistently declined from 17% in the first to 9% in the second to -5% in the third sub-period of the present study.

Productivity Growth

Productivity, 24 which grew merely by 0.4% during 1973–2001, has shown a persistent decline in its growth from 1.3% in the first sub-period (1973-1979) to 0.61% in the second (1980-1990) to - 0.2% in the third (1991-2001). Negative growth in productivity in the third sub-period, albeit marginal, may sound baffling when a host of economic reforms were implemented. The finding is, however, in line with other studies.25 These studies have reported deterioration in productivity growth in the post-reforms period.

6. SUMMARY AND CONCLUSION

The manufacturing sector is thought to hold a place of unique importance mainly for two reasons: It can provide large scale employment to labour force increasingly being displaced from shrinking agriculture sector, and secondly it can help in accelerating the GDP growth by virtue of its forward and backward linkages with other sectors of the economy. The present study attempts to identify the factors which can help in unlocking the employment potential of the manufacturing sector. An attempt is then made to identify the various sources of output growth. Since productivity is one of the most important factors, attempt is made to examine if economic reforms unleashed from 1991 had any impact on it. And lastly, study attempts to analyse the growth in output in manufacturing sector is sustainable in the face of ever increasing capital labour ratio. Analyses are based on CES production function, utilising the ASI data for a period from 1973/74 to 2001/02. To examine the impact of various economic policy over the years, the present study also analyses variables across the following three sub-periods: 1973/74–79/80 (first sub-period), 1980/81–91/92 (second sub-period), and 1992/93–01/02 (third sub-period).

Justification for applying CES production function is provided by the findings of the value of lasticity of substitution and technical change. Neither the elasticity of substitution between labour and capital was not found to be 1 nor was the technical change ‗Hicks neutral,' thus ruling outthe applicability of Cobb-Douglas production function for Indian manufacturing. The value of elasticity of substitution was found to be less much than 1, ranging between 0.35 and 0.67, depending upon the method of estimation. Similarly, technical change was biased with labour saving occurring at 6.7% and capital use increasing at 4.3 per cent per annum. Further, both elasticity of substitution and degree of biased technical change have declined in the post-reforms period, indicating that decline in share of labour could be arrested in future. Determinants of factor employment and their share have been identified in terms of technical change and factor prices. Decomposition of change in labour employment (L/Y), which declined at 5% per annum in 1973–01, reveals that 64% of the decline was due to labour-saving technical change and the remaining was due to rise in real wage rate. Wage rate, however, is increasingly becoming an important variable that determines employment. In fact, its share has moved from 25% in 1973– 79 to 53.3% in 1992–01. Thus, now both biased technical change and rising wages have become equally important determinants of manufacturing employment. Increasing the employment by reduction of wage rate however may not be possible as the wage rate is found to be smaller than the marginal product of labour. The solution, therefore, lies in reducing the degree of technical bias by making labour laws more flexible and loosening the job security regulations. Income share of labour, witnessing a fall at 2.2% per annum during the study period, has been the net result of biased technology (taking the share up) and wage rate (taking the share down). In the first two sub-periods, despite a rising wage rate, the share of labour fell because of considerable labour-saving technical change. In the last sub-period, however, the price effect was powerful enough to outweigh the negative effects of technical change, resulting in a marginal growth in share of labour (0.1%). With the influence of technical bias continuing to weaken and that of wage rate on the rise, the share of labour may accelerate upwards in future. Decomposition of the change in capital employment (K/Y), which increased at 1.5% per annum over the study period, reveals that as much as 97.2% of the increase, has been contributed by technical change alone, limiting the contribution of price factor to only 2.8%. As expected, the price factor strengthened in the post-reforms period, which saw real price of capital falling at 3% per annum and contributing almost half of the total increase in capital intensity. If capital price continues to decline further, it may further boost capital intensity and mitigate the effect of a declining technical bias in its favour. Income share of capital has been primarily governed by technology rather than the price factor over the study period. But the share contribution of price factor has increased fast over the years. In absolute terms, however, contribution of capital increased during first and second period and declined during the third sub period. Contribution of capital moved directly with the price of

capital indicating inelastic demand for capital. If the demand for capital was elastic—as would have happened if the labour policy was flexible—the growth in share of capital would have been positive even in the post- reforms period. With view to investigate the issue of employment of factors further, attempt is made to see whether factors have been paid according to marginal products. Interestingly, it was found that both labour and capital have been paid lower than their marginal product. The difference was sharper for labour, indicating that firms stopped employing labour before reaching the profit maximising situation. Thus, the deviation between marginal productivity of labour and its price could be the reason for the slow employment in the organised manufacturing sector. If this is the state of affairs of this sector then it also indicates that wages paid to labourers in the unorganized sector would be even lower than its marginal productivity. Hence, if the labour welfare promotion is important objective of the development process, then it becomes necessary to remove impediments for larger number of manufacturing industries to increase in size and remove the incentive for large employment intensive organised industries to fragment into smaller units. Across-the-sub-period, the analysis shows that deviation of marginal productivity of labour (MPL) from wages was statistically significant during the first and third periods. During the second sub-period (what is termed as jobless growth period), the gap between marginal productivity and wage rate was insignificant, implying that employment was close to optimum.

REFERENCES

Das, D. K. (2003), ―Manufacturing Productivity under Varying Trade Regimes: India in the 1980s and 1990s', *Working Paper No. 107*, ICRIER, New Delhi, July.

Fallon, Peter R., and Robert E.B. Lucas (1991), "The Impact of Changes in Job Security Regulations in India and Zimbabwe", *World Bank Economic Review*, vol. 5(3).

Ghose, Ajit K (1994), ―Employment in Organised Manufacturing In India', *Indian Journal of Labour Economics*, Vol 37, No 2, pp 143-60.

Goldar, B. N. (1986), *Productivity Growth in Indian Industry*, Allied Publishers, New Delhi.

Goldar, B. N. (2000), ―Employment Growth in Organized Manufacturing in India', *Economic and Political Weekly*, April 1, pp 1191-95.

Goldar, B. N. (2000a), ―TFP Growth in the Indian Manufacturing in the 1980s', *Economic and Political Weekly*, 37(49): 4966-68.

Goldar, B. N. and Anita Kumari (2003), ―Import Liberalization and Productivity Growth in Indian Manufacturing Industries in the 1990s', *Developing Economies*, December, 41(4): 436-60.

Goldar B. N. (2004), ―Productivity Trends in Indian Manufacturing in the Pre- and Post-Reform periods', *Working Paper No. 137*, ICRIER, New Delhi, June.

Goldar, B. and R. Banga (2005), ―Wage Productivity Relationship in Organised Manufacturing in India: A Statewise Analysis', *The Indian Journal of Labour Economics*, Vol. 48, No. 2.