# PRODUCTIVITY AND WAGES IN COTTON TEXTILE INDUSRY : STATEWISE ANALYSIS, 1973-74 to 1982-83

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## CERTIFICATE

This is to certify that the dissertation entitled " PRODUCTIVITY AND WAGES IN COTTON TEXTILE INDUSTRY: STATEWISE ANALYSIS, 1973-74 to 1982-83", submitted by Mr. Rakesh Kumar Singh in fulfilment of six credits out of total requirements of twenty-four credits for the Degree of Master of Philosophy (M.Phil) of the University is his original work according to the best of my knowledge and may be placed before the examiners for evaluation.

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However, I alone am responsible for the shortcomings which may be found in the work.

(RAKESH KUMAR SINGH )

# CONTENTS

# LIST OF TABLES

APPENDIX TABLES

# CHAPTER - 1

# INTRODUCTION

## 1.1 Productivity

For the successful monitoring of economic progress, whether at the macro or the micro level, it is essential to make scientific appraisal of the trends in productivity – the efficiency with which resources are converted into goods and services. The reasons are obvious. Productivity indices have been accepted not only as measures of performance but also as important means of motivating improvements in productive efficiency of the economy as a whole. Their use in the analysis of the factors that promote productivity and in the analysis of dynamic economic relationships as a basis of forecasting trends and making policy decisions, are well recognised and being increasingly used at the level of the firm, the industry and the economy.

When the same resources as employed before give comparatively higher output or alternatively, to sustain the same output as before less resources are required than in the past, we can say that productivity has increased. If productivity is increasing in an economy, it implies that improvements in the factors of production are manifesting themselves as increase in output efficiency. A rising productivity connotes several things - higher wage rates, larger and growing employment potential, price stability and greater levels of living.

The economic impact of rising productivity within a given country can be studied at several levels. At the macro level, the trend of productivity is an objective indicator of the country's progressive transformation from a lower to a higher stage of development. It is a key variable in unit costs and price changes. At the level of firms, differences in the levels of productivity are chief elements in explaining the differential profile rates.

A third approach to understanding the issue of productivity growth is the study of inter-industry differences. These differences, working through relative price changes, are influenced in generating changes in the industrial structure of an economy.[1]

1.1.1 Productivity in Classical Theory:

In the classical framework, productivity was taken as an important, often independent, source of growth . It was viewed as a relation at a macro-level between commodity inputs and commodity outputs. Adam Smith[2] in his "Wealth of Nations" refers to progressive, stationary and declining states based on productivity. He refers to the sources of productivity improvement. These are - (i) Improvements in machinery, facilitating and abridging labour (ii) alternations in employment in

favour of productive employment and (iii) Increasing returns due to greater division of labour. Smith is the father of the notion that all technical improvements involve a saving of labour and technically, there is no limit to increase in labour productivity, given capital expandability. Harrod, in his model of growing economy, followed Adam Smith's reasoning - due to technical progress which is labour augmenting in nature, there will be continuous improvements in productivity even if population growth rate and net savings are zero.[3] Diminishing returns to factors was first discovered by West (1815 ) which was followed up by Ricardo.[4] In his work, the fundamental proposition is that the ratio of economic surplus to capital has a natural downward slope at successive capital and labour accumulation levels. This falling trendency can only be checked by technological improvements affecting the production of wage goods.

The lapse in Ricardo's analysis was that he did not visualise diminishing returns to hold even if requirement of subsistence is withdrawn.

Sir George Ramsay[5] in his "Essays on the Distribution of Wealth" (1836) excluded wage goods from being a part of capital. He drew attention to a reduction in capital -

net output ratio being a powerful source of technical progress. Thus, Ramsay was the originator of the concept of capital augmenting technical progress. John Stuart Mill[6] in his famous "Principles of Political Economy" lists, among causes of superior productivity, superior knowledge and skill of labour and of those who supervise labour; improvements in arts consisting of inventions and use of machinery; economies of large scale; value of spread of knowledge among common people. Thus many of the concepts of factors affecting "residual" can be traced to Mill.

The productivity factor was considered as central to economics in the writings of Francois Quesnay, John Rae and Karl Marx also.

The classical approach could hold good when classical conditions prevailed, namely, labour and capital expanded simultaneously and land was in elastic supply. There was no technical progress affecting the quantities of factors and there were no changes in distribution. In the modern world, capital expands much faster than labour and land is inelastic in supply. Here, one has to find a way of grouping together capital, land and labour to derive a measure of the effect of changing quantities of the aggregate factors. The classical theory had no answer

to this.

1.1.2 Neoclassical Approach to Productivity:

The marginalists in 1870's postulated that the three factors of production - capital, labour and land will get precise reward rates depending upon their substitution potential in methods of production and consumption patterns. This yielded a determinate theory of distribution based on marginal productivity. Clark[8] showed that given the variability of factors at the margin, marginal productivities of labour, capital and land could be determined at the aggregate level in the economy, when any two factors are fixed. Walras[9] demonstrated the theory of general equilibrium of values of goods and services and of factor reward rates.

These developments seemed to provide a way out for estimating an index number of quantity of each factor and heralded scope for a method for a combined index of total factor productivity. The concept of total factor productivity, defined as the ratio between real output and real factor inputs was introduced by Jan Tinbergen [10] in a notable article. This concept was developed independent of Tinbergen's work by Stigler.[11] In another branch of

study, the empirical approach of Paul Douglas[12] in the form of the famous Cobb-Douglas production function provided one explanation of invariant relative factor shares under conditions of disproportionate growth of different factor input supplies.

Other important contributions to the measurements of total factor productivity during the 1950's were made by Schmookler(1952), Abramovitz(1956), Kendrick (1956), Solow(1957) and Fabricant (1951).

## 1.2 Wage Determination

In a developing economy, wage policy is faced with a real conflict between the needs of workers for larger consumption and the demands of the economy for a higher rate of capital formation. This conflict is reflected in the thinking of all responsible bodies on the issue of wage determination. Thus while there is considerable emphasis on the promotion of workers' well-being in the First Five Year Plan, it is pointed out "that rates of progress has to be determined not only by the needs of the workers but also by the limitations of the country's resources ..... On the side of labour, there should be a keen realization of the fact that in an undeveloped economy, it cannot build

for itself and the community a better life except on the foundations of a higher level of productivity to which it has itself to make a substantial contribution".[13] Similarly, the Fair Wages Committee which was appointed by the Government of India to go into the whole question of wage fixation observed that "the objective is not merely to determine wages which are fair in the abstract, but to see that employment at existing levels is not only maintained but, if possible, increased. From this point of view, it will be clear that the level of wages should enable the industry to maintain production with efficiency".[14] Again, it is emphasised in the Third Plan that "neither the exercise of their organized strength in industrial conflicts nor laws and the intervention of the state can help the workers much in realizing their aspirations. Their gains can arise only out of the strength and dynamism of the economies, the only enduring basis of which is rising level of productivity".[15] These observations clearly suggest that productivity analysis should occupy a central place in the study of wage problems and policies.

The dilemma of wage policy confronted the industrialized economies in their development phases in the same form as it is bothering planners in our country today. It was ultimately resolved through significant advances

in productivity. In the initial phases, however, a policy of wage freeze and wage restraint was of considerable help in stepping up the rates of capital accumulation and industrial development. The negative aspect of the wage policy is common to the capitalist and planned economies alike and seems to suggest that exploitation of labour (in the sense of rising productivity going with stagnant or even declining wage rates) provides the main basis for accelerated rates of development in the early phases of economic growth.[16]

The historical experience of industrialized economies is, however, an unsatisfactory guide to our wage policy since absolute levels of their wages and living were never so low as prevail in India today. At our wage levels the workers are unable to procure the basic supply of goods and services needed to maintain them in a reasonable state of health and efficiency. An effort to fill the gap between the existing and the minimum efficiency wage may, therefore, have the effect of a direct increase in productivity. Labour productivity is, however, determined by a number of factors like plant modernisation and rationalization, adequate flow of raw materials in right quantities and of the right type, managerial efficiency, etc., some of which are independent

of workers' efficiency. The desired efforts of introducing minimum efficiency wage may, therefore, fail to be realized so long as other aspects of the industry are not set in order.

The Fair Wage Committee unanimously recommended that "the fair wage should on no account be less than the minimum wage" which in its view "must provide not merely for the bare sustenance of life but for the preservation of efficiency of the workers".[17] While the lower limit of the fair wage must obviously be the minimum wage, the upper limit is equally set by what may broadly be called the capacity of the industry to pay, determined on the basis of "(i) a fair return on capital and remuneration to management, and (ii) a fair allocation to reserve and depreciation so as to keep the industry in a healthy condition".

At its fifteenth session held in July 1957, the Indian Labour Conference specified the physical norms relating to workers' consumption which should underline the need-based minimum wage. The Central Wage Board for the Cotton Textile Industry admitted the sanctity of these norms but pointed out that a minimum wage which

translated these norms into practice " would be a leap forward of a character that the industry would not be able to support".[18] Evidently, the need for enforcing need-based minimum wage has to be compromised with the principle of industry's capacity to pay.[19] Workers' interests demand adequate provision for maintenance and additions to capital stock as much as for improvements in real wages. However, the twin objectives can be readily fulfilled when the revenues of the industry are expanding relative to the import of various resources.

1.3 Productivity - Wage Relationship :

The relationship between wages and productivity has been an important theme in economic theory. There are varying approaches ranging from postulating a positive relationship between the trends in production per worker and wages, to the theoretical exercise in devising a principle of equality between marginal productivity and wages. These approaches proceed on the assumption of direct and automatic relation between a rise in productivity and a rise in wages. On the other hand, it is sometimes argued that there is no such automatic adjustment which makes wages rise in direct response to a rise in

productivity; the relation, to the extent it exists, is indirect: through the effects of productivity on wage-determining factors.[20] According to this line of reasoning, productivity is merely a 'permitting' factor[21] in raising wages.

Nevertheless, the contention that a high level of real wages can ultimately result only from a rising level of productivity is indisputable. It has been correctly observed that an increase in productivity does not automatically lead to a rise in wages. The connection between productivity and wages is not so close and direct as to act as a stimulus: "The most that can be said is that increased productivity enlarges the possibility of higher wages"[22] or "it permits an increase in the wage rate without increasing labour cost per unit".[23] The degree to which increases to productivity lead to increases in wages is determined by factors like relative bargaining power of the parties and the extent of public control. Here it is not a matter of automatic and objective connection, but of a dliberate "gearing"[24] of wage movements in line with the productivity movements. Thus the relationship between productivity and wages may better be seen as an aspect of the prescriptive policy

formulations and deliberate use of productivity criterion in regulating wages, rather as a theoretical analysis of a hypothetical situation.

In the absence of public control, the effective working of the market mechanism may, however, provide possibilities of automatic adjustments of wages to productivity through its efforts on various wage determining variables. For example, any given increase in gross productivity will have a positive effect on the demand for labour, if there results an increasing average net productivity correspondingly, and if the demand curve for the product is sufficiently elastic. Similarly, productivity increases will increase the profitability of a firm or industry, thus raising its paying capacity, which is an important factor in wage increases. To the extent these variables are relevant to the determination of wages and are affected by changes in productivity, there shall be an automatic connection between productivity and wages. Best all these relationships are indirect and uncertain, depending upon the validity or otherwise of the underlying assumptions upon the validity or otherwise of the underlying assumptions regarding the working of market mechanism. For a direct and easily ascertainable relationship between productivity and wages

one has to look for the instances where changing productivity is made a basis for a change in wages by the wage-fixing institutions.

Operationally, it appears that the simple formula for linking wages to productivity is to grant increase in wage rates proportionate to increase in labour productivity. The formula can, however, provide little guidance untill specific assumptions are made about capital productivity and rate of return on capital.[25] If output-capital ratio, however, remains constant, wage increase proportionate to labour productivity would imply a constant rate of return. If, however, output-capital ratio declines, wage increase proportionate to productivity cannot be allowed without depressing the rate of return. If on the other hand, output-capital ratio rises, it may be possible to allow more than proportionate increase in wages consistent with stable or even rising rate of return. Analysis of trends in output-capital ratio or what is also termed as partial productivity of capital is , therefore, as significant as labour productivity in a study of wage-productivity relationship.

A more firm basis for linking wages to productivity is provided by the measure of what Kendrick[26] has called "total-factor productivity". It is the ratio between actual

output in any year and the weighted sum of inputs in the same year, the weights being the base period rates of compensation. If the ratio remains unity, there is no net productivity gain, and the rate of compensation to any one factor can be increased only at the expense of another. Any rise in the ratio implies increase in total productivity. The absolute magnitude of productivity increment is measured by difference between actual output in any year (at constant prices) and the potential output at constant base period levels of productivity (the sum of inputs weighted by their respective base period rate of return corresponds to this potential if we assume perfect competition and constant returns to scale so that factor prices are equal to their respective marginal products). Once the size of this increment is known, it becomes easy to examine how it is shared between different parties. A part of this increase would be transformed to the consumers in the form of lower product prices. If , however, output prices remains constant, the entire gain accrues to the industry and is available for distribution among the supplies of various inputs.

