Chapter III

Labour Demand Functions for The Indian Textile Industries
CHAPTER III

LABOUR DEMAND FUNCTIONS FOR THE INDIAN TEXTILE INDUSTRIES

3.1 INTRODUCTION

Industrialization has an important role to promote rapid growth and prosperity of independent India. The manufacturing sector, in India, has been quite phenomenal and has resulted in economic growth impelled by import substitution, export promotion and acquisition of modern technology. Despite of all these development programmes, there is a general failure in employment generation in the Indian industrial sector. The development economists believed that industrialization is an important instrument to achieve not only higher rates of growth but also achieving higher rates of employment.

Labour demand is a direct product of economic growth. There should be faster growth in productivity to employ more workforces resulting in the improvement of quality in labour force. Productive employment is the ultimate goal of economic development and poverty eradication.

In the post reform period, the Gross Domestic Product growth has not been accompanied by growth in higher rates of employment opportunities. The relationship between growth in GDP and employment can be calculated as the elasticity of employment with respect to GDP. The elasticity of employment indicates the expected rate of growth in GDP. The growth of the Indian manufacturing sector depends largely on factor productivities and substitution possibilities between labour and capital.

Increase in output is normally related to an increase in active labour force or employment generation. It shows positive employment elasticity in the industrial sector. Employment elasticities are typically expected to be less than unity because productivity per person employed is expected to increase over time, that means, employment increases less proportionally than the output.
The rate of growth of output was higher during the 1980's. But, the rate of growth of employment in the manufacturing sector declined to negligible levels during the 1990's. A World Bank study attributed it, to the increase in the level of real wages and inflexible laws with regard to firms to retrenchment of workers. Nagaraj and Bhalotra pointed out that basically increase in the hours of worked had been more important than increase in real wage rates for the decline in the rate of growth of employment in the manufacturing sector during the 1990's. Further, Bhalotra observed that technological change also contributed to the decline in the rate of growth of employment.

With the overall growth and development accomplished by the economy, wage rates would increase faster than the price of other factors of production. In this situation, firms would not only substitute capital for labour at the given level of technology, but they are also to be expected to bring about technological changes, so that the extents of substitution possibilities are enhanced.

Employment of labour is a derived demand depending on the level of output, factor prices and technology of production. Depending on whether factors like capital and materials are substitutes for or compliments with labour, changes in their prices would have a positive or negative effect on the employment of labour. An attempt in the present study has been made to examine the factors determining employment growth and analyse the short-run and long-run employment elasticities both in regard to real wages and output in the Indian textile industries for the period from 1980-81 to 1997-8. The analysis has been carried out at three-digit level of industrial disaggregation.

3.2 PATTERN AND STRUCTURE OF EMPLOYMENT GROWTH

Employment in India increased annually at a rate of around 2.00 percent per annum. Over the past four and half decades, the growth rate varied from decade to decade at less than one percent per annum in the 1950's, two per cent in the 1960's, slightly lower than two percent in the 1970's decelerating to about 1.8 percent in the 1980's. During the early 1990's it
further decelerated but rose to over two percent during 1992-97, and later it again decreased to about 1.00 percent.\textsuperscript{5}

The growth of employment needs to be seen in relation to demand and supply of labour. Labour demand is basically determined by the rate and the pattern of growth, particularly the former. One of the reasons for the slow growth of employment during the 1950's has been due to slower rate of GDP (3.5 percent) growth, as well as large investments made in infrastructure industries. This had a low potential for direct employment generation and were involving relatively long gestation periods. As a result, employment during this period grew slower vis-à-vis the GDP growth. Although the growth in GDP picked up in mid-1970's and accelerated during the 1980's, the growth in employment did not follow correspondingly. This was largely because of significant component of the GDP growth came from productivity growth. Further, the industries, which grow faster, were not employment intensive. In 1997-98 the growth of employment has been attributed not only to the increasing capital intensity of the economy but also due to much slower growth of labour force than expected\textsuperscript{6}.

The result of the 50\textsuperscript{th} round of the NSSO has shown sharp decline in the growth rate of employment from 2.04 percent per year in the period 1983-84 to 1993-94 to only 0.98 percent in the 1993-94 to 1999-2000. This phenomenon has raised considerable concern. Although this deceleration in employment has been associated with a sharp decline in the rate of growth of labour from 2.29 percent in the period 1987-88 to 1993-94 to only 1.03 percent in the period 1993-94 to 1999-2000\textsuperscript{7}. There is no doubt that the employment growth has been inadequate. The growth rate of employment is less than the growth rate of the labour force indicating an increase in the employment rate. When seen in terms of sectoral distribution, it is observed that the deceleration in the employment growth during 1994-2000 has been basically due to the stagnancy in agricultural employment which compound during the period 1983-84 to 1994-95. It co-incited with agricultural employment grew about 1.5 percent per
annum. As a result, the proportion of workers employed in agriculture, which declined from 68.5 percent in 1983 to 64.8 percent in 1999-2000. Another sector which has stagnated relates to the services. In fact, these two sectors viz, agriculture and services which provide a large share of employment have almost experienced employment elasticity to be stagnant during 1994-2000 as against 0.50 during 1983-94. Employment in sectors like trade, construction, financial services, transport, storage and communication has grown faster than the average and the share of these sectors in the total employment, therefore increased. The share of manufacturing to total employment has also increased but only marginally. The deceleration in employment growth and decline in employment elasticity in the organized manufacturing industry has been caused by the highly protective labour regime. Industry seems to have become inevitably more capital intensive in the wake of modernization and emergence of high technology segments in the manufacturing sector. Entrepreneurs seem to be making rational decision on the choice of technology in response to the demand in the domestic and international market. The trend is likely to continue and in fact, accelerate with liberalization and opening up of the economy, as the compulsions of international competition are likely to further reduce the employment intensity partially due to the need for cost reduction; but mostly for the reason of improving the quality of products. Let us now examine the theoretical background of the demand for labour in the textile industries in the following sections.