## 1.4 Literature Survey:

There have been a number of studies on productivity

wages, as well as productivity-wage link in the manufacturing industry in India. It may therefore be useful to briefly look at them and highlight their salient and important findings. The first study on inter-industry production function was by Murty and Sastry.[27] They used the Balance Sheet data of about 750 major public limited joint stock companies covering 46 industries for years 1951 and 1952. They found that Cobb-Douglas production function gives a good fit for Indian industries for assumption of constant returns to scale holds for the majority of the industries.

Reddy and Rao's study[28] concluded that for large manufacturing for the period 1946-1957, the factor shares were determined by their respective marginal productivity and remained stable through time, but for random variations. Diwan and Gujrati[29] found that there were increasing returns to scale. The increase in wage rates were greater than increases in marginal production so that this increase seems to have reduced the imperfections in labour market. This study was based on employment and output data for twenty eight selected industries for the period 1946-1958.

Rajkrishna and Mehta's[30] study was for the whole industrial sector covering period 1948-1953 and 1958-1963.

Single factor productivity of labour registered an increase of 42% whereas value added per rupee of wages paid decreased by 5.5%. This increase in monetary compensation per unit of labour exceed the increase in marginal productivity of labour. The study confirms the results by Diwan and Gujrati cited above. The value added per unit of capital ratio declined by 18% which would mean capital-output ratio increased by 43%. Krishna and Mehta postulate that this is in accordance with the historical experiences of all the developed countries where capital deepening has increased the productivity of labour.

A.K. Chatterji[31], in an inter-industry study found that twenty two industries recorded a rise in productivity and three industries - paper and paper board, sewing machines, and equipment for generation of electricity, showed a decline in productivity. He concluded that old industries show slow rise in productivity and the newer ones like heavy metal, heavy non-metals, heavy machinery, and fertilizers show a fast rise.

Narsimhan and Fabryey [32] found the assumption of constant returns to scale holds for the period 1949-1958. They categorised Iron and Steel as an efficient industry; paper, cement and chemicals a medium efficiency industries; and sugar textiles, aluminium , and general engineering to

belong to inefficient industries. They found evidence of technical progress at an average annual rate of 2% per annum.

Goldar's[33] study covers TFP trends during 1951-1965 and covers all CMI industries eecept General and electrical engineering. His results show that during 1951-1965, labour productivity grew at an average rate of 3.83% and the corresponding rate for capital productivity was 1.4%. In a recent study covering sixties and seventies, Goldar[34] concluded for the census sector that tobacco, paper and paper products, and leather and fur products experienced an appreciable rise in TFP during 1960s but failed to maintain this high rate of TFP growth in the 1970s. Food products, rubber products, and petro and coal products experienced a steep fall in TFP during 1960-70's.

A large number of studies have been undertaken on the structure of wages also in the Indian industries. However, whereas most of the productivity studies are at the All India level, studies dealing with wages have focussed on the regional aspect of wages also.[35] Papola's[36] study shows that the inter-regional wage dispersion - both absolute and relative - is found to have registered a declining trend in the organized manufacturing sector

of the Indian economy during 1950-1964. Khosla's study shows that there have been an increase in the overall regional wage differentials during 1961-1969.[37]

### 1.4.1 Studies on Cotton Textile Industry:

There have been a number of studies on productivity in the cotton textile industry.[38] All of them are time series studies and cover broadly the period 1946-70. Time series studies in current prices are ignored for obvious reasons. Almost all the studies are based on the CMI and the ASI. An exception to this is the study by the National Productivity Council[39] which uses data on output, capital and labour in physical units. In this study, machine hours has been used as a proxy for capital. According to this study, the average productivity of labour in the cotton textile industry between 1956 and 1974 showed a modest rate of increase. Capital productivity measured in terms of output per unit of machine hour worked on the other hand, showed a rpaidly declining trend. This was applicable to both the spinning and weaving activities of the industry. The production function estimates had yielded the following results _____ (i) Labour is statistically significant in explaining the output variations in the industry, both in the spinning and the

weaving sections (ii) Capital is statistically not significant in explaining the variations in output both in the spinning and the weaving activities(iii) while returns to scale comes out to be unity or less than unity in the spinning activity, it is higher than unity in the case of weaving. On the whole, the cotton textile industry (total) is found to have increasing returns to scale.(iv) The total productivity indices both for spinning and weaving recorded positive but unimpressive magnitude of growth during the 18 year period between 1956 and 1973.

Beri[40] perhaps is the first to use electricity consumption as a proxy for capital in the Indian context. Unfortunately, his measure does not include self-generation of power within the industry. It is to be noted that except cotton textiles, Beri had estimated partial and total factor productivity indices for cement, iron and steel and sugar also for the period 1948-1955.

Asit Bannerji[41] did a study of selected industries for the period 1946-1964 and found the existance of constant returns to scale in the cotton textiles industry. He also found that output was more elastic with respect to labour than with respect to capital for cotton and paper industry. A significant downward trend of TFP was

observed for the period of study. Average annual rate of fall in solow index was found to be 1.6%.

Sinha and Sawhney [42] in their study on wages and productivity in selected Indian industries have observed that labour productivity(ratio of gross output to total workers) increased by about 45% during the period 1950-63 in the cotton textile industry. In the same period, the ratio of net distributable output to labour input increased even faster, by 55.9% . Unlike labour productivity, capital productivity did not show a consistent trend. Its trend rate of increase was however, found to be 1.3% (as against 2.9% in the labour productivity). They also worked out the raw materials productivity during the entire period but it showed only a marginal increase. On the other hand, the total factor productivity based on the concept of gross output showed an increase of only 16% while that based on net distributable output had increased by 44% over in whole period in this industry.

Sinha and Sawheny's study brought out significantly rising trend in wages and salaries as well as in composite earnings per employee. While money wages showed a trend rate of annual increase of 2.7% , the rate of increase in salary per person in salaried class was found to be 3.1% per annum. It was interesting to note that there was an

accelerated rise in money earnings after 1959, the period following the award of the Central Wage Board for cotton textile industry.

In order to seek a wage productivity relationship in the cotton textile industry, Sinha and Sawhney regressed earnings per employee on labour productivity (at current prices) and cost of living index and from the values of simple $R^2$, it was found that productivity explained about 84% of the variations in money earnings per employee while $R^2$ improved further to .95 with the introduction of cost of living as an additional variable.



In an earlier empirical study, T.S. Papola[43] attempted a statistical analysis of the productivity - wage relationship in the cotton textile industry to arrive at the following conclusions - (i) In the long run (during the period 1939-62), wages were found moving in line with the value of production per worker, although sometimes, for one to two years, the two had also moved in opposite directions. In the cotton industry of India as well as in the three important centres, namely, Ahmadabad, Bombay and Kanpur, the productivity and wage movements were highly correlated (ii) The regional differentials in productivity had not been important factors in wage

differentials in the case of cotton industry. The consistency between different centres in productivity and wage-differentials is generally lacking except in limited cases. The centre with lowest productivity(Kanpur) was also one with lowest wage level, but the centre with highest wages (Bombay) was not the same as the centre with highest productivity.

In a significant study on the cotton mill industry, D.U. Sastry[44] has found that labour productivity has increased in Maharashtra, Tamilnadu(these were the only regions for which the study concentrated) as well as in India as a whole for the period 1949-70. However, the increase has been much faster in Tamilnadu than in Maharashtra. But capital productivity declined in Maharashtra, Tamil Nadu and in the country as whole during 1949-70. But the decline has been much faster in Maharasthra, perhaps due to old capital stock and the secular decline in capacity utilization both in spinning and weaving. All the three indices of total factor productivity, namely, Kendrick, Solow and Domar, show a general uptrend over 1949-70. However, fluctuations are more pronounced over 1949-61 than over 1961-70.

Sastri has investigated the relationship between productivity, capital intensity[45] and wage rate also for Maharashtra and Tamilnadu. It was found that in Maharasthra the growth of labour productivity has been due to increase in capital intensity. In contrast to this , the growth of labour producitivity in Tamil Nadu has been due to increase in wage rate.

Thus the major findings of these studies are: a generally increasing trend in labour productivity and in total factor productivity and a declining trend in capital productivity. However, very few of the studies have focussed on the regional aspect of productivity. So far as wage-productivity relationship is concerned, one gets the impression from the various studies that the movements of productivity and wages are positively correlated, although in the short-run the movements of wages may diverge from movements in productivity.

## 1.5 Design of Our Study

Having discussed the concepts of productivity, wages and wage-productivity relationship, and also having got ourselves acquainted with the various studies undertaken on these topics, let us now discuss the design of our study.

Chapter 1 gives introduction and survey of existing literature.

Chapter 2 contains objectives, the methodological framework, the variables chosen, definitions, data base and other selected issues.

In Chapter-3, we discuss the partial productivity trends in five chosen three-digit level cotton textile industrues.

Chapter 4 analyses the total factor productivity trends in these industries.

In Chapter-5 , we discuss the wage trends and wage productivity relationship in these cotton textile industries of India.

Finally, Chapter-6, concludes,the discussion of our findings. It also includes the limitations of the analysis and policy recommendations of the study.

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# CHAPTER - 2

## OBJECTIVES ,METHODOLOGY, VARIABLES CHOSEN AND OTHER SELECTED ISSUES

### 2.1 Objectives of Our Study:

The cotton textile industry is amongst the oldest and largest manufacturing industries in India. It is more than a hundred years old and occupies a dominant position in the industrial structure. It has the single largest weight in the index of industrial production and is one of the largest export industries. 'Next only to food, clothing is the most important item of family expenditure in India accounting for about 10 per cent.[1] Thus, both from the points of view of production and consumption the cotton textile industry is very important.

Cotton textiles are a large group consisting of the mill and decentralized sector. The mills are of two kinds, spinning mills which produce only yarn and composite mills which produce both yarn and cloth. The decentralized sector consists of handlooms, powerlooms and powerlooms except those of Khadi are wholly met by mills which emphasize the close link between the two. Powerlooms are somewhat of a satellite sector to the

mill industry and are geographically concentrated in close proximity to the mills.

It is with this background of the importance and structure of the cotton textile industry which is the subject of our study that we define the objectives of the study as -

1. To study the productivity trends in the cotton textile industries.
2. To study the wage trends and to study the influence of productivity on the wage rates in the cotton textile industries.

The third and fourth chapter deal with the first objective and fifth chapter deals with the second objective.

## 2.2 Methodology:

Productivity measures can be broadly classified into two types:

i. Partial factor productivity

ii. Total factor productivity measures

## 2.2.1 Partial Factor Productivity:

Partial productivity is the average product of the particular input in question. It admits only a single input in the production function. The productivity of labour has been the subject of study for a long time, both because of the relative ease of measuring it and its welfare aspects. Capital productivity has been investigated by several workers during the last four decades or so. In recent times, the productivities of various materials and fuels have also been studied. All these are partial factor productivities in the sense that output is related to only one input at a time, without explicit recognition of the role played by other inputs in the production process.

In the present study, we have worked out partial factor producitivity ratios for three important factors, namely, labour, capital and raw materials. Labour productivity has been measured as a ratio of gross value added to total workers (i.e., gross value added per worker); capital productivity has been measured as a ratio of gross value added to total fixed capital (i.e, gross value added per unit of fixed capital) and raw materials productivity has been measured as a ratio of total output to total inputs(other than labour and capital) (i.e, output

per unit of input consumed).

In addition to these partial factor productivity ratios, we have worked out the following two productivity related ratios also -

i. Wage rate per worker and

ii. Capital intensity (i.e, fixed capital per worker).

All these ratios have been calculated for all the ten years of our study (i.e, from 1973-74 to 1982-83) and for all the regions to be studied, covering five main cotton textile industries at three-digit level.

A change in labour productivity can be due to a combined effect of a change in three factors. The efficiency of factor use may have changed; secondly, the amount of capital employed per worker may have changed and finally, the quality of labour may have changed.[3] Consequently, the observation of movements in these ratios includes the effects of various types of changes.

Sometimes the different partial productivity ratios move in opposite directions and render a judgement of overall efficiency impossible. But they do provide a fair

idea whether any saving in inputs is achieved overtime and have been used to answer the question of sources of growth of output.[4]

It is to be noted that such ratios can, sometimes, measure the shifts in the production function particularly when the time series data is used, but they cannot reflect the nature and the extent of movements along the same production function. From the point of view of productivity analysis, the degree of movements along the same production function is as important as the shifts in the production function. Since both these aspects are not simultaneously revealed in the simplified concepts of partial or average productivity, they have only a limited scope for interpretation and application . W.E.G. Salter[5] maintains _____"Unless there is a revolution in statistical techniques and information, only one type of productivity concept is measurable. This is the concept of output per unit of input.....The most common measure is that of labour productivity ..... critics object that it does not measure anything peculiar to labour while labour itself remains passive.... The only significance that can be given to such figures is that they are indications of what may be termed as "growth in depth" as distinct from "intensive growth"..... individual

productivity measures have little direct significance unless we can relate them to the complex process of change of which they are a product.... We cannot divorce changes in the productivity of one factor from the productivity of other factors indeed, from all the elements of an interrelated economic system." Therefore, the trends shown by the partial productivity of factors like labour and capital should be treated as a prelude to more refined analytical tools like Production function and total factor productivity indices.

### 2.2.2 Total Factor Productivity:

Total Factor Productivity(TFP) may be defined as the ratio of output to a weighted combination of inputs. These are comprehensive indices which differ from one another with respect to the weighted system involved. The Kendrick Index [6] was the first TFP index, followed by Solow's geometric index[7], Salter's index[8] and the translog index developed by Jorgenson and Lau. Each of these indices have their own pros and cons. We found the Kendrick and translog indices to be compatible with our study plans and so these two indices have been used in the present work.

(A) <u>The Kendrick Index</u>:

This index is based on the assumption of a linear production function of the form -

$$Y = aL + bK$$

Where , Y is output, L is labour and K is capital employed, a and b are empirical constants. Then, the TFPG index is given as -

$$TFPG_k = \frac{Y}{a_o L + b_o K}$$

Where ,Y,L and K are defined as in the production function; $a_o$ is the base year wage rate and $b_o$ is the base year rental of capital.

In Kendrick's words, the precise meaning of this measure may be obtained by "comprring what the outputs of period II would have cost at the factor prices and unit factor requirements of I (real output) with what they did cost in constant I factory prices, but at II level of productive efficiency (real input) . Alternatively, we are comparing the actual real output of II with what the output of the factors would have been in II had the productive efficiency of I (real input) prevailed".

Kendrick's index involves the following assumptions:

(i) There is no rise in total productivity or productive efficiency if there are constant returns to scale, i.e, total output increases in the same proportion as the weighted average increase in the quantity of factors, each factor being weighted by its relative share in total input in the base period.

(ii) There is competitive market so that the relative shares of different inputs in the total input(output) basket in the base period measured their respective elasticity coefficients, and

(iii) elasticity coefficients are constant implying constant and unit elasticity of substitution.

A serious flaw of this index is that it is based on a linear production function and thus, fails to allow for possible diminishing returns on factors of production or in other words - does not possess the property of asymptotes . Domar[10] in his article said that Kendrick tries to distinguish between efficiency in the use of resources which the index is supposed to measure and economic efficiency which it is not. Domar's contention was that if efficiency is understood as the ratio of the

actual to some potential output or the proximity to some optimum level of output, clearly the index measures neither. A fall in rate of growth of the index is not necessarily a sign of inefficiency in resource utilisation. Utilisation of poorer materials or expansion of activities like services, where the other forces have lesser room to play, may depress the index and yet be economically justified. Nor is a rapidly increasing index , the opposite.

D. The Translog Index of Total Factor Productivity:

The translog index is based on the Divisia index of technical change which was introduced by Solow[11] and was later discussed by Jorgenson and Griliches[12]. The Divisia indices are symmetric in time (satisfy the time reversal test) and rate of growth of Divisia indices of prices and quantitites add up to Division index of value (factor reversal test). Divisia indices also have property that the Divisia index of Divisia indices is also a Divisia index of the components.

The Divisia indices methodology was extended to include data at discrete points of time. For this purpose a specific form of production function was given by Christernsen, Jorgenson and Lau[13] - and was called the transcedental logarithmic production function or simply

Translog production function.

The translog index of technical change was first derived from the translog production function by Jorgenson and Lau.[14] This index does not require the conditions of Hicks-neutrality of technical change. For two discrete points of time T and (T-1), the average rate of technical change can be expressed as the difference between successive logarithms of output less a weighted average of the difference between successive logarithms of capital and labour inputs with weights taken to be the respective value shares.

The elaborate procedure of computing can be simplified by making the assumption of competitive equilibrium and thus taking income shares of capital and labour as proxy for output elasticities. Then, the translog index can be defined as -

$$TFPG_t = \log (Y_t/Y_{t-1}) - W_L \log(L_t/ L_{t-1}) - W_k \log(K_t/K_{t-1})$$

Where, $W_L = 1/2 (S_{Lt} + S_{L(t-1)})$

and $W_k = 1/2 (S_{Kt} + S_{k (t-1)})$

Where , $S_L$ and $S_K$ denote shares of wages and capital in output respectively.

The translog function allows the elasticity of substitution to be different from unity. The condition of competitive equilibrium does not imply the constancy of factor shares as in the case of Cobb-Douglas function.

(C) Production Function Estimate:

A production function formally specifies a unique technological relationship between inputs and outputs within a production unit, say firm, industry or the national economy. The function may be linear or non-linear in its form, depending upon the hypothesised relationship between inputs and outputs and between one input and another.

The production function employed in this study is of a Cobb-Douglas form of the following type-

$$\log Y = A + a \log K + b \log L$$

Where, Y, K and L estimate value added, capital, and labour respectively. A is the empirical coefficient which measures Hicks-neutral technological changes, a and b are empirical coefficients that determine the capital intensity and returns to scale.

The elasticity of substitution, in the Cobb Douglas function is unitary. If technology is unchanging, then a

proportionate change in relative factor inputs produces a compensating proportionate change in relative factor input and consequently relative factor shares remain constant.

The Cobb-Douglas production function, however, has many limitations. The main ones are as follows:-

(i) It specifies unitary elasticity of substitution between labour and capital and so rules out non-neutral technological changes.

(ii) It does not possess the property of asymptotis, i.e. when one factor of production grows infinitely large, the function does not converge to a finite limit and then fall as required by the neoclassical theory.[15]

(iii) High multicollinearity between labour and capital does not give good structural fit of Cobb-Douglas function.[16]

(iv) The cross-section fit of Cobb-Douglas production function, unless the firms are in equilibrium and there is perfect competition , measures short run disequilibria , monopoly imperfections etc. and not structural parameters.[17]

(iv) The Cobb-Douglas form applies only to situations in which the character of input does not change. This cannot hold when one uses aggregate data. Griliches,[18] pointed out that to study economies of scale, one should have a functional form that is not homogenous at least over some ranges of inputs, so that it can accommodate indivisibilities and disproportionalities.

In the present study, we have worked out Kendrick and Translog indices as well as the Cobb-Douglas production function estimate for all the ten years of study for all the states and for All-India(for all the five industries). We have also estimated the annual trend rates of these indices in the present study.

2.2.3 Methodology for Productivity-Wage Rate Linkage:

Our second objective is to study the inter-regional wage trends and to ascertain whether productivity has any influence over the wage rates in the cotton textile industries or not. For the first part of this objective, i.e., for analysing the inter-regional wage trends, we have worked out wages per worker for all the major states where these industries are located.

In order to ascertain whether productivity has any influence over the wage rates in the cotton textile industries or not, we have regressed wages per worker of the major regions where a particular cotton textile industry is located on their respective labour productivities.

## 2.3 The Data Base:

To study time series variations in productivity, we need state level as well as All-India level data on value added, capital and labour employed, wages and share of wages in value added. This has to be supplemented with data on suitable deflators so as to make possible inter-temporal comparison at constant prices.

With a view to studying the disaggregated trends in the manufacture of cotton textiles, five three-digit level(National Industrial Classification) industries were selected. These industries[19] are as follows:

i. Cotton ginning, cleaning and bailing( 230)

ii. Cotton spinning, weaving, shrinking, sanforising mercerising and finishing of cotton textiles in mills(231).

(iii) Printing, dyeing, and bleaching of cotton textiles(232).

(iv) Production of Khadi and Weaving and finishing of cotton textiles in handlooms other than Khadi(235).[20]

(v) Weaving and finishing of cotton textiles in power -looms (236).

The selection was primarily done on the basis of an industry having an adequate dispersal through space.

The major centres of the cotton ginning, cleaning and bailing industry(in order of their contribution to the gross value added) are- (1) Gujarat (2) Maharashtra (3) Punjab (4) Madhya Pradesh and (5) Tamil Nadu.[21] Rajasthan, Karnataka, Harayana and Andhra Pradesh(in that order) are the other important centres of this industry.

In the cotton spinning, weaving, shrinking, etc. industry, the major centres are (1) Gujarat (2) Tamil Nadu (3) Maharashtra (4) Uttar Pradesh and (5) Madhya Pradesh. West Bengal, Karnatka, Andhra Pradesh,Rajasthan, Kerala, Orissa, Harayana, Punjab and Bihar are the other important centres of this industry.

The five most important centres of the printing, dyeing and bleaching of cotton textiles , are (1) Maharashtra (2) Gujarat (3) Harayana (4) Karnataka and (5) Tamil Nadu Punjab, West Bengal, Rajasthan and Uttar Pradesh

stand next in importance.

The major centres of production of Khadi and weaving and finishing of cotton textiles in handlooms other than Khadi, are (1) Kerala (2) West Bengal (3) Uttar Pradesh and (4) Maharashtra. Andhra Pradesh and Punjab are the other main centres.

In the weaving and finishing of cotton textiles in powerlooms, however, the major centres are (1) Tamil Nadu (2) Orissa and (3) Maharashtra. West Bengal, Gujarat, Uttar Pradesh and Kerala stand next in importance.

(A) The Data Source:

The basic data on industrial production and employment is taken from the Annual Survey of Industries (ASI) which is conducted every year by the National Sample Survey Organisation and processed by the Central Statistical Organisation. It gives detailed information on value added, employment , capital stock, wages, etc. However, this data is available for the organized sector only.

For this study, the disaggregated data was available only for the census sector. This sector includes factories in which the manufacturing process is carried on with the aid of power and which employ more than

fifty persons on an average and those where hundred or more people are employed without the aid of power. The survey data are naturally subject to variations in response and therefore, in coverage.

Deflators -Wholesale Price Indices:

Since the industrial data given by ASI was at current prices, we used the wholesale price indices for nearest relevant category as deflators in obtaining the value added, wages paid, depreciation and capital stock at constant prices. The whole data was converted to data at 1973-74 constant prices.

(B) The Variables Used:

The following variables were taken -

(a) Value Added (Y)

Gross value added, obtained by adding back depreciation to the net value added figure was taken as a measure of output for our main study. Though net value added is a more relevant figure but given the highly arbitrary nature of the data on depreciation charges (being more relevant for tax purposes for showing the decline in value of the capital stock) in Indian industries, gross figures are generally preferred.

(b) Capital:K

For capital input, data on gross fixed assets was used. In the ASI data, gross fixed capital includes building, plant, machinery and miscellaneous assets and the value of capital items is taken as in the books of the factory. The estimates under the various heads of capital relate to Dec 31st of the relevant year in factories which close accounts on that day and in other cases to the data on which accounts were closed prior to 31st December.

(c) Labour (L)

For lahour input, figures for employment of workers were used. Although man-hour data is more relevant, the same was not available for later years at disaggregated level.

(d) Wages (W)

Wages include all payments made in cash as compensation for work done during the year, e.g., basic wages, dearness allowance, over time payments, shift allowance, leave wages, wages for paid holidays, all bonuses such as profit sharing bonus, production bonus, incentive bonus, etc. and other cash payments made from

time to time, regular and adhoc contractual or ex-gratia. These also include lay off payment and compensation for unemployment except where such payments are made for trusts or the special funds set up expressly for this purpose, i.e, payment not made by the employee. Employee's contribution to old-age benefit, employees contribution to other social security charges and inputed value of benefits in kind and travelling and other expenditure incurred for bonus purposes and reimbursed by the employer are excluded.

In addition to the gross value added, gross fixed capital, total workers and wages, we have also used variables like output and total input consumed _ so far as the estimation of the partial factor productivity trends is concerned.

Output is the aggregate value of products and by products manufactured for sale, work done for customers and sale value of goods sold in the same condition as purchased, and is adjusted for the difference in stocks of semi-finished goods at the beginning and at the end of the Survey Year.

Input is the gross value of materials and fuels, etc. consumed, products reported for sale last year but used for further manufacture, incidental expenditure on

purchase of materials, etc. non-industrial service purchased, depreciation and purchase value of goods sold in the same condition as purchased.

(C) Some comments on measurements of capital and labour inputs

(a) Measurement of Capital Input:

The major problem here is the question of gross versus net capital stock figures. There seems to be a general agreement amonst economists that gross figures are a better estimate of capital stock. Leontiff[21] argues that use of depreciated coefficients (of capital stock) implies that capital stock decreases in efficiency in exact relation to depreciation charges. Most available evidence indicates that this is not a reliable assumption. Similarly, Asit Bannerjee[22] argues that even though the value of old machines declines, it need not lead to any decline in current services of the capital input which is what the capital stock figures are supposed to approximate.

Hashim and Dadi[23], in their important work state that the efficiency of assets does not decline as fast as accounting procedure of depreciation show. They quote Barna[24] who states that in most industries which are capital

intensive, the efficiency of plant tends to increase and not decrease with life.

Domar[25] argues that working with net investment and net stock of capital, one looses sight of gross investment as a major vehicle of technical progress. He advocates deductions of some smaller magnitude than conventional depreciation for deterioration of existing capital. But Hashim and Dadi consider even smaller deductions to be unnecessary basing their argument on Barnas' argument.

Hence, one can say that gross value is the most useful concept and is also closest to the concept of capital in theory.

Further, there is the problem of capacity utilisation. Many Indian industries are not operating at full capacity level. Actually, it is not the stock but the services of capital which is to be treated as factor of production. RBI (1970) has published data for capacity utilisation for different industries for the period 1960-68 based on official services of index numbers of industrial production. However, no data has been provided by RBI after 1968.