3.3 EMPLOYMENT AND SURPLUS LABOUR SUPPLY

Since the 1950's, the primary concern of the development theories and policies were centered on the question of output maximization rather than employment maximization. There are very few theories and growth models that are specifically employment oriented. The pioneering growth models of Harrod, Domar and Solow were originally intended to understand whether a matured capitalist economy would escape from the long run stagnation when a fixed proportion of its national income is consistently saved, for want of
profitable investment opportunities. When applied to the developing economies, these growth models, implicitly assumes, that the problem faced by the developing economies are centered on achieving rapid growth in per capita incomes rather than generating employment. Singer\textsuperscript{12} has modified Harrod's growth equation and applied it to the developing nations. From the results, he concluded that the growth of per capita national income was inversely proportional to the population growth. However, we do not find specific focus being, given for the objective of employment generation in the early growth models.

The models developed by Nurkse\textsuperscript{13} Lewis\textsuperscript{14} and Fei and Ranis\textsuperscript{15} Shows that it is possible to simultaneously fulfill the growth and employment objectives. The developing economies are characterized with redundant labour in the agricultural sector with marginal products often less than the prevailing product wage rate, the basic idea held by Lewis is that, if the redundant agriculture labour are transferred to the industrial sector by giving the wage equivalent to the prevailing agricultural wages, and if the remaining workers on land do not increase their consumption levels, then due to the fact that the industrial sector will realize output at rates greater than or equal to the prevailing agricultural wages, the system will be able to increase aggregate employment without imposing the need for additional savings. An 'unlimited supply of labour' i.e. a perfectly elastic labour supply curve will be available for the industrial sector at the subsistence wage ratio, so long as the redundant labour exists in the system. Hence, the Nurkse-Lewis model suggests an apparently costless way of creating additional employment, capital accumulation and output growth. However, one important limitation of their model is that there is no need of additional supply of labour required from agriculture. Further, Lewis believed that the surplus or the redundant labour from agriculture could be absorbed by industry as long as the wages in the industrial sector in real terms are just equal to the subsistence standards. According to Lewis the absorption process of labour will retain a sequential process and will work until the entire surplus labour or the redundant labour is provided with employment. In supposing constant industrial wages leading to
the absorption of labour in a cumulative process, Lewis assumes a number of things, which are not explicitly discussed by him. In essence the assumption that larger the capital input with which labour works will lead to higher levels of marginal productivity of labour implies that

$$\Theta^2 Q_o \lambda K > 0,$$

where $Q = f(k, L)$ is a typical production function formulation of the relationship between output growth and employment of factor inputs. Both the Cobb-Douglas and the Constant Elasticity of substitution (CES) production function meet this specification. In the Cobb-Douglas case:

$$Q = A K^\alpha L^\beta, \text{ where } \alpha, \beta > 0$$

$$MPPL = \alpha Q / \alpha L = \beta A L^{1-\beta} K^\alpha$$

And

$$\Theta^2 Q / \alpha L K = \alpha A K^{p-1} \beta L^{p-1} > 0$$

In the CES production function

$$Q = \lambda \left[ \alpha K^{p-1} \beta L^{-p} \right] ^{-1/p}$$

Where $\lambda$ is the efficiency parameter, $\alpha$ and $\beta$ are the distribution parameters of capital and labour respectively and $p$ is the substitution parameter.

$$\alpha Q / \alpha L = \alpha \lambda^p (Q/L)^{(1+p)}$$

It is evident here as well, that as $K$ increases $Q$ increases and so $MPPL$ also increases. However, the new capital may embody, labour saving technical progress. Apart from such technical progress, one can visualize a disembodied technical progress which would tend to reduce the demand for labour given the wage rate.

### 3.4 TWO VIEWS ON EMPLOYMENT AND FACTOR SUBSTITUTION

Regarding the effect of low wages on factor substitution, there are two strongly conflicting views. Reynolds, Reynolds and Gregory, Galenson and Leibenstein and Miller pointed out that low employment generation in the industrial sector is primarily due to high real wages and low interest rates.
prevailing in the industrial sector. They argued that industrial wages are pushed up by trade union pressures and governments minimum wage regulations. Therefore these forces are responsible for the substitution of labour for capital, i.e. for labour saving innovations in the industrial manufacturing sector. They thus considered a high elasticity of substitution between labour and capital (\( \sigma \)) being responsible for the low level of employment.

Eckaus\(^{20} \) on the other hand argued that low employment in the industrial sector is essentially due to the zero or low substitutability between labour and capital which in turn characterize the production iso-quants assuming the property of right angled triangles or assuming steep curvatures. Therefore, he held that to absorb the excess supply of labour in the system, additional capital is rendered necessary in the process of output growth. But since developing nations are capital constrained, employment will be intensive to wages and rents.

3.5 REVIEW OF LITERATURE

The following section deals with a brief summary of selected studies that have support the present scope of the study.

Nikolaos Dritsakis\(^{21} \) made an effort in order to investigate the nexus of dynamic interrelations between the general macro-economic environment of Greek economy with a special reference to the real wage determination, for the causality analysis among real wages, consumer prices index, labour productivity, unemployment rate and gross domestic product, a multivariate auto regressive VAR model was used, covering the period 1960:1 until 2005:IV. Granger causality test based on error correction models (ECM) showed that there is a strong granger casual relation among labour productivity, real wages, rate of unemployment and GDP as well as between real wages and unemployment rate and also among unemployment rate, real wages GDP.

Rana hasan, Devashish mitra, and K.V. Ramaswamy\(^{22} \) using industry level data desegregated by states, finds a positive impact of trade liberalization on (at the absolute value of) labour demand elasticities in the Indian manufacturing sector.
The magnitudes of these elasticities turn out to be negatively related to protection levels that vary across industries and over time. Furthermore, they find that these elasticities are not only larger in size for Indian states with more flexible labour regulations, they are also impacted there to a larger degree by trade reforms. Finally, we find that the reforms have led to a reduction in the share of labour in total output and value added, possibly due to the reduction in the bargaining power of the people.

Mine Zeynep Senses\textsuperscript{23} estimated effects of outsourcing on conditional labour demand elasticities. The study shows that the increased possibility of outsourcing should increase labour demand elasticities. He used the US census bureau’s constitutional research database (LRD) for the years 1980-1992. The instrumental variable approach used in the estimation of labour demand equations is the main methodological contribution of this paper.

Takahiro Safo\textsuperscript{24} argues the issues relating to the effects of the economic regulation on a firm’s demand for labour in India. It focuses on the textiles and apparels industries on the one hand which have been one of the largest industries in the Indian economy for long time and industrial dispute act on the other hand which requires that any firm employing more than 100 workers must get the permission from the government in order to retrench or lay-off even a single worker. The data used for this study is taken from CSO’s annual surveys of industries and NSSO’s informal non-agricultural enterprises.

Bhandari, Amit.K and Heshmati, Almas\textsuperscript{25}, provides an empirical investigation of the adjustment process of labour in Indian manufacturing industries, which evolved through structural transformation in the era of globalization. The analysis is based on the dynamic modal applied to a panel of 22 two-digit manufacturing industries for the time period of 22 years. Covering 1980-81 to 2001-02. It assumes that the competition increases industries adjust their employment to a desired level which is both industry and time specific. The result indicates that the manufacturing sector has shown a considerable dynamism in adjusting its workforce. The long run labour demand responds
greatest to the output, followed by capital and least by wages. It is observed that Indian manufacturing is not inefficient in labour use as modest speed of adjustment has led employment size closer to the optimal level.

Elisa Riihimaki\textsuperscript{26} by using theoretical model and empirical analysis, it investigates the effects of the economic integration on the elasticity of labour demand with own price. In a general theoretical model of intra-industry trade, the study analysis, how economic integration changes the labour demand elasticity. The study shows that intensified trade competition increases the labour demand elasticity. Where as better advantage of economies of scale decreases the elasticity of labour demand by decreasing elasticity of substitution between differentiated products. If integration gives rise to an increase in input substitutability and /or outsourcing activities , labour demand will become more elastic, the study test the idea whether European integration has changed the labour demand elasticities in Finland using the data from the manufacturing sector from 1975 to 2002. Overall the result provides support for the hypothesis that economic integration has contributed to increased elasticities of total labour demand.

Suresh Chandra Agarwal\textsuperscript{27} estimated the demand for labour in respect of (1) the use of kink method to find out the growth rates for the sub periods of structural breaks (II) testing the structural breaks with the help of CHOW test (III) testing the time series for stationary (IV) the use of capital cost as input in labour demand function.(V) the estimation of the function separately for production and non-production works and (VI) estimation of the functions with the help of instrumental variables method. It has been observed that the kink method is the most appropriate for finding out growth rates. Instrument variable method, which provides consistent estimates, gives higher values for short run elasticities and lower values for long run elasticities as compared to OLS. Therefore, any employment projections based on OLS estimates will be biased and have far reaching policy consequences.
Pravin Krishna, Devashish Mitra and Sajjid Chinoy\textsuperscript{28} says, in the recent debate over the impact of trade reforms on factor markets, it has been argued that trade liberalization will lead to an increase in the labour demand elasticities, placing labour markets under increased pressure. They test this idea using Turkish plant-level data spanning the course of dramatic trade liberalization. They were unable to find any empirical support for this supposed theoretical link in most of the industries, they cannot reject the hypothesis of no relationships between trade openness and labour demand elasticities.

M. Upender\textsuperscript{29} with a view to generating empirical information, an attempt is made in this paper to estimate the elasticity of labour productivity so as to find the substitution possibilities of labour for capital in the Indian manufacturing sector covering the period 1973-74 to 1989-90. The results shows that there is need to redirect the Indian manufacturing sector towards greater use of labour intensive technology until the marginal productivity of labour is equal to marginal wage rate.

Mohan\textsuperscript{30} examined the association between employment and economic growth and the relationship between employment growth and other variables like labour productivity, capital intensity per worker etc. The empirical examination revealed that growth rate in employment and economic growth was statistically not significant. But, growth during 1980-81 to 1999-2000 can not be described as jobless growth as growth itself has not been statistically significant during this period. Increase in growth during the 1980’s has just been sustained in the 1990’s.

Heshmat, Almas\textsuperscript{31} has estimated labour demand and efficiency in Swedish saving banks. The model employed was generalized to incorporate a variance function. A flexible translog functional form was used where the demand for labour was treated to be a function of wages, output, quasi-fixed inputs and a time variable. The variance function appears multiplicatively with the demand function and it accommodates both positive and negative marginal effects with respect to the determinants of employment. The labour productivity and
efficiency has defined in terms of a shift in the labour demand over time and the bank’s distance from the labor demand frontier respectively.

Maarten Goos\textsuperscript{32} examines labour demand, firm growth and the evolution of industries for Belgium covering the period 1986-1995. The study used a new approach to study the gross job flows which is the traditional focus on the aggregate employment stock and its net changes over time. The result shows that initial firm size and age are negatively related to firm growth. A 10.00 percent increase in employment was found that account for a 0.41 percent decrease in the growth rate of the average firm. Based on the same reasoning a 10.00 percent increase in the firm’s age has resulted in a 0.34 percent decrease in the average growth rate of firms. It can be summarized that small and young firms grow at the higher rates, but at the same time it seems that small firms have the poorest foresight of staying in business. He found inverted U-shaped relationships exist between firm’s survival and firm employment size. Hence, differences in employment behaviour not only seen between sectors but also within sectors.

Beng\textsuperscript{33} in his study on the performance of small firms under adversity has derived a labour demand function for Singapore manufacturing industries. He had used the data from the census of industrial production of Singapore and estimated three equations for small, medium, and large firms for the period 1973-86. He found that cost factor to be important than the output factor in determining labour demand in the small and medium firms of Singapore. Both wage rate and output factors were found important in the labour demand function in the large firms.

Dhananjayan\textsuperscript{34} has studied employment and productivity relationships for the Indian two-digit manufacturing industries for the period 1973-74 to 1982-83, using the ASI data, he has fit two labour demand functions and found that the elasticity of factor substitution was less than unity in the Indian manufacturing industries. In the first model, the wage rate coefficient was negative in 17 industries and the output coefficient was positive in 14 industries. The time trend coefficient was positive in 11 industries. In the
lagged model the inverse relationship between the level of employment and wage rate was found in 13 industries and the output elasticity was positive in 17 industries. The lagged labour coefficient has shown the existence of significant time lag in the adjustment of labour demand in the Indian two digit manufacturing industries.