(b) Measurement of Labour Input:

Labour input should ideally be measured through man-hours worked out but since that data was not available, the number of workers was taken to be labour input. We have not used total number of employees as 'workers' on a strong assumption that "workers" and "other than workers" categories are not perfect substitutes. We would also like to hypothesize that since "other than workers" category is, by and large, the executive category which is getting higher rewards not because of their higher potential as human beings as compared to workers, but because there is so much more of individual and social capital invested in them, this category should not be included in the definition of labour. The Labour Bureau has omitted 'persons other than workers' on the ground that "they form a small proportion of total employment and the number of such persons is fairly stable in relation to the number of workers".[26]

It may be pointed out, however, that "although such persons form only 4 per cent to 8 per cent of all persons employed , their share in the total wage bill ranges from 10 per cent to 16 per cent"[27]. It is precisely because of this reason that though not in the

case of total factor productivity, but in the case of partial productivity trends we should have dealt with not only total workers employed but also with number of total employees as well as "persons other than workers" seperately.

(D) The Selection of Time-Period:

At the outset, one must state that the selection of the time period was dictated more by the availability of comparable data than by any other consideration. Upto 1971, the industrial establishments were classified broadly on the basis of Indian Standard Industrial Classification. This was replaced by National Industrial Classification(NIC) 1970 from ASI, 73-74. We also, therefore, have selected our time period from 1973-74 onwards upto 1982-83 - the latest year for which data in disaggregated form was available in the Census Sector.

(E) Data Limitations:

(i) The criteron for the classification of an industry under the ASI scheme is the value of that industry's principal products. In some instances this has resulted in the shift of factories from one industrial class to another industrial class over a period of time. This has affected the comparability of the data over time.

(ii) The use of value figures instead to quantity makes it impossible to disengage parameters of the production from the 'elasticities of product demand and factor supplies in an imperfect market situation.

(iii) Deflators were at best approximations of the actual inputs and outputs. Capital consists of heterogenous machines and equipment and deflation by the wholesale price index of machinery was not very appropriate , as machines of different vintages, productivity and efficiency are aggregated under one head.

(iv) Ideally, a measurement of capital and labour services should be used but as mentioned before, the data on capacity utilization and man-hours is not available.

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19. The numbers inside the brackets show their respective code no. as given under National Industrial Classification.

20. Production of Khadi and Weaving and Finishing of Cotton Textiles in Hand-looms other than Khadi, are in fact, two distinct three-digit level cotton textile industries according to NIC, with respective code no. as 234 and 235. In this study, however, we have kept these two industries in the same category and given them an arbitrary code no. as 235. This is because, these two industries did not show adequate dispersal through space in the base period.

21. The major centres of the various industries have been determined on the basis of their share in gross value added during 1982-83. In addition to their share in gross value added, we have also estimated their share in total fixed capital and total workers employed (both for the period 1973-74 and 1982-83). All these estimates have been presented in Appendix Table 1.1 to 1.4.

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# CHAPTER - 3

## PARTIAL PRODUCTIVITY TRENDS

In this chapter an attempt is made to analyse the partial productivity trends in different cotton textile industries of India. The focus is on the regional aspects of productivity.

We have worked out the annual trend rates(usually, for the period 1973-74 to 1982-83) of the partial productivity ratios for the three important factors, namely, labour, capital and raw materials. Labour productivity has been measured as a ratio of value added to workers, capital productivity has been measured as a ratio of value added to fixed capital and raw materials productivity has been measured as a ratio of output to inputs (other than labour and capital). Both value added and fixed capital are gross of depreciation and in constant prices. We shall examine below several aspects of these productivity trends.

### Cotton Ginning, Cleaning and Bailing (230)

In column one of Table 3.1 are set out the annual trend rates of labour productivity in the cotton ginning, cleaning and bailing industry. It may be easily noted

that for all-India, labour productivity increased at the rate of 1.13 per cent per annum.

At the regional level also, labour productivity has increased over the entire period (i.e. 1973-74 to 1982-83) for most of the states. The highest increase in the annual trend rates of labour productivity was registered in Andhra Pradesh (which incidently, is not a major centre for this industry), followed by Rajasthan, Gujarat, Tamil Nadu, Karnataka, Harayana and Madhya Pradesh. On the other hand, Maharashtra and Punjab are the two major states where the annual trend rates of labour productivity have declined significantly . This is really a very distressing matter. It seems that the positive annual trend in labour productivity for all-India, has emerged mainly due to the positive contributions by three other major centres, namely, Gujarat, Madhya Pradesh and Tamil Nadu. Other wise, we might have experienced a negative annual trend rate of labour productivity at the all-India level.

The factor which seems to explain labour productivity growth in Andhra Pradesh, Gujarat, Karnataka and Madhya Pradesh, is increase in the wage rate. The relationship between wage rate and labour productivity is complex due to simultaneous interaction. However, if one takes the view that wage rate is largely exogenous and is determined by

institutional factors, it can be argued that increase in wage rate, given other factors, will increase labour productivity as labour is better provided. In case of Harayana, Rajasthan and Tamil Nadu, however, in addition to the increase in wage rate, increase in capital intensity also explains the labour productivity growth (refer to Appendix Table - 2.1).

In column two of Table-3.1 are set out the annual trend rates of capital productivity in the cotton ginning, cleaning and bailing industry. As it is clear from the table, for all-India, capital productivity increased by about 3.79 per cent per annum.

Among the major centres, Gujarat recorded the highest increase in capital productivity(4.12 per cent per annum), followed by Punjab (2.14 per cent per annum) and Maharashtra (0.44 per cent per annum). Madhya Pradesh and Tamil Nadu showed a decline in the annual trend rates of capital productivity.

Andhra Pradesh (which is not a major centre of this industry) experienced a significant increase in capital productivity of about 10.88 per cent per annum. On the other hand, the highest decline in the annual trend rate of capital productivity was registered in case of

Table 3.1

Annual Trends rates of productivity ratios Industry - 230

(in percentage)

| Regions (o) | Labour Productivity (1) | Capital Productivity (2) | Raw Materials Productivity (3) |
|---|---|---|---|
| Gujarat | 2.79 | 4.12 | 0.94 |
| Maharashtra | -2.34 | 0.44 | 2.29 |
| Punjab | -1.57 | 2.14 | 0.32 |
| M.P | 1.20 | -1.17 | 1.86 |
| Tamil Nadu | 1.92 | -2.54 | 0.15 |
| Rajasthan | 2.90 | -3.21 | 0.39 |
| Karnataka | 1.79 | 3.18 | -3.53 |
| Haryana | 1.52 | -5.91 | -0.02 |
| A.P. | 11.38 | 10.88 | 0.23 |
| ALL-INDIA | 1.13 | 3.79 | 0.88 |

Harayana(-5.91 per cent) and Rajasthan (-3.81 per cent).

It is interesting to note that capital productivity and capital intensity are related somewhat inversely in this industry. In fact, the factor which seems to be responsible for the declining annual trend rate of capital productivity in Harayana, Rajasthan and Tamil Nadu, is chiefly the rise in capital intensity in these regions. It can also be noticed that the increasing annual trend rate of capital productivity in this industry is associated with declining capital intensity in regions such as Andhra Pradesh, Gujarat and Punjab.

So far as the raw-materials productivity in the cotton ginning, cleaning and bailing industry is concerned, it may be easily noted from column three of Table - 3.1 that for all-India, its annual trend rate stood at only 0.88 per cent per annum, which is insignificant . At the regional level also, raw materials productivity showed an insignificant growth in most of the states. The exceptions , however, are Maharashtra and Tamil Nadu, which showed significant growth in the raw materials productivity and Karnataka which showed a significant decline in the raw materials productivity growth.

It seems that the insignificant growth in raw materials productivity in this industry for most of the

states as well as for all-India, has resulted mainly due to the stagnant level of technology and the slowly increasing (or even decreasing) efficiency of labour and capital. The use of the aggregated estimates of the raw materials(instead of working out the productivity of fuels, materials, etc. seperately) may be the other cause of this type of trend in the raw materials productivity growth.

Cotton Spinning, Weaving, Shrinking, Sanforising, Mercerising and Finishing of Cotton Textiles in Mills(231)

In column one of the Table- 3.2 are set out the annual trend rates of labour productivity in the cotton spinning, weaving, shrinking, etc. industry. We can see that for all-India, labour productivity increased at the rate of 1.26 per cent per annum.

At the regional level also, labour productivity increased in most of the states. Madhya Pradesh registered the highest annual trend rate of 4.27 per cent, followed by Bihar (3.54 per cent) Karnataka (2.51 per cent), Punjab (2.38 per cent ) and Kerala (1.71 per cent). In Harayana, however, it decreased by about -1.06 per cent per annum. Gujarat also experienced a decline in the annual trend rate of labour productivity, though it was

significant. Tamil Nadu (a major centre of this industry) could show only an insignificant growth in labour productivity. Perhaps, it is due to this stagnancy in the labour productivity in two major centres of this industry, namely, Gujarat and Tamil Nadu, that at the all-India level labour productivity could not show an impressive trend rate.

The factors which seem to explain productivity growth in the majority of the states(though not essentially in the major states) as discussed above, are increase in capital intensity and wage rate (refer to Appendix Table-2.2). It can be easily observed that except Harayana and Andhra Pradesh where annual trend rates of capital intensity were not very high, and Orissa, where annual trend rate of wage rate was even negative (though insignificantly), the annual trend rates of capital intensity and wage rate were high in almost all the states.

Data on capital productivity presented in column two of Table-3.2 show a decrease of about -3.27 per cent per annum at the all-India level. At the state level also, capital productivity showed a downtrend in various states. The most pronounced decline was noticed in the case of Punjab, followed by Tamil Nadu, Maharasthra and West Bengal.

Table 3.2

Annual Trend rates of productivity ratios Industry - 231

(in percentage)

| Regions (o) | Labour Productivity (1) | Capital productivity (2) | Raw Material Productivity (3) |
|---|---|---|---|
| Gujarat | -0.32 | -4.10 | -1.40 |
| Tamil Nadu | 0.55 | -4.13 | -0.58 |
| Maharashtra | 2.30 | -4.35 | -0.86 |
| U.P. | 3.41 | -4.21 | 0.67 |
| M.P. | 4.27 | -2.75 | 1.09 |
| Karnataka | 2.51 | -2.82 | -0.21 |
| A.P. | 0.95 | -1.63 | -0.11 |
| Rajasthan | 2.04 | -0.11 | 0.38 |
| Kerala | 1.71 | -4.74 | -0.52 |
| Orissa | 1.13 | -1.96 | 1.26 |
| Haryana | -1.06 | -2.53 | -1.04 |
| Punjab | 2.38 | -6.01 | -0.40 |
| West-Bengal | 0.77 | -3.72 | 0.16 |
| Bihar | 3.54 | -2.06 | 1.14 |
| ALL-INDIA | 1.26 | -3.27 | -0.18 |

The most striking feature of the declining annual trend of capital productivity in almost all the states as well as in India as a whole, in their association with increasing capital intensity (refer to Appendix Table-2.2).

So far as the productivity of raw materials in this industry is concerned, it may be easily observed from column three of Table - 3.2 that for all-India, it decreased insignificantly by about -0.18 per cent per annum. At the state level also, raw materials productivity declined (though insignificantly) in most cases. Orissa, Bihar and Madhyra Pradesh, however showed an increase in raw materials productivity by about 1.09 to 1.26 per cent per annum.

The stagnating growth in raw materials productivity in this industry for most of the states as well as for all-India has resulted mainly due to the stagnant level of technology as well as the efficiency of labour and capital.

Printing, Dyeing and Bleaching of Cotton Textiles(232)

In column one of Table -1.3 are set out the annual trend rates of labour productivity in the printing, dyeing and bleaching of cotton textiles.

At the all-India level, labour productivity increased by about 4.41 per cent per annum. Among the major centres of this industry, the highest increase in labour productivity was recorded for Gujarat, followed by Maharashtra and Harayana. Among the less important centres of this industry (in terms of their lower contribution to the gross value added), however, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal have shown tremendous increase in the annual trend rates of labour productivity.

The factors which seem to explain labour productivity growth in the majority of the states as discussed above, are increase in capital intensity and wage rate (refer to Appendix Table-2.3). It can be easily observed that except Harayana and Punjab (where the annual trend rates of capital intensity and wage rate were not very high), annual trend rates of capital intensity and wage rate were fairly high in almost all the remaining states.

In column two of Table-3.3 are set out the annual trend rates of capital productivity in the printing, dyeing and bleaching of cotton textiles. As it is clear from the table, at the all-India level, capital productivity showed a declining trend of about -0.83 per cent per annum. Two major centres of this industry, namely,

TABLE - 3.3

Annual Trend Rates of Productivity Ratios

INDUSTRY - 232

(In percentage)

| Regions (0) | Labour productivity (1) | Capital Productivity (2) | Raw materials productivity |
|---|---|---|---|
| Maharashtra | 1.83 | -0.67 | 0.11 |
| Gujarat | 2.23 | 0.19 | 0.03 |
| Harayana | 0.90 | -0.48 | 1.05 |
| Karnataka | 3.42 | -0.11 | 0.72 |
| Tamil Nadu | 8.41 | 2.22 | 1.39 |
| Punjab | 3.77 | -5.36 | -0.87 |
| West Bengal | 6.02 | -17.42 | -2.26 |
| Rajasthan | 8.66 | - 1.61 | -1.93 |
| U.P. | 11.03 | - 2.27 | 1.35 |
| All -India | 4.41 | - 0.83 | 0.29 |

Maharashtra and Harayana, have also shown an insignificantly declining annual trend in capital productivity. Gujarat, an another important centre, has, however, shown an insignificantly increasing annual trend in capital productivity. Thus, there is no doubt that the annual trend rate of capital productivity at the all-India level has been influenced very much by the annual trend rates of capital productivity in these three major centres of this industry.