Goldar in a study of labour demand in Indian industries has derived a labour demand function from the CES production function. He used the data from the ASI reports for 20 industries which accounted to 87 percent of the value added in total manufacturing in 1977. The empirical results have shown that output and real wages are the two major determinants of industrial employment. It was also found that employment responded to changes in output and real wages only when there was a one year time lag.

Diwan and Gujarati have been estimated the labour demand function for the Indian manufacturing industries using the CMI data for the manufacturing sector for the period 1946-1958. They have estimated the function for 28 industries. They found that the short-run and long run coefficients of labour demand with respect to output were significantly less than unity in many industries in India.

Krishna studied the demand function for labour in Indian industries by combining the CMI and ASI data for the periods 1951-1958 and 1959-1965, respectively and estimated the function for the aggregate manufacturing sector. He found for the manufacturing sector the short run elasticity was close to unity and the long-run elasticity tending to be above unity.

Rajalakshmi studied employment and productivity relationships in the Metals and Metal products manufacturing industries (MM Group) in the Rajasthan state and All India for the period 1960-1973. The elasticity of employment with respect to output in six product categories tended to assume values less than one in Rajasthan and All India level. The coefficient of time on employment was not significantly different from zero in a number of product groups in Rajasthan.
3.6 ESTIMATION OF LABOUR DEMAND FUNCTIONS

To examine the factors determining employment growth in the Indian textile industries, two labour demand models have been arrived by using CES production function. The study incorporated an additional explanatory variable in one of the model, which is based on the assumption that the growth in current year employment is positively dependent on the level of employment lagged by one year. The CES production function stated by ACMS

\[ Q_{(0)} = \gamma [\alpha (L_{(0)}) - p + \beta (K_{(0)})]^p h^{1/p} \]

(1)

Where,

- \( Q \) - Output
- \( t \) - The time subscript or the year subscript
- \( \gamma \) - Efficiency parameter
- \( \alpha, \beta \) - Distribution parameters
- \( h \) - Degree of homogeneity or scale parameter
- \( L \) - Labour
- \( P \) - Substitution parameters
- \( K \) - Capital

The elasticity of substitution between labour and capital, \( \sigma \) is given by:

\[ \sigma = \left[ \frac{1}{1 + \rho} \right] \quad \text{And so} \quad \rho = \left[ \frac{1 - \sigma}{\sigma} \right] \]

For this purpose the original CES production functions slightly modified by replacing the efficiency parameter \( \gamma \), by separate labour augmenting factor \( (\lambda) \) and capital augmenting factor \( (K) \)

\[ Q_{(0)} = [\alpha e^{\lambda L_{(0)}} - p + \beta e^{\beta K_{(0)}}]^p h^{1/p} \]

(2)

Where "e" is the Naperian logarithmic base 2. 718
e \lambda t \cdot L \cdot (t) is regarded as the efficiency of labour and e \kappa t \cdot K \cdot (t) is regarded as the efficiency of capital. The elasticity of substitution in the CES production function is given by:

\[ \sigma = \left[ \frac{1}{1 + \rho} \right] \quad \text{and so} \quad \rho = \left[ \frac{1 - \sigma}{\sigma} \right] \quad \text{........................................ (3)} \]

So assuming

\[ \lambda = K \text{ ie, } e^{\lambda t} = e^{kt} \text{ can be factored out and it takes the place of } \lambda. \]

We can rewrite the equation (2) as:

\[ Q = \alpha e^{\lambda t} L^{[\frac{\sigma}{\alpha}]} + \beta e^{\kappa t} K^{[\frac{\sigma}{\sigma}]} \quad \text{........................................ (4)} \]

In equation (4) we have substituted (\sigma / \alpha) for -\rho and for convenience the subscript 't' is omitted.

The marginal physical product of labour MPPL is then equal to

\[ \frac{\partial Q}{\partial L} = h \alpha e^{\lambda t} L^{[\frac{\sigma}{\alpha}]} [Q]^{[\frac{\sigma - \sigma + 1}{\sigma}] - \alpha} \quad \text{........................................ (5)} \]

Since profit maximization requires that MPPL should be equal to the product wage, viz, the real wage, it can be written that \( \frac{dQ}{dL} = w/p \), where 'w' is the wage paid in money terms, of nominal wage and 'p' is the price of the output used as the money wage deflator to arrive at the real wage.

Solving equation (5) for L, we get,

\[ L = \left[ \frac{w}{p} \right]^{-\sigma} [h - \alpha] e^{(\sigma - 1)\lambda t} [Q]^{[\frac{\sigma - \sigma + 1}{\sigma}] - \alpha} \quad \text{........................................ (6)} \]

Calling w/p = w and expressing the equation in the logarithms, we get

\[ LN(L) = -\sigma LN(w)LN(h\alpha)^\sigma + \left[ (\sigma - 1)^\lambda \right] + \left[ \frac{\sigma h - \sigma - 1}{\alpha} \right] LNQ \quad \text{.............. (7)} \]
For the purpose of estimation we call

\[ \ln (h.a)^{\sigma} = \alpha \]
\[ (\sigma-1)^{\lambda t} = \beta_3 \]
\[ -\sigma = \beta_1 \]

\[ \left[ \frac{\sigma h - \sigma - 1}{h} \right] = \beta_2 \]

And arrive at the labour equation by slightly rearranging the terms and defining the value added as ‘V’ we get regression equation (8)

**3.6.1 LABOUR DEMAND FUNCTION-I**

\[ \ln (L) = \alpha + \beta_1 \ln (w) + \beta_2 \ln (V) + \beta_3 (t) + \mu \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (8) \]

The \( \beta_1 \) coefficient is the elasticity of substitution between the two factor inputs labour and capital i.e. \( \sigma \). It measures the elasticity of labour demand with respect to real wage. Higher the magnitudes of \( \sigma \), the more are the adverse effects of a rise in real wage on employment. Alternatively it follows that more are the favorable effects of a fall in real wage in creating more employment. The coefficient \( \beta_2 \) measures the elasticity of labour demand with respect to changes in the volume of output.