Now coming to the productivity of raw materials in the printing, dyeing and bleaching of textiles, it can be seen from column three of Table-3.3 that for all-India, its annual trend rate was insignificant (0.29 per cent). In Gujarat, Karnataka, Maharashtra and Punjab also, the annual trend rates of the raw materials productivity did not register any significant gains or losses. In West Bengal, however, raw materials productivity registered a significant decline of about -2.26 per cent per annum. On the other hand, in Harayana, Tamil Nadu, and Uttar Pradesh, it increased by 1.05 to 1.39 per cent per annum.

Production of Khadi and Weaving and Finishing of Cotton Textiles in Handlooms other than Khadi

Column one of Table-3.4 presents annual trend rates of

labour-productivity in the production of Khadi and Weaving and finishing of cotton textiles in handlooms other than Khadi. It clearly shows that for all-India, labour productivity increased by about 2.95 per cent per annum.

At the regional level, except Kerala (which is the most important centre of this industry), all the other centres of this industry eeperienced a very high annual trend rate of labour productivity. West Bengal showed the most pronounced growth in labour productivity, mainly because of the unbelievable increase in the last year of our study. Otherwise, it must have shown a declining trend rate. In fact, between 1977-78 to 1979-80 , the labour productivity ratio in West Bengal was extremely low.

Next to West Bengal, Punjab registered the highest increase in labour productivity of about 7.60 per cent per annum in this industry, followed by Uttar Pradesh (6.66 per cent per annum) and Karnataka (4.5 per cent per annum).

In case of this industry also, it seems that the chief factors explaining growth in labour productivity in different states have been increase in capital intensity and wage rates. In West Bengal, where labour productivity showed highest annual trend rate, capital intensity and wage rate were very high. On the other hand, in Kerala,where labour productivity

did not grow significantly, capital intensity and wage rate were comparatively low.

In column two of Table-3.4 are set out data on capital productivity. For all-India, capital productivity shows a decline of about -3.68 per cent per annum. At the regional level also, Kerala , West Bengal, Karnataka, and Punjab have shown significant decline in the annual trend rates of capital productivity. Uttar Pradesh, however, is the state which has registered increasing annual trend in capital productivity.

Here again, the factor which seems to be responsible for the declining annual trend rates of capital productivity in the majority of the states, as well as in all-India, is the rise in capital intensity(refer to Appendix Table-2.4). We can see that in all the states except Uttar Pradesh (where capital productivity is positively increasing), capital intensity is high.

Data on raw materials productivity in this industry as presented in column three of Table-3.4 show that for all-India, raw materials productivity decreased by about -0.81 per cent per annum. At the regional level also, except Kerala, Punjab and Uttar Pradesh, where raw materials productivity increased insignificantly by

TABLE - 3.4

Annual Trend Rates of Productivity Ratios

INDUSTRY-235

(In percentage)

| Regions (0) | Labour productivity ( 1 ) | Capital productivity ( 2 ) | Raw materials productivity ( 3 ) |
|---|---|---|---|
| Kerala | 0.67 | -3.89 | 0.79 |
| West Bengal | 11.27 | -7.01 | -2.18 |
| U.P. | 6.66 | 8.89 | 0.87 |
| Karnataka | 4.45 | - 9.48 | -8.28 |
| A.P. | 3.18 | -10.88 | -0.56 |
| Punjab | 7.60 | - 7.48 | 0.67 |
| All-India | 2.95 | - 3.68 | -0.81 |

about 0.67 to 0.87 per cent per annum, the remaining states such as Karnataka, West Bengal and Andhra Pradesh showed a declining trend in it. In Karnataka, the annual trend rate of decline in the raw materials productivity was as high as -8.28 per cent.

It seems that the insignificant trend in raw materials productivity in this industry in states such as Kerala, Uttar Pradesh, Andhra Pradesh and Punjab as well as in all-India has resulted mainly due to the stagnant level of technology and the declining efficiency of capital. The use of the aggregated values of the raw materials (instead of working out the productivity of fuels, materials, etc. seperately) may also be one of the reasons for this type of raw materials productivity growth in these regions.

Weaving and Finishing of Cotton Textiles in Power-looms(236)

In colum one of Table-3.5 are set out the annual trend rates of labour productivity in weaving and finishing of cotton textiles in power-looms. It is evident from this table that for all_India, labour productivity increased at the rate of 2.39 per cent per annum.

In Orissa and Tamil Nadu, which are the two most important centres of this industry(in terms of their contribution to the gross value added), labour productivity grew at the rate of 5.91 and 3.10 per cent per annum. West Bengal , Gujarat and Uttar Pradesh have also registered significant increase in the annual trend rate of labour productivity. In Kerala (which incidently is not a major centre of this industry), however, labour productivity showed a decline of about -6.65 per cent per annum.

The factors which seem to explain labour productivity growth in this industry is once again, increase in capital intensity and wage rates in most of the regions. The reason that Kerala, which showed a significant increase in annual trend rate of capital intensity but experienced significant decline in labour productivity, is that the annual trend of wage rate was declining alarmingly there (-2.38 per cent per annum).

In colum two of Table-3.5 are set out the capital productivity growth rates in this particular industry. It is evident that for all-India, capital productivity suffered a significant decline of about -5.11 per cent per annum. At the regional level also, except Gujarat, almost all the states have shown a declining annual trend

rate in their respective capital productivity ratios. In the two most important centres of this industry, namely, Tamil Nadu and Orissa, capital productivity has declined by about -5.92 and -1.78 per cent per annum respectively. This is really a matter of concern to all of us.

Gujarat, where the annual trend rate of capital intensity was negative (refer to Appendix Table-2.5), has demonstrated positive annual trend rate of about 1.15 per cent in capital productivity.

Column three of Table-3.5 presents the annual trend rates of raw materials productivity in weaving and finishing of cotton textiles in power-looms. As it can be easily observed , for all-India, raw materials productivity has declined at the rate of -0.44 per cent per annum. In other words, for all-India, it did not register any significant trend.

In Tamil Nadu, a major centre of this industry, raw materials productivity declined, though insignificantly by about -0.32 per cent per annum. On the other hand, in Orissa, an another major centre, it showed an insignificant grwoth of about 1.08 per cent per annum.

TABLE - 3.5

Annual Trend Rates of Productivity Ratios

INDUSTRY - 236

(in percentage)

| Regions | Labour productivity | Capital productivity | Raw materials productivity |
|---|---|---|---|
| (0) | (1) | (2) | (3) |
| Tamil Nadu | 3.10 | -5.92 | -0.32 |
| Orissa | 5.91 | - 1.78 | 1.08 |
| West Bengal | 3.21 | -2.34 | - 1.26 |
| Gujarat | 1.83 | 1.15 | -0.97 |
| U.P. | 1.16 | -3.86 | -0.18 |
| Kerala | -6.65 | -2.41 | -2.16 |
| All-India | 2.39 | -5.11 | -0.44 |

West Bengal, Gujarat and Uttar Pradesh have shown an insignificant decline in the annual trend rates of the raw materials productivity. Kerala, however, has registered a significant decline of about -2.16 per cent per annum in the raw materials productivity.

It seems that the stagnating and even marginally declining growth rate in raw materials productivity in the weaving and finishing of cotton textiles in power-looms in most of the states has resulted mainly because of the stagnant level of technology. The use of the aggregated estimates of the raw materials(instead of working out the productivity of fuels, materials consumed, etc., seperately), may also be responsible for this type of trend in the productivity of raw materials in this industry.

Summary:

The partial productivity trends in different cotton textile industries of India show that -

(i) In general, labour productivity showed increasing trend rates for all-India as well as for the majority of the states (except Maharashtra and Punjab in industry-230, Gujarat and Harayana in industry-231 and Kerala in industry_-236).

(ii) Capital productivity showed decreasing trend rates for all-India as well as for most of the states(except Gujarat, Punjab , Karnataka and Andhra Pradesh in industry-230, Tamil Nadu and Uttar Pradesh in industry-232, Uttar Pradesh in industry-235 and Gujarat in industry-236).

(iii) Usually, labour productivity was high in those regions where wage rate and capital intensity were high.

(iv) Capital productivity and capital intensity were found to be inversely related in most of the states.

(v) Raw materials productivity did not register any significant trend in most of the states as well as in India as a whole. Perhaps, this indicates the absence of the large scale use of modern technology in the cotton textile industries of India.

# CHAPTER - 4

## TOTAL FACTOR PRODUCTIVITY TRENDS

In this chapter an attempt is made to measure and analyse the total factor productivity trends in different cotton textile industries of India. Two alternative measures of total factor productivity, namely, Kendrick and Translog indices have been worked out for all-India as well as for the major states where a particular industry is located, for the period 1973-74 to 1982-83. In the later part of this chapter, we have also tried to fit the Cobb-Dougals production function for these industries in various states of India.

### Cotton Ginning, Cleaning and Bailing (230):

In Table-4.1 are set out the indices of total factor productivity in cotton ginning, cleaning and bailing industry. At the bottom of the table are presented the annual trend rates of productivity increase.

Both the total factor productivity (TFP) indices, namely, Kendrick and Translog, reveal a general uptrend over the period for all-India as well as for the various states. For all-India, the Kendrick and Translog indices registered an increase of about 56 per cent and 50 per cent respectively over the entire period and their

Table 4.1

TOTAL FACTOR PRODUCTIVITY INDICES, INDUSTRY - 230

| Year | GUJRAT | | MAHARASTHRA | | PUNJAB | | M.P. | | TAMIL NADU | |
|---|---|---|---|---|---|---|---|---|---|---|
| | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN |
| 1973-74 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1974-75 | 129 | 125 | 114 | 115 | 102 | 98 | 87 | 80 | 76 | 76 |
| 1975-76 | 120 | 118 | 125 | 132 | 134 | 128 | 79 | 75 | 96 | 95 |
| 1976-77 | 115 | 112 | 75 | 79 | 108 | 103 | 124 | 120 | 72 | 70 |
| 1977-78 | 110 | 106 | 90 | 98 | 72 | 68 | 117 | 117 | 95 | 93 |
| 1978-79 | 118 | 121 | 131 | 158 | 79 | 70 | 128 | 124 | 102 | 102 |
| 1979-80 | 148 | 153 | 141 | 167 | 115 | 108 | 122 | 121 | 99 | 95 |
| 1980-81 | 130 | 140 | 125 | 135 | 98 | 90 | 145 | 140 | 105 | 107 |
| 1981-82 | 147 | 145 | 100 | 100 | 141 | 131 | 159 | 160 | 112 | 110 |
| 1982-83 | 158 | 169 | 108 | 110 | 152 | 142 | 135 | 137 | 106 | 102 |
| A.T.R. | 4.42 | 5.08 | 1.13 | 1.44 | 2.01 | 1.97 | 2.08 | 2.19 | 0.61 | 0.51 |

Contd.

TOTAL FACTOR PRODUCTIVITY INDICES, INDUSTRY - 230

| Year | RAJASTHAN | | KARNATAKA | | HARYANA | | A.P. | | ALL-INDIA | |
|---|---|---|---|---|---|---|---|---|---|---|
| | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN |
| 1973-74 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1974-75 | 82 | 84 | 82 | 78 | 129 | 119 | 130 | 123 | 117 | 112 |
| 1975-76 | 94 | 98 | 104 | 109 | 88 | 93 | 123 | 119 | 122 | 118 |
| 1976-77 | 106 | 104 | 127 | 120 | 85 | 88 | 105 | 103 | 104 | 112 |
| 1977-78 | 120 | 115 | 137 | 129 | 84 | 87 | 126 | 123 | 115 | 116 |
| 1978-79 | 111 | 118 | 139 | 138 | 98 | 102 | 104 | 104 | 131 | 128 |
| 1979-80 | 101 | 110 | 177 | 158 | 102 | 105 | 151 | 144 | 150 | 146 |
| 1980-81 | 107 | 112 | 188 | 162 | 110 | 109 | 135 | 130 | 136 | 145 |
| 1981-82 | 109 | 114 | 142 | 130 | 92 | 98 | 140 | 148 | 129 | 140 |
| 1982-83 | 104 | 101 | 181 | 140 | 125 | 109 | 162 | 175 | 156 | 150 |
| A.T.R. | 1.27 | 1.40 | 2.85 | 2.81 | 1.21 | 0.88 | 4.58 | 4.50 | 3.60 | 3.87 |

KEN = KENDRICK, TRN = TRANSLOG, and A.T.R. = ANNUAL TREND RATE.

annual trend rates were recorded as 3.60 per cent and 3.87 percent per annum respectively.