Another variant of the labour demand function derived from the CES production function assumes, that there exists a lagged effect of the past year’s employment on the current year’s demand for labour. The new estimating form incorporates the above assumption, in equation (8)

**3.6.2 LABOUR DEMAND FUNCTION-II**

\[ \ln (L_t) = \alpha + \beta_1 \ln (w_t) + \beta_2 \ln (V_t) + \beta_3 \ln (L_{t-1}) + \mu \ldots \ldots (9) \]

\( L_t \) - all employees in the current year.
\( W_t \) - wage rate in the current year
\( V_t \) - value added in the current year
\( L_{t-1} \) - all employees with one year time lag
The $\beta_1$ coefficient is expected to be negative, since it measures the elasticity of labour demand with respect to growth in wage rates. The $\beta_2$ measuring the elasticity of labour demand with respect to output growth is expected to be positive. The assumption about the lag structure underlying this model requires $\beta_3$ to be positive. The short-run elasticity of employment with respect to the real wage is given by $\beta_1$ and the long run elasticity of employment with respect to real wages by $\frac{\beta_1}{1-\beta_3}$ similarly, the short run elasticity of employment with respect to output is given by $\beta_2$ and the long-run elasticity of employment with respect to output by $\frac{\beta_2}{1-\beta_3}$. We expect the long-run elasticities to be longer than the short run ones.

3.7 RESULTS AND DISCUSSIONS:

The following section deals with, detailed discussion of the nature and characteristics of the factors determining labour demand in the three digit level Indian textile industries during the period 1980-81 to 1997-98

3.7.1 REGRESSION ESTIMATES OF LABOUR DEMAND FUNCTION:
MODEL I

Table 3.1 presents the regression estimates of the labour demand function-1, fit for the 15 Indian textile industry categories at three digit level desegregation.

The coefficient of multiple determination $R^2$ has been quite high and emerged statically significant in all the 14 industry categories except for the industry category engaged in Manufacture of water proof textiles fabrics (268).

The coefficient $\beta_1$ measuring the impact of wage rate on employment has observed the specified negative sign in the following 11 industries, viz, Cotton ginning, cleaning and bailing (230), Cotton Spinning, Weaving and processing in mills (235), Bleaching, dyeing and printing of Cotton textiles (236), Manufacture of knitted or crocheted textile products (260), Manufacture
of all types of threads, cordage, ropes, twines, and nets etc. (261), Embroidery work, zari work and making ornamental trimmings (262), Making of blankets, shawls, carpets, rugs and other similar textiles products (263), Manufacture of rain coats, hats, caps and school bags etc. from waterproof textiles (266), Fabrics or plastic sheetings, manufacture of made up textile article; expect apparel (267), Manufacture of waterproof textiles fabrics (268) and Manufacture of textile/textile products n.e.c. like linoleum, padding, wadding upholesting and filling etc. (269).

The $\beta_1$ was positive and less than one in the following industries, Weaving and finishing of cotton textiles in handlooms (233) and Weaving and finishing of cotton textiles on powerloom (234), indicating increasing real wages leading to additional employment at less than proportionate rate.

The $\beta_2$ coefficient measuring the elasticity of employment on account of output growth has obtained theoretically specified positive sign property in all the 15 industries. Of the 15 industries, in 11 industry categories the elasticity of employment on account of output growth has emerged statically significant. These include Cotton ginning, cleaning and bailing (230), Weaving and finishing of cotton textiles in handlooms (233) and Weaving and finishing of cotton textiles on powerloom (234), Cotton Spinning, Weaving and processing in mills (235), Manufacture of knitted or crocheted textile products (260), Manufacture of all types of threads, cordage, ropes, twines, and nets etc. (261), Embroidery work, zari work and making ornamental trimmings (262), Manufacture of all types of textile garments and clothing accessories n.e.c. (expect by purely tailoring establishments) from not self-produced material (265), Fabrics or plastic sheetings, manufacture of made up textile article; expect apparel (267), Manufacture of waterproof textiles fabrics (268) and Manufacture of textile/textile products n.e.c. like linoleum, padding, wadding upholesting and filling etc. (269). The $\beta_2$ assumed in all the 15 industries, indicating a positive relationship between output growth and employment.
The time trend coefficient $\beta_3$ by assuming positive magnitudes has satisfied the model specification in nine out of the 15 textile industry categories. The $\beta_3$ was statistically significant in seven industry categories, viz, Cotton ginning, cleaning and bailing (230), Weaving and finishing of cotton textiles in handlooms (233), Bleaching, dyeing and printing of Cotton textiles (236), manufacture of floor covering of jute, mesta, sannhemp, and other kinder fibers and coir (264), Manufacture of all types of textile garments and clothing accessories n.e.c. (expect by purely tailoring establishments) from not self-produced material (265), Manufacture of waterproof textiles fabrics (268) and Manufacture of textile/textile products n.e.c. like linoleum, padding, wadding upholstesting and filling etc. (269).

In the industries engaged in Weaving and finishing of cotton textiles in handlooms (233), Weaving and finishing of cotton textiles on powerloom (234), Embroidery work, zari work and making ornamental trimmings (262), manufacture of floor covering of jute, mesta, sannhemp, and other kinder fibers and coir (264), Manufacture of all types of textile garments and clothing accessories n.e.c. (expect by purely tailoring establishments from not self-produced material (265), the $\beta_3$ assumed negative values, indicating that, time rate of employment growth in these industries being retrogressive in nature.

3.7.2 REGRESSION ESTIMATES OF LABOUR DEMAND FUNCTION: MODEL II

The coefficient of multiple determinations $R^2$ of the fit model has emerged statistically significant in 13 out of 15 industry categories. The wage rate coefficient $\beta_1$ has assumed the specified negative sign in 11 out of 15 industries, and has emerged statistically significant in six industries, which include, Cotton ginning, cleaning and bailing(230), Bleaching, dyeing and printing of Cotton textiles (236), Embroidery work, zari work and making ornamental trimmings (262), Manufacture of rain coats, hats, caps and school bags etc. from waterproof textiles (266), Fabrics or plastic sheetings, manufacture of made up textile article; expect apparel (267), Manufacture of
textile / textile products n.e.c. like linoleum, padding, wadding upholstesting and filling etc. (269).

The coefficient $\beta_1$ has assumed the specified positive sign in four industries viz, Weaving and finishing of cotton textiles in handlooms (233), Weaving and finishing of cotton textiles on powerloom (234), manufacture of floor covering of jute, mesta, sannhemp and other kinderd fibers and coir (264), Manufacture of all types of textile garments and clothing accessories n.e.c. (expect by purely tailoring establishments) from not self-produced material (265) and has emerged statistically significant in industry engaged in manufacture of floor covering of jute, mesta, sannhemp, and other kinderd fibers and coir (264).

The output coefficient $\beta_2$ has obtained positive sign in all the 15 industry categories and statistically significant in 11 industry categories, viz, Cotton ginning, cleaning and bailing (230), Weaving and finishing of cotton textiles in handlooms (233), Weaving and finishing of cotton textiles on powerloom (234), Cotton Spinning, Weaving and processing in mills (235), Manufacture of knitted or crocheted textile products (260), Manufacture of all types of threads, cordage, ropes, twines, and nets etc. (261), Embroidery work, zari work and making ornamental trimmings (262), Manufacture of all types of textile garments and clothing accessories n.e.c. (expect by purely tailoring establishments) from not self-produced material (265), Fabrics or plastic sheetings, manufacture of made up textile article; expect apparel (267), Manufacture of waterproof textiles fabrics (268), Manufacture of textile/textile products n.e.c. like linoleum, padding, wadding upholstesting and filling etc. (269) it shows that the employment growth is a positive function of output growth.

The coefficient $\beta_3$ which measures, the elasticity of change in the current year employment due to the lagged-effect of the employment in the previous year has in 10 out of 15 industries, satisfied the theoretical specification by assuming positive magnitudes, among them, four industry were statistically
significant. Viz, Cotton ginning, cleaning and bailing (230), Bleaching, dyeing and printing of Cotton textiles (236), Fabrics or plastic sheetings, manufacture of made up textile article; expect apparel (267), Manufacture of textile/textile products n.e.c. like linoleum, padding, wadding upholstery and filling etc. (269), in five out of 15 industries showed implausible negative values.

3.7.3 SHORT RUN AND LONG RUN EMPLOYMENT ELASTICITIES

Table 3.3 present the short run and the long run employment elasticities both in regard to real wages and output for the Indian textile industries at the three digit desegregation for the period 1980-81 to 1997-98.

The long run elasticity in general is expected to be greater than the short run ones. From the table (3.3) the mean value of the short run employment elasticity with respect to real wages has shown a positive relationship of the order of 0.8063, while in the long run the mean value has assumed the higher magnitude of 0.8263. From the results, it can be concluded, when the real wages are increasing the employment tends to reduce in the short run and when the real wages increasing, the employment tend to increase in the long run.

The empirical estimates clearly shows, that employment growth in Indian textile industries has been quite sensitive to changes in real wages over the study periods.

3.7.4 ELASTICITY OF EMPLOYMENT WITH RESPECT TO OUTPUT

A similar analysis of employment elasticity with respect to output shows that on an average in the textile industries, we find the mean value of the long run elasticities are greater than the short run elasticity. The short run employment elasticity of output magnitude less than their long run elasticities, in the following industries viz, Cotton ginning, cleaning and bailing (230), Cotton Spinning, Weaving and processing in mills (235), Bleaching, dyeing and printing of Cotton textiles (236), Manufacture of all types of threads, cordage, ropes, twines, and nets etc. (261), Making of blankets, shawls, carpets, rugs and other similar textiles products (263), Manufacture of rain coats, hats,
caps and school bags etc. from waterproof textiles (266), Fabrics or plastic sheetings, manufacture of made up textile article; expect apparel (267), Manufacture of waterproof textiles fabrics (268), Manufacture of textile/textile products n.e.c. like linoleum, padding, wadding upholesting and filling etc. (269).

In the remaining five industries, the short run elasticity of employment due to output growth is greater than the long run increase in output growth on employment.

The empirical estimation of employment function explained above has been immensely useful in showing that the level of real wages and the growth of output are the two most important determinants of the rate of change in the employment in the Indian textile industries.
NOTES AND REFERENCES


2. World bank (1989) India poverty, employment and social services’ a World Bank country study, World Bank, Washington DC


5. Planning commission, five year plans documents, government of India. New Delhi.


7. Planning commission reports on labour and employment economic India INFO services, Academic foundation, Bharath ram road. New Delhi


9. Harrod P.F (1939) ”An essay on dynamic theory” Economic journal, vol.39,


### LABOUR DEMAND- I

Estimates of labour demand function for Indian textile industries during 1980-81 to 1997-98

\[ \ln(L) = \ln(a) + \beta_1 \ln(W/L) + \beta_2 \ln(V) + \beta_3 T + \mu \]