As it was expected, generally the highest annual trend rates of these TFP indices were registered in those states which had recorded significant positive increase in both the labour and capital productivities (as discussed in the earlier chapter). For instance, in Andhra Pradesh, where the labour and capital productivities were found to have significant positive annual trend rates, the trend rates of Kendrick and Translog indices were as high as 4.58 and 4.50 per cent per annum.

The least increase in the annual trend rates of the TFP indices was associated with Tamil Nadu(0.61 and 0.51 per cent per annum), followed by Harayana (1.21 and 0.88 per cent per annum), Rajasthan (1.27 and 1.40 per cent per annum) and Maharashtra (1.13 and 1.44 per cent per annum). And despite the declining annual trend of capital productivity of about -1.57 per cent in Punjab, it recorded an impressive trend rate of the TFP indices as 2.01 and 1.97 per cent per annum respectively.

The most striking feature of these two TFP indices is their close correspondence for all_India as well as for the various regions over the period 1973-74 to 1982-83. The peaks and troughs synchronize practically in all cases.

Cotton Spinning, Weaving, Shrinking, Sanforising, Mercerising and Finishing of Cotton Textiles in Mills (231) :

In Table-4.2 are set out the TFP indices in cotton spinning, weaving, shrinking, etc industry. It is evident from this table that for all-India, although the Kendrick and Translog indices have failed to show any significant increase over the entire period of our study (i.e. between 1973-74 to 1982-83), but their annual trend rates have still managed to record positive increase of about 1.46 and 1.39 per cent per annum respectively. This is mainly because of the significant improvement in these indices during the years 1975-76 to 1979-80.

Except Bihar, Gujarat, Kerala, Maharashtra and Punjab (where the annual trend rates of the TFP indices were found to be either negative or insignificant), these two TFP indices reveal a general uptrend over the period for almost all the major states where this industry is located.

Madhyra Pradesh and Karnataka (where the annual trend rates of labour productivity were fairly high), have recorded the highest increase in the annual trend rates of the TFP indices. In fact, Madhya Pradesh

Table 4.2

TOTAL FACTOR PRODUCTIVITY INDICES, INDUSTRY - 231

| Year | GUJRAT | | TAMIL NADU | | MAHARASHTRA | | U.P. | | M.P. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN |
| 1973-74 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1974-75 | 109 | 110 | 99 | 99 | 103 | 104 | 143 | 132 | 126 | 123 |
| 1975-76 | 101 | 104 | 88 | 90 | 82 | 90 | 115 | 112 | 89 | 85 |
| 1976-77 | 91 | 92 | 90 | 94 | 91 | 98 | 78 | 76 | 125 | 120 |
| 1977-78 | 117 | 116 | 109 | 110 | 97 | 102 | 106 | 105 | 119 | 115 |
| 1978-79 | 122 | 124 | 114 | 120 | 105 | 107 | 151 | 141 | 130 | 125 |
| 1979-80 | 122 | 125 | 108 | 116 | 111 | 115 | 166 | 156 | 140 | 135 |
| 1980-81 | 109 | 110 | 111 | 118 | 103 | 105 | 158 | 149 | 147 | 140 |
| 1981-82 | 99 | 100 | 108 | 109 | 123 | 125 | 111 | 108 | 130 | 125 |
| 1982-83 | 79 | 88 | 104 | 106 | 57 | 69 | 135 | 134 | 148 | 142 |
| A.T.R. | -0.29 | -0.15 | 0.74 | 1.10 | -1.28 | -0.89 | 2.57 | 1.94 | 3.08 | 2.82 |



Contd.

TOTAL FACTOR PRODUCTIVITY INDICES , INDUSTRY - 231

| Year | KARNATAKA | | A.P. | | RAJASTHAN | | KERALA | | ORISSA | |
|---|---|---|---|---|---|---|---|---|---|---|
| | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN |
| 1973-74 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1974-75 | 98 | 96 | 87 | 84 | 121 | 118 | 89 | 90 | 98 | 99 |
| 1975-76 | 108 | 107 | 83 | 83 | 92 | 90 | 56 | 62 | 87 | 90 |
| 1976-77 | 96 | 93 | 98 | 95 | 99 | 95 | 58 | 68 | 80 | 82 |
| 1977-78 | 101 | 99 | 103 | 100 | 119 | 120 | 68 | 70 | 85 | 85 |
| 1978-79 | 106 | 104 | 108 | 110 | 169 | 170 | 86 | 91 | 93 | 95 |
| 1979-80 | 110 | 106 | 117 | 115 | 187 | 185 | 102 | 105 | 123 | 125 |
| 1980-81 | 128 | 120 | 124 | 124 | 130 | 125 | 82 | 89 | 103 | 102 |
| 1981-82 | 118 | 115 | 110 | 106 | 124 | 120 | 61 | 69 | 97 | 95 |
| 1982-83 | 102 | 101 | 105 | 101 | 102 | 100 | 50 | 67 | 120 | 122 |
| A.T.R. | 1.38 | 1.20 | 1.08 | 1.01 | 2.13 | 2.02 | -1.87 | -1.57 | 0.97 | 1.06 |



Contd.

TOTAL FACTOR PRODUCTIVITY INDICES , INDUSTRY - 231

| Year | HARYANA | | PUNJAB | | WEST BENGAL | | BIHAR | | ALL-INDIA | |
|---|---|---|---|---|---|---|---|---|---|---|
| | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN |
| 1973-74 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1974-75 | 137 | 135 | 114 | 115 | 95 | 92 | 64 | 50 | 108 | 107 |
| 1975-76 | 66 | 68 | 94 | 90 | 78 | 73 | 58 | 52 | 84 | 82 |
| 1976-77 | 72 | 73 | 108 | 112 | 83 | 79 | 123 | 120 | 87 | 85 |
| 1977-78 | 79 | 82 | 104 | 107 | 98 | 92 | 127 | 125 | 100 | 98 |
| 1978-79 | 144 | 145 | 92 | 95 | 113 | 108 | 138 | 130 | 122 | 117 |
| 1979-80 | 128 | 130 | 116 | 120 | 122 | 115 | 107 | 99 | 130 | 129 |
| 1980-81 | 113 | 125 | 106 | 112 | 112 | 110 | 148 | 142 | 108 | 105 |
| 1981-82 | 118 | 127 | 96 | 100 | 118 | 115 | 121 | 120 | 115 | 112 |
| 1982-83 | 81 | 90 | 102 | 105 | 129 | 122 | 95 | 90 | 108 | 105 |
| A.T.R. | 0.65 | 1.17 | -0.69 | 0.37 | 1.22 | 1.02 | 0.33 | -0.12 | 1.46 | 1.39 |

KEN = KENDRICK, TRN = TRANSLOG and A.T.R=ANNUAL TREND RATE.

showed an increase of about 1.38 and 1.20 per cent per annum in the Kendrick and Translog indices respectively.

Uttar Pradesh and Rajasthan also, have shown significant gain in the annual trend rates of the TFP indices. Gujarat, Kerala and Maharashtra, however, are the states which experienced down trends in both the Kendrick and Translog indices. Perhaps this is mainly due to the significant downtrend in the capital productivity in these states over the entire period.

In the case of this industry also, a striking feature of the computed Kendrick and Translot indices is their close correspondence for all-India as well as for the various regions overthe period 1973-74 to 1982-83. The peaks and troughs synchronize practically in all cases.

Printing, Dyeing and Bleaching of Cotton Textiles(232):

Table-4.3 gives data on TFP indices in printing, dyeing and bleaching of cotton textiles. It is evident from this table that for all-India, Kendrick and Translog indices increased by about 24 and 35 per cent respectively over the entire period of study. Their annual trend rates were, however, 2.90 and 3.12 per cent per annum respectively. These indices increased from 100 in 1973-74 to 159 and

160 respectively in 1976-77. In 1977-78, they declined sharply to 133 and 135 respectively and then again started increasing upto as high as 180 and 189 respectively - untill the last year of our study, i.e., 1982-83 , when they again dropped back to 124 and 135 respectively.

At the state level also, the TFP indices showed a general uptrend in the states of Gujarat(2.23 and 2.60 per cent per annum), Punjab (3.02 and 3.98 per cent per annum) , Rajasthan (4.42 and 4.90 per cent per annum) and Uttar Pradesh (4.23 and 4.85 per cent per annum). It is interesting to note that among these states, Rajasthan and Uttar Pradesh which showed the highest increase in the trend rates of the TFP indices, have experienced significant positive annual trends in labour productivity also. In fact, in Rajasthan and Uttar Pradesh, the annual trend rate of labour productivity was as high as 8.66 and 11.03 per cent per annum.

West Bengal is the only state which experienced a sharp decrease in both the Kendrick and Translog indices by about -3.71 and -3.10 per cent per annum. It seems that it was mainly due to a marked decline in labour productivity(-17.42 per cent per annum) in that state

Table 4.3

TOTAL PRODUCTIVITY INDICES, INDUSTRY - 232

| Year | MAHARASHTRA | | GUJRAT | | HARYANA | | KARNATAKA | | TAMIL NADU | |
|---|---|---|---|---|---|---|---|---|---|---|
| | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN |
| 1973-74 | 100 | 100 | 100 | 100 | - | - | - | - | 100 | 100 |
| 1974-75 | 160 | 155 | 84 | 102 | - | - | 100 | 100 | 143 | 130 |
| 1975-76 | 150 | 149 | 133 | 150 | - | - | 71 | 75 | 110 | 102 |
| 1976-77 | 155 | 157 | 155 | 152 | 100 | 100 | 82 | 80 | 118 | 110 |
| 1977-78 | 153 | 154 | 120 | 128 | 66 | 65 | 139 | 135 | 83 | 85 |
| 1978-79 | 146 | 142 | 156 | 158 | 124 | 124 | 80 | 79 | 85 | 90 |
| 1979-80 | 173 | 178 | 118 | 128 | 113 | 111 | 91 | 89 | 91 | 95 |
| 1980-81 | 161 | 165 | 133 | 140 | 49 | 45 | 103 | 100 | 113 | 101 |
| 1981-82 | 149 | 145 | 122 | 131 | 190 | 182 | 78 | 75 | 169 | 139 |
| 1982-83 | 139 | 140 | 128 | 142 | 78 | 75 | 117 | 112 | 136 | 118 |
| A.T.R. | 2.39 | 2.92 | 2.23 | 2.60 | 0.53 | 0.42 | 0.85 | 0.77 | 1.47 | 1.26 |



Contd.

TOTAL FACTOR PRODUCTIVITY INDICES, INDUSTRY - 232

| Year | PUNJAB | | WEST BENGAL | | RAJASTHAN | | U.P. | | ALL-INDIA | |
|---|---|---|---|---|---|---|---|---|---|---|
| | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN |
| 1973-74 | 100 | 100 | 100 | 100 | - | - | 100 | 100 | 100 | 100 |
| 1974-75 | 141 | 145 | 112 | 117 | 100 | 100 | 118 | 120 | 115 | 110 |
| 1975-76 | 122 | 120 | 102 | 106 | 127 | 130 | 141 | 140 | 147 | 140 |
| 1976-77 | 156 | 158 | 145 | 149 | 180 | 185 | 136 | 132 | 159 | 160 |
| 1977-78 | 169 | 170 | 65 | 67 | 160 | 161 | 116 | 118 | 133 | 135 |
| 1978-79 | 186 | 189 | 60 | 65 | 171 | 170 | 148 | 151 | 149 | 155 |
| 1979-80 | 168 | 173 | 72 | 79 | 152 | 155 | 184 | 190 | 148 | 158 |
| 1980-81 | 160 | 165 | 79 | 84 | 180 | 186 | 210 | 211 | 152 | 161 |
| 1981-82 | 149 | 155 | 136 | 135 | 108 | 115 | 190 | 194 | 180 | 189 |
| 1982-83 | 193 | 194 | 92 | 96 | 175 | 182 | 172 | 175 | 124 | 135 |
| A.T.R. | 3.02 | 3.98 | -3.71 | -3.10 | 4.42 | 4.90 | 4.23 | 4.85 | 2.90 | 3.12 |

KEN = KENDRICK , TRN = TRANSLOG AND A.T.R. = ANNUAL TREND RATE.

over the entire period of study.

Harayana and Karnataka did not register any significant improvement in the annual trend rates of the TFP indices. We can see that these are the states which experienced pronounced fluctuations in the TFP indices over the entire period. Sometimes they fall sharply and sometimes they increased sharply. There was not any significant uptrend or down trend in these two states over the entire period of study.

A striking feature of the computed Kendrick and Translog indices for this industry also, is their close correspondence for all-India as well as for the various regions over the period 1973-74 to 1982-83. The peaks and troughs synchronize practically in all cases.

Production of Khadi and Weaving and Finishing of Cotton Textiles in Hand-looms other than Khadi

Table-4.4 gives data on TFP indices in production of Khadi and Weaving and finishing of cotton textiles in handlooms other than Khadi. It may be easily noted from this table that for all-India Kendrick and Translog indices of total factor productivity increased by 61 and 70 per cent respectively over the entire period, i.e.,

Table 4.4

TOTAL FACTOR PRODUCTIVITY INDICES, INDUSTRY - 235

| Year | KERALA | | U.P. | | A.P. | | PUNJAB | | ALL-INDIA | |
|---|---|---|---|---|---|---|---|---|---|---|
| | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN |
| 1973-74 | 100 | 100 | - | - | 100 | 100 | 100 | 100 | 100 | 100 |
| 1974-75 | 109 | 111 | - | - | 86 | 89 | - | - | 119 | 127 |
| 1975-76 | 88 | 92 | 100 | 100 | 82 | 85 | - | - | 118 | 125 |
| 1976-77 | 103 | 102 | 113 | 109 | 78 | 84 | - | - | 121 | 128 |
| 1977-78 | 107 | 104 | 148 | 138 | 81 | 81 | 88 | 92 | 136 | 138 |
| 1978-79 | 86 | 85 | 153 | 150 | 75 | 78 | 55 | 60 | 122 | 126 |
| 1979-80 | 108 | 108 | 202 | 197 | 69 | 75 | 61 | 65 | 188 | 189 |
| 1980-81 | 110 | 109 | 147 | 155 | 80 | 83 | 57 | 62 | 182 | 188 |
| 1981-82 | 114 | 117 | 163 | 170 | 75 | 78 | 58 | 66 | 142 | 164 |
| 1982-83 | 110 | 107 | 150 | 138 | 79 | 80 | 53 | 60 | 161 | 170 |
| A.T.R. | -0.68 | -1.07 | 5.22 | 5.02 | -3.31 | -2.89 | -5.80 | -3.48 | 4.26 | 4.55 |

KEN = KENDRICK, TRN = TRANSLOG and A.T.R. = ANNUAL TREND RATE.

between 1973-74 to 1982-83. Their annual trend rate at 4.26 and 4.55 per cent also look quite impressive. They increased from 100 in 1973-74 to the peak of their light as 188 and 189 respectively in 1979-80 . In the next two years, i.e. in 1980-81 and 1981-82, they suffered a decline, but in the last year of our study, they again picked upto 161 and 170 respectively.

At the state level, Uttar Pradesh registered the highest annual trend rates in the Kendrick and Translog indices by about 5.22 and 5.02 per cent respectively. The main reason behind this significant uptrend in the TFP indices in Uttar Pradesh seems to be the significant positive increase in the annual trend rate of both the labour and capital productivity there. As we have already seen in the last chapter, labour and capital productivity increased at a rate of 6.66 and 8.89 per cent per annum in Uttar Pradesh.

Punjab showed the steepest decline in the annual trend rates of the TFP indices (by -5.80 and -3.48 per cent), followed by Andhra Pradesh (-3.31 and -2.89 per cent) and Kerala (-0.68 and -1.07 per cent). In the last chapter, we have already seen that the annual trend rates of capital productivity in these states were showing significant decline. For instance, in

Andhra Pradesh and Punjab, the annual trend rates of capital productivity were recorded as -10.88 and -7.48 per cent respectively.

Weaving and Finishing of Cotton Textiles in Power-looms (236)

In Table -4.5 are set out the indices of total factor productivity in weaving and finishing of cotton textiles in power-looms. As it is evident from this table, for all-India; while Translog index showed a nominal increase in the annual trend rate (0.67 per cent), Kendrick index registered a declining annual trend rate of -1.39 per cent. Both these indices are showing pronounced fluctuations. It seems that a nominal increase in Translog index and a decline in Kendrick index for all-India is mainly due to the over-powering of the negative annual trend rate of capital productivity (-5.21 per cent) over that of positively increasing labour productivity (1.29 per cent).

At the state leve, Gujarat, Orissa, Tamil Nadu and West Bengal showed a general up-trend in both of these TFP indices. We may also notice pronounced flucutations in the TFP indices in these states.

Table 4.5

TOTAL FACTOR PRODUCTIVITY INDICES, INDUSTRY - 236

| Year | TAMIL NADU | | ORISSA | | WEST BENGAL | | GUJRAT | | U.P. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN | KEN | TRN |
| 1973-74 | 100 | 100 | 100 | 100 | - | - | - | - | 100 | 100 |
| 1974-75 | 108 | 108 | - | - | 100 | 100 | 100 | 100 | 67 | 70 |
| 1975-76 | 119 | 120 | 153 | 150 | 141 | 139 | 142 | 124 | 73 | 82 |
| 1976-77 | 130 | 130 | 107 | 110 | 152 | 155 | 77 | 74 | 71 | 75 |
| 1977-78 | 114 | 115 | 108 | 112 | 135 | 140 | 60 | 64 | 102 | 108 |
| 1978-79 | 132 | 137 | 137 | 145 | 136 | 142 | 120 | 115 | 89 | 92 |
| 1979-80 | 149 | 151 | 177 | 179 | 106 | 115 | 189 | 173 | 94 | 102 |
| 1980-81 | 95 | 102 | 100 | 110 | 124 | 131 | 149 | 145 | 112 | 119 |
| 1981-82 | 88 | 95 | 99 | 104 | 161 | 168 | 107 | 105 | 88 | 97 |
| 1982-83 | 102 | 108 | 163 | 170 | 170 | 179 | 121 | 117 | 119 | 128 |
| A.T.R. | 1.39 | 1.88 | 4.32 | 4.69 | 3.92 | 4.27 | 2.36 | 2.03 | -0.36 | 0.84 |

Contd.

TOTAL PRODUCTIVITY INDICES, INDUSTRY - 236

| Year | KERALA | | ALL-INDIA | |
|---|---|---|---|---|
| | KEN | TRN | KEN | TRN |
| 1973-74 | 100 | 100 | 100 | 100 |
| 1974-75 | 89 | 88 | 89 | 90 |
| 1975-76 | - | - | 120 | 118 |
| 1976-77 | - | - | 112 | 115 |
| 1977-78 | 151 | 154 | 104 | 108 |
| 1978-79 | 142 | 148 | 71 | 79 |
| 1979-80 | 86 | 96 | 107 | 117 |
| 1980-81 | 39 | 47 | 80 | 83 |
| 1981-82 | 77 | 83 | 79 | 92 |
| 1982-83 | 44 | 52 | 113 | 119 |
| A.T.R. | -7.03 | -6.42 | -1.39 | 0.67 |

KEN = KENDRICK , TRN =TRANSLOG A.T.R. =ANNUAL TREND RATE.

Kerala is the state which experienced a sharp decline in the annual trend rates of these TFP indices. They went down there by -7.03 and -6.42 per cent per annum respectively. In fact, labour and capital productivity had also declined in Kerala by -7.75 and -5.41 per cent per annum.

Once again we may notice that a striking feature of the computed Kendrick and Translog indices for this industry is their close correspondence for all-India as well as for the various states over the entire period of our study. The peaks and troughs synchronize practically in all cases . Exceptions are very few.

Production Function Estimates:

The production function employed in this study is of a Cobb-Douglas form of the following type -

$$\log Y = A + a.\log K + b.\log L$$

Where, Y,K and L estimate value added, capital and labour respectively. A is the empirical coefficient which measures Hicks-neutral technological changes. 'a' and 'b' are coefficients that determine capital intensity and returns to scale.

We have worked out time series regression estimates of the Cobb-Douglas production function for all the five cotton textile industries at three-digit level which have been our subject of study. Separate production functions are estimated for all-India as well as for different states of India. We shall examine below several aspects of these estimates.

(A) Table-5.1 summarises the regression estimates of Cobb-Douglas production function in cotton ginning, cleaning and bailing industry. It is evident from this table that the fit as given by $R^2$ corrected for degrees of freedom, is not good for many states such as Harayana, Karnataka, Maharashtra, Punjab and Tamil Nadu. However, the value of $R^{-2}$ is high in states such as Andhra Pradesh, Gujarat, Madhya Pradesh, Rajasthan and in all-India also.

Capital coefficients are significant in case of Andhra Pradesh, Madhya Pradesh and Tamil Nadu. It means variations in output seem to be significantly related to variations in capital in these states. On the other hand, labour coefficients are significant for Gujarat, Maharashtra, Rajasthan and for all-India. It means, variations in output seem to be significantly related to variations in labour in these regions.

Table 5.1 : Estimates of Cobb-Douglas Production Function, INDUSTRY-230

Dependent Variable: (log GVA)

| State | Constant (A) | Coeff. of log FCT (a) | Coeff. of log WT (b) | $\bar{R}^2$ | Returns to Scale | No. of observations |
|---|---|---|---|---|---|---|
| AP | -3.91 | 1.17* (0.22) | 0.39** (0.16) | 0.92 | 1.56 | 10 |
| GJT | -7.5 | 0.09 (0.56) | 1.67* (0.37) | 0.75 | 1.76 | 10 |
| HRN | 6.52 | -0.09 (0.18) | 0.89 (0.72) | -0.12 | 0.80 | 10 |
| KRTK | -3.20 | 0.12 (0.45) | 1.31 (0.85) | 0.33 | 1.43 | 10 |
| MHRS | 3.38 | -0.05 (0.44) | 0.95*** (0.40) | 0.21 | 0.90 | 10 |
| MP | -3.03 | 1.11** (0.40) | 0.34 (0.41) | 0.67 | 1.45 | 10 |
| PJB | 7.77 | -0.07 (0.54) | 1.19 (1.85) | -0.20 | 1.12 | 10 |
| RJST | -2.60 | 0.38 | 1.00*** | 0.52 | 1.38 | 10 |
| TN | 8.47 | 0.44** (0.14) | 0.23 (0.35) | 0.36 | 0.67 | 10 |
| ALL-INDIA | -3.22 | 0.36 (0.34) | 0.95* (0.25) | 0.82 | 1.31 | 10 |

* Significant at 1% level, ** Significant at 5% level, *** Significant at 10% level.

Returns to scale estimates are found to be greater than unity for all-India (as well as for the majority of the states. This implies that in most of the states, increasing returns to scale are prevailing in this industry. The exceptions, however, are Harayana, Maharashtra and Tamil Nadu where the value of the returns to scale estimates, is below unity, implying decreasing returns to scale in these states.

(B) In Table-5.2 are set out the regression estimates of Cobb-Douglas production function in cotton spinning, weaving, shrinking, sanforising, mercerising and finishing of cotton textiles in mills. As it is evident from this table, the fit, as given by $R^{-2}$ is generally bad in all equations eecept those relating to Punjab, Harayana, Maharashtra and Madhya Pradesh.

Capital coefficient has been found to be significant only in case of Madhya Pradesh. And with a few exceptions, capital coefficients are negative in the majority of the states. On the other hand , labour coefficients are significant in case of Harayana, Maharashtra , Punjab, Rajasthan, Uttar Pradesh and for all-India.

Table - 5.2: Estimates of Cobb- Douglas Production Function, INDUSTRY -231

Dependent Variable: (log GVA)

| State | Constant (A) | Coeff. of log FCT (a) | Coeff. of log WT (b) | $\bar{R}^2$ | Return to Scale | No. of Observations |
|---|---|---|---|---|---|---|
| AP | 2.86 | 0.73<br>(0.38) | 0.33<br>(1.09) | 0.20 | 1.06 | 10 |
| BHR | 1.23 | -0.23<br>(0.82) | 1.11<br>(0.73) | 0.11 | 0.88 | 10 |
| GJT | 6.50 | -0.15<br>(0.22) | 0.84<br>(0.46) | 0.14 | 0.69 | 10 |
| HRN | 0·34 | -0.36<br>(0.34) | 1.61**<br>(0.51) | 0.61 | 1.25 | 10 |
| KRL | -7.45 | 0.17<br>(0.37) | 1.23<br>(0.81) | 0.43 | 1.06 | 10 |
| KRTK | 14.53 | -0.03<br>(0.64) | 0.68<br>(1.97) | -.28 | 0.65 | 10 |
| MHRS | 8.84 | -0.27<br>(0.45) | 0.78**<br>(0.24) | 0.53 | 0.51 | 10 |
| MP | 2.62 | 0.76*<br>(0.27) | 0.21<br>(0.45) | 0.59 | 0.97 | 10 |
| ORS | 4.82 | 0.85<br>(0.86) | 0.27<br>(0.90) | -0.12 | 1.12 | 10 |
| PJB | -3.16 | -0.39<br>(0.27) | 1.47*<br>(0.30) | 0.87 | 1.08 | 10 |

Contd...

Table 5.2(Contd)

: Estimates of Cobb- Douglas Production Function, INDUSTRY- 231

Dependent Variable : (log GVA)

| State | Constant (A) | Coeff. of log FCT (a) | Coeff. of log WT (b) | $\bar{R}^2$ | Return to Scale | No. of observations |
|---|---|---|---|---|---|---|
| RJST | 5.13 | -0.18 (0.39) | 1.05** (0.39) | 0.40 | 0.87 | 10 |
| TN | 0.41 | 0.18 (0.38) | 0.96 (0.42) | 0.08 | 1.14 | 10 |
| UP | -3.36 | -0.15 (0.25) | 1.55*** (0.69) | 0.37 | 1.40 | 10 |
| WB | 0.56 | 0.25 (0.23) | 0.84 (0.92) | 0.40 | 1.09 | 10 |
| ALL- INDIA | -6.91 | 0.23 (0.21) | 1.41 (0.83) | 0.12 | 1.64 | 10 |

* Significant at 1% level.

** Significant at 5% level.

***Significant at 10% level.

For Maharashtra, the returns to scale estimate is below unity, implying decreasing returns to scale. For Madhra Pradesh and Punjab, however, these are almost equal to unity, implying constant returns to scale in this industry.