<table>
<thead>
<tr>
<th>Ind code</th>
<th>( \alpha ) (t.a)</th>
<th>( \beta_1 ) (t.( \beta_1 ))</th>
<th>( \beta_2 ) (t.( \beta_2 ))</th>
<th>( \beta_3 ) (t.( \beta_3 ))</th>
<th>( R^2 )</th>
<th>( F )</th>
<th>( R^2 )</th>
<th>( \sigma )</th>
<th>D-W</th>
</tr>
</thead>
<tbody>
<tr>
<td>230</td>
<td>4.459954</td>
<td>-0.86229</td>
<td>0.215762</td>
<td>0.036426</td>
<td>0.629996</td>
<td>0.555088</td>
<td>0.86229</td>
<td>2.440548</td>
<td></td>
</tr>
<tr>
<td>233</td>
<td>2.470183</td>
<td>0.380441</td>
<td>0.500755</td>
<td>-0.04698</td>
<td>0.697351</td>
<td>0.632496</td>
<td>-0.380441</td>
<td>1.843887</td>
<td></td>
</tr>
<tr>
<td>234</td>
<td>3.66044</td>
<td>0.014435</td>
<td>0.200563</td>
<td>-0.00138</td>
<td>0.814187</td>
<td>0.774369</td>
<td>-0.014435</td>
<td>1.328445</td>
<td></td>
</tr>
<tr>
<td>235</td>
<td>5.017055</td>
<td>-0.65531</td>
<td>0.302513</td>
<td>0.040071</td>
<td>0.841392</td>
<td>0.80479</td>
<td>0.655311</td>
<td>1.606933</td>
<td></td>
</tr>
<tr>
<td>236</td>
<td>5.4154</td>
<td>-1.68251</td>
<td>0.117995</td>
<td>0.072395</td>
<td>0.729649</td>
<td>0.671717</td>
<td>1.68251</td>
<td>1.440627</td>
<td></td>
</tr>
<tr>
<td>260</td>
<td>2.85191</td>
<td>-0.46407</td>
<td>0.479553</td>
<td>0.013208</td>
<td>0.96192</td>
<td>0.95376</td>
<td>0.46407</td>
<td>2.566662</td>
<td></td>
</tr>
<tr>
<td>261</td>
<td>6.349477</td>
<td>-0.97923</td>
<td>3.859646</td>
<td>0.595755</td>
<td>117.8831</td>
<td>0.869954</td>
<td>0.41625</td>
<td>1.336247</td>
<td></td>
</tr>
<tr>
<td>262</td>
<td>7.423783</td>
<td>-0.41625</td>
<td>0.292651</td>
<td>0.022888</td>
<td>0.892904</td>
<td>0.869954</td>
<td>0.41625</td>
<td>1.336247</td>
<td></td>
</tr>
<tr>
<td>263</td>
<td>4.957295</td>
<td>-1.10967</td>
<td>0.175869</td>
<td>0.040441</td>
<td>0.296167</td>
<td>0.843833</td>
<td>0.810369</td>
<td>0.65414</td>
<td></td>
</tr>
<tr>
<td>264</td>
<td>2.65643</td>
<td>1.468607</td>
<td>0.053531</td>
<td>-0.08976</td>
<td>0.797597</td>
<td>0.145346</td>
<td>0.55842</td>
<td>0.90494</td>
<td></td>
</tr>
<tr>
<td>265</td>
<td>7.54999</td>
<td>2.738688</td>
<td>0.4179</td>
<td>-4.61218</td>
<td>18.38969</td>
<td>0.754225</td>
<td>-1.466807</td>
<td>2.22109</td>
<td></td>
</tr>
<tr>
<td>266</td>
<td>1.902954</td>
<td>1.819531</td>
<td>0.403773</td>
<td>-0.07482</td>
<td>0.97725</td>
<td>0.972952</td>
<td>-1.819531</td>
<td>0.502002</td>
<td></td>
</tr>
<tr>
<td>267</td>
<td>2.758759</td>
<td>2.185198</td>
<td>3.705477</td>
<td>-1.892311</td>
<td>204.8387</td>
<td>0.972952</td>
<td>-1.819531</td>
<td>0.502002</td>
<td></td>
</tr>
<tr>
<td>268</td>
<td>3.839718</td>
<td>-1.01038</td>
<td>0.042436</td>
<td>0.014495</td>
<td>0.744813</td>
<td>0.690131</td>
<td>1.01038</td>
<td>1.749448</td>
<td></td>
</tr>
<tr>
<td>269</td>
<td>7.55359</td>
<td>-2.95131</td>
<td>0.38663</td>
<td>0.059112</td>
<td>13.62061</td>
<td>0.936712</td>
<td>0.92493</td>
<td>2.417305</td>
<td></td>
</tr>
<tr>
<td>271</td>
<td>2.443896</td>
<td>-1.892**</td>
<td>0.544386</td>
<td>0.034177</td>
<td>0.94788</td>
<td>0.936712</td>
<td>0.92493</td>
<td>2.417305</td>
<td></td>
</tr>
<tr>
<td>272</td>
<td>3.425633</td>
<td>-1.51986**</td>
<td>2.118652**</td>
<td>0.07736</td>
<td>0.272347</td>
<td>0.116421</td>
<td>0.41357</td>
<td>1.762875</td>
<td></td>
</tr>
<tr>
<td>273</td>
<td>2.69211</td>
<td>-0.58287</td>
<td>0.392861</td>
<td>0.030176</td>
<td>0.50048</td>
<td>0.879154</td>
<td>0.58287</td>
<td>2.881634</td>
<td></td>
</tr>
<tr>
<td>274</td>
<td>7.370581</td>
<td>-2.22683**</td>
<td>2.634154**</td>
<td>1.859864**</td>
<td>42.22513</td>
<td>0.879154</td>
<td>0.58287</td>
<td>2.881634</td>
<td></td>
</tr>
</tbody>
</table>

Note:
- * = 't' significant at 95 percent ** = 't' significant at 90 percent
- @ = 'F' significant at 99 percent significant @@ = 'F' significant at 95 percent
LABOUR DEMAND-2
Estimates of labour demand function for Indian textile industries during 1980-81 to 1997-98

\[ \text{LN (L)} = \alpha + \beta_1 \text{LN (W/L)} + \beta_2 \text{LN (V)} + \beta_3 (\text{LT-1}) + \mu \]

<table>
<thead>
<tr>
<th>Ind code</th>
<th>( \alpha ) (t a)</th>
<th>( \beta_1 ) (t B1)</th>
<th>( \beta_2 ) (t B2)</th>
<th>( \beta_3 ) (t B3)</th>
<th>R2</th>
<th>F</th>
<th>R2</th>
<th>F</th>
<th>( \sigma )</th>
<th>D-W</th>
</tr>
</thead>
<tbody>
<tr>
<td>230</td>
<td>4.510881</td>
<td>12.81047*</td>
<td>0.205864</td>
<td>0.033997</td>
<td>0.585617</td>
<td>0.84999</td>
<td>-12.81047</td>
<td>2.419259</td>
<td></td>
<td></td>
</tr>
<tr>
<td>233</td>
<td>2.440863</td>
<td>6.459341*</td>
<td>0.498556</td>
<td>-0.04739</td>
<td>9.545383</td>
<td>0.626733</td>
<td>-0.375873</td>
<td>1.792734</td>
<td></td>
<td></td>
</tr>
<tr>
<td>234</td>
<td>3.666737</td>
<td>15.1035*</td>
<td>0.198179</td>
<td>-2.8E-06</td>
<td>8.102547</td>
<td>0.79647</td>
<td>-0.011704</td>
<td>1.299743</td>
<td></td>
<td></td>
</tr>
<tr>
<td>235</td>
<td>5.017055</td>
<td>6.028223*</td>
<td>0.302513</td>
<td>0.004071</td>
<td>8.413931</td>
<td>0.80479</td>
<td>0.65531</td>
<td>1.606933</td>
<td></td>
<td></td>
</tr>
<tr>
<td>236</td>
<td>5.476331</td>
<td>13.94487*</td>
<td>0.11752</td>
<td>0.070894</td>
<td>7.008594</td>
<td>0.631826</td>
<td>1.65962</td>
<td>1.444133</td>
<td></td>
<td></td>
</tr>
<tr>
<td>260</td>
<td>2.851958</td>
<td>5.853393*</td>
<td>0.477318</td>
<td>0.012528</td>
<td>9.556629</td>
<td>0.94662</td>
<td>0.43945</td>
<td>2.552004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>261</td>
<td>3.188473</td>
<td>6.759674*</td>
<td>0.307125</td>
<td>0.02289</td>
<td>9.1375</td>
<td>0.893846</td>
<td>0.38946</td>
<td>1.642689</td>
<td></td>
<td></td>
</tr>
<tr>
<td>262</td>
<td>1.93676</td>
<td>6.54497*</td>
<td>0.838934</td>
<td>-0.02273</td>
<td>8.024640</td>
<td>0.756878</td>
<td>0.66488</td>
<td>1.831532</td>
<td></td>
<td></td>
</tr>
<tr>
<td>263</td>
<td>3.867275</td>
<td>4.732966*</td>
<td>0.17486</td>
<td>0.008327</td>
<td>2.84762</td>
<td>1.537953</td>
<td>0.091624</td>
<td>0.60504</td>
<td></td>
<td></td>
</tr>
<tr>
<td>264</td>
<td>2.613643</td>
<td>6.691806*</td>
<td>0.049927</td>
<td>-0.08971</td>
<td>7.93765</td>
<td>0.746173</td>
<td>-1.434182</td>
<td>2.212151</td>
<td></td>
<td></td>
</tr>
<tr>
<td>265</td>
<td>2.224892</td>
<td>1.934832**</td>
<td>0.373552</td>
<td>-0.05214</td>
<td>0.976222</td>
<td>0.970734</td>
<td>-1.395448</td>
<td>0.398161</td>
<td></td>
<td></td>
</tr>
<tr>
<td>266</td>
<td>3.859032</td>
<td>14.22684*</td>
<td>0.048835</td>
<td>0.012504</td>
<td>0.731305</td>
<td>0.669299</td>
<td>1.00359</td>
<td>1.764632</td>
<td></td>
<td></td>
</tr>
<tr>
<td>267</td>
<td>2.425284</td>
<td>7.457063*</td>
<td>0.515754</td>
<td>0.036857</td>
<td>0.95637</td>
<td>0.948763</td>
<td>0.83619</td>
<td>2.576312</td>
<td></td>
<td></td>
</tr>
<tr>
<td>268</td>
<td>3.432835</td>
<td>10.82068*</td>
<td>0.200625</td>
<td>0.007668</td>
<td>0.255199</td>
<td>0.083322</td>
<td>0.40891</td>
<td>1.751212</td>
<td></td>
<td></td>
</tr>
<tr>
<td>269</td>
<td>2.733198</td>
<td>6.891941*</td>
<td>0.386283</td>
<td>0.030539</td>
<td>0.890312</td>
<td>0.864999</td>
<td>0.57966</td>
<td>2.861245</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note:
- * = 't' significant at 95 percent  ** = 't' significant at 90 percent
- @ = 'F' significant at 99 percent  @@ = 'F' significant at 95 percent
Table 3.3
Short run and Long run employment elasticities with respect to Real wages and Output in the Textile Industries in India.
1980-81 to 1997-98

<table>
<thead>
<tr>
<th>Industry code</th>
<th>Elasticity with respect to real wage</th>
<th>Elasticity with respect to output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short run</td>
<td>Long run</td>
</tr>
<tr>
<td>230</td>
<td>-0.79539</td>
<td>-0.82939</td>
</tr>
<tr>
<td>233</td>
<td>0.375873</td>
<td>0.358866</td>
</tr>
<tr>
<td>234</td>
<td>0.001704</td>
<td>0.001704</td>
</tr>
<tr>
<td>235</td>
<td>-0.65531</td>
<td>-0.65799</td>
</tr>
<tr>
<td>236</td>
<td>1.65962</td>
<td>1.786255</td>
</tr>
<tr>
<td>260</td>
<td>-0.43945</td>
<td>-0.44503</td>
</tr>
<tr>
<td>261</td>
<td>-0.38946</td>
<td>-0.39658</td>
</tr>
<tr>
<td>262</td>
<td>-0.60504</td>
<td>-0.61007</td>
</tr>
<tr>
<td>263</td>
<td>1.434182</td>
<td>1.316113</td>
</tr>
<tr>
<td>265</td>
<td>1.395448</td>
<td>1.326295</td>
</tr>
<tr>
<td>266</td>
<td>1.00359</td>
<td>-1.0163</td>
</tr>
<tr>
<td>267</td>
<td>-0.83619</td>
<td>-0.86819</td>
</tr>
<tr>
<td>268</td>
<td>-0.40891</td>
<td>-0.41207</td>
</tr>
<tr>
<td>269</td>
<td>-0.57966</td>
<td>-0.59792</td>
</tr>
<tr>
<td>X</td>
<td>0.806334</td>
<td>0.8263</td>
</tr>
</tbody>
</table>