(C) In Table-5.3 are set out the regression estimates of Cobb-Douglas production function for 'printing, dyeing and bleaching of cotton textiles'. As it can be seen from the value of $R^{-2}$ , the fit is generally good in all equations. Only the equations dealing with Maharashtra and Uttar Pradesh are showing low values of $R^{-2}$.

Capital coefficient are found to be significant for Karnataka, Uttar Pradesh as well as for all-India. Thus, the regression estimates of Cobb-Douglas production function show that variations in output are significantly related to variations in capital in these states, so far as this particular industry is concerned . On the other hand, labour coefficients have been found to be significant in case of Maharashtra , Rajasthan, Tamil Nadu and West Bengal.

Returns to scale estimates have been found to be greater than unity for all-India as well as for Gujarat and Rajasthan. For Harayana, Karnataka and Tamil Nadu, however,

Table - 5.3 : Estimates of Cobb- Douglas Production Function, INDUSTRY -232

Dependent Variable : (log GVA)

| State | Constant (A) | Coeff. of log FCT (a) | Coeff. of log Wt (b) | $\bar{R}^2$ | Return to Scale | No. of observation |
|---|---|---|---|---|---|---|
| GJT | 0.07 | 0.66 (0.53) | 0.40 (0.63) | 0.92 | 1.06 | 10 |
| HRN | -5.57 | 0.89 (0.56) | 0.03 (1.54) | 0.79 | 0.92 | 7 |
| KRTK | 0.79 | 0.74*** (0.31) | 0.23 (0.36) | 0.78 | 0.97 | 9 |
| MHRS | -1.15 | 0.22 (0.37) | 0.89*** (0.35) | 0.44 | 1.01 | 10 |
| PJB | - | - | - | - | - | - |
| RJST | -1.49 | 0.05 (0.32) | 1.50** (0.44) | 0.82 | 1.55 | 9 |
| TN | -0.64 | -0.31 (0.41) | 1.34** (0.67) | 0.60 | 1.03 | 10 |
| UP | 0.49 | 0.78** (0.31) | 0.19 (0.36) | 0.35 | 0.97 | 10 |
| WB | 1.01 | -0.44 (0.80) | 1.24* (0.29) | 0.77 | 0.80 | 10 |
| ALL-INDIA | 2.53 | 1.24** (0.39) | -0.19 (0.27) | 0.72 | 1.05 | 10 |

* Significant at 1% level, ** Significant at 5% level, *** Significant at 10% level.

returns to scale estimates are almost equal to unity, implying constant returns to scale in this industry.

(D) Table-5.4 brings into light the regression estimates of Cobb-Douglas production function in 'production of Khadi and weaving and finishing of cotton textiles in handlooms other than Khadi'. As it is evident from the table, the fit as given by $R^{-2}$ is good for all-India as well as for many states such as Andhra Pradesh, Kerala, Punjab and West Bengal.

Capital coefficients are significant for all-India as well as for Punjab and West Bengal. On the other hand, labour coefficients are significant for Andhra Pradesh and Punjab.

From returns to scale estimates for this industry, it is evident that in Andhra Pradesh , Kerala and Punjab, decreasing returns to scale is prevailing. However, in West Bengal and in India as a whole, returns to scale estimates are greater than unity, implying the presence of increasing returns to scale.

(E) In Table-5.5 are set out the regression estimates of Cobb-Douglas production function in 'Weaving and finishing of cotton textiles in power-looms'. As it can be seen, the fit, as given by $R^{-2}$, is generally good for

Table 5.4 : Estimates of Cobb- Douglas Production Function, INDUSTRY - 235

Dependent Variable : (log GVA)

| State | Constant (A) | Coeff. of log FCT (a) | Coeff. of log WT | $\bar{R}^2$ | Returns to Scale | No. of observations |
|---|---|---|---|---|---|---|
| AP | 0.44 | 0.09<br>(0.05) | 0.78<br>(0.12) | 0.94 | 0.87 | 10 |
| KRL | 1.74 | 0.07<br>(0.48) | 0.89<br>(0.71) | 0.68 | 0.96 | 10 |
| KRTK | 3.72 | 0.22<br>(0.33) | 0.24<br>(0.99) | -0.54 | 0.46 | 5 |
| PJB | 0.59 | 0.49**<br>(0.13) | 0.40**<br>(0.17) | 0.78 | 0.89 | 7 |
| UP | 6.16 | 0.58<br>(0.89) | -0.45<br>(1.54) | -0.17 | 0.13 | 8 |
| WB | -5.09 | 0.65*<br>(0.12) | 0.64<br>(0.24) | 0.80 | 1.29 | 9 |
| ALL-INDIA | -2.88 | 0.32**<br>(0.13) | 1.15**<br>(0.34) | 0.85 | 1.47 | 10 |

* Significant at 1% level.

** Significant at 5% level.

***Significant at 10% level.

Table 5.5 : Estimates of Cobb- Douglas Production Function, INDUSTRY - 236

Dependent Variable : (log GVA)

| State | Constant (A) | Coeff. of log FCT | Coeff. of log WT | $\bar{R}^2$ | Return to Scale | No. of observations |
|---|---|---|---|---|---|---|
| GJT | -6.16 | -1.65** (0.74) | 3.16* (0.78 ) | 0.73 | 1.51 | 9 |
| KRL | 5.75 | -0.44 (0.64) | 0.69 (1.74) | -0.28 | 0.25 | 8 |
| MHRS | -0.28 | 0.52 (0.75) | 0.65 (0.88) | 0.78 | 1.17 | 10 |
| ORS | 0.94 | 0.36 (0.55) | 0.85 (0.68) | 0.64 | 1.21 | 9 |
| TN | 1.47 | 0.64*** (0.23) | 0.26 (0.36) | 0.91 | 0.90 | 10 |
| UP | -0.42 | 0.15** (0.04) | 1.12* (0.07) | 0.97 | 1.17 | 10 |
| WB | 1.62 | 0.56 (1.18) | 0.55 (1.63) | 0.42 | 1.11 | 9 |
| ALL-INDIA | 1.19 | 0.12 (0.18) | 0.89** (0.30) | 0.86 | 1.01 | 10 |

* Significant at 1% level, ** Significant at 5% level, *** Significant at 10% level.

all equations except that relating to Kerala and West Bengal.

Coefficient of capital has turned out to be significant in case of Gujarat, Tamil Nadu and Uttar Pradesh. On the other hand, labour coefficient is significant in case of Gujarat, Uttar Pradesh and in India as a whole. Thus, according to the Cobb-Douglas production function estimates, Gujarat and Uttar Pradesh are the only states where both labour and capital coefficients have turned out to be significant.

Returns to scale estimates were found to be greater than unity and thereby implying increasing returns to scale, in case of Gujarat and Orissa. However, for Maharashtra, Tamil Nadu, Uttar Pradesh and for all-India, returns to scale estimates were almost equal to one. This suggests the prevalence of the constant returns to scale in these regions.

Summary:

Both the Kendrick and Translog indices of total factor productivity have shown a general uptrend over the entire period of our study, for all-India as well as for the various states. The exceptions, however, are Gujarat, Kerala, Maharashtra and Punjab in industry-231, West Bengal in industry-232; Punjab and Andhra Pradesh in industry-235 and Kerala again in industry-236. In these states, the TFP indices showed either a declining or a stagnating trend rate.

A striking feature of the compueted TFP indices is their close correspondence for all-India as well as for various regions over the period 1973-74 to 1982-83. The peaks and troughs synchronize practically in all cases.

In cotton ginning, cleaning and bailing(230) and in cotton spinning, weaving , shrinking, etc.(231), the fit of Cobb-Douglas production function as given by $R^2$ corrected for degrees of freedom, is generally, not good for many states. However, in the other three cotton textile industries (i.e. industry-232, 235 and 236), the value of $R^{-2}$ is generally high for most of the states.

# CHAPTER - 5

## WAGE TRENDS AND WAGE-PRODUCTIVITY LINKAGE

In this chapter, our main emphasis is to find out wage-productivity relationship in various cotton textile industries of India. We would try to examine whether increases in labour productivity have led to increases in wages per worker or not. But before doing so, it would be proper to look at the trends in wages in these industries. Analysis of trends in wages is important both for its welfare and for its incentive implications.

For studying the trends in wages, we have worked out the ratios of wages per worker for all the major states as well as for all-India, in all the five cotton textile industries of India at the three digit level. On the other hand, in order to find out wage productivity linkage in these industries, we have regressed wages per worker on labour productivity in all the years of our study. We shall examine below several aspects of these findings.

### Cotton Ginning, Cleaning and Bailing (230)

In Table-6.1 are set out wages per worker in the cotton ginning, cleaning and bailing industry. The table

brings out significantly rising trend in wages for most of the states as well as for all-India.

For all-India, wages per worker increased by about 2.4 per cent over the entire period of our study(i.e, between 1973-74 to 1982-83), the annual trend rate being 1.02 per cent. At the regional level, Andhra Pradesh recorded the highest increase in the annual trend rate of wages per worker of about 3.64 per cent, followed by Gujarat (2.08 per cent), Tamil Nadu (1.99 per cent) and Madhya Pradesh (1.87 per cent). Maharashtra and Rajasthan are the two states where the annual trend rate of wages per worker suffered a decline of about -0.80 and -0.64 per cent per annum respectively.

One may notice wide spread inter-regional wage variations in the cotton ginning, cleaning and bailing industry. On an average, wages per worker is highest in Punjab and Haryana and lowest in Andhra Pradesh and Madhya Pradesh. In fact, the coefficient of variation of wages per worker as worked out for the major states where this industry is located never stood below 35 per cent during the entire period of our study.

Since workers are paid out of what they produce, it is natural to seek a relationship between their wages

TABLE-6.1

WAGE RATE PER WORKER INDUSTRY - 230

(In thousand Rs)

| Year | GJT | MHRS | PJB | MP | TN | RJST | KRTK | HRN | AP | INDIA |
|---|---|---|---|---|---|---|---|---|---|---|
| 1973-74 | 0.64 | 0.75 | 1.85 | 0.55 | 0.64 | 0.98 | 0.59 | 1.27 | 0.61 | 0.72 |
| 1974-75 | 0.40 | 0.52 | 1.48 | 0.32 | 0.63 | 0.79 | 0.51 | 0.89 | 0.59 | 0.69 |
| 1975-76 | 0.47 | 0.68 | 1.98 | 0.47 | 0.61 | 0.98 | 0.75 | 1.13 | 0.69 | 0.63 |
| 1976-77 | 0.46 | 0.55 | 1.54 | 0.41 | 0.66 | 1.00 | 0.56 | 1.14 | 0.62 | 0.58 |
| 1977-78 | 0.58 | 0.65 | 1.38 | 0.45 | 0.62 | 0.92 | 0.54 | 1.12 | 0.64 | 0.68 |
| 1978-79 | 0.80 | 0.72 | 1.62 | 0.49 | 0.74 | 1.19 | 0.68 | 1.69 | 0.65 | 0.79 |
| 1979-80 | 0.76 | 0.66 | 1.60 | 0.58 | 0.85 | 1.23 | 0.85 | 1.56 | 0.67 | 0.77 |
| 1980-81 | 0.68 | 0.70 | 1.67 | 0.63 | 0.71 | 1.28 | 0.74 | 1.74 | 0.74 | 0.75 |
| 1981-82 | 0.67 | 0.67 | 1.60 | 0.62 | 0.81 | 1.02 | 0.58 | 1.54 | 0.75 | 0.72 |
| 1982-83 | 0.80 | 0.74 | 1.90 | 0.80 | 0.84 | 1.23 | 0.85 | 1.46 | 0.91 | 0.89 |
| A.T.R. | 2.08 | -0.80 | -0.64 | 1.87 | 1.99 | 1.28 | 1.60 | 1.40 | 3.64 | 1.02 |

A.T.R = Annual trend Rate.

## TABLE-7.1 : WAGE-PRODUCTIVITY LINKAGE, IND-230

| Year | Constant of the Equation | Coefficient of productivity (GVA/WT) | $R^2$ |
|---|---|---|---|
| 1973-74 | 0.29 | 0.27* (0.06) | 0.74 |
| 1974-75 | 0.14 | 0.25* (0.04) | 0.83 |
| 1975-76 | 0.22 | 0.23* (0.02) | 0.95 |
| 1976-77 | 0.08 | 0.28* (0.02) | 0.97 |
| 1977-78 | 0.03 | 0.34* (0.06) | 0.80 |
| 1978-79 | 0.12 | 3.36* (0.06) | 0.85 |
| 1979-80 | 0.91 | 0.05*** (0.02) | 0.29 |
| 1980-81 | 0.92 | 0.07** (0.02) | 0.50 |
| 1981-82 | 0.30 | 0.24* (0.05) | 0.69 |
| 1982-83 | 0.13 | 0.35* | 0.94 |

and productivity. We, therefore, regress wages per worker of the major regions where this industry is located, on their labour productivity and obtain the results as set out in Table - 7.1.

From the values of simple $R^2$ given in the table, it is evident that productivity is significant in explaining the trends in wages per worker in the cotton ginning, cleaning and bailing industry. Productivity explains about 74 per cent of the variations in wages per worker in 1973-74, the initial year of our study. In the next three years, the value of $R^2$ went on to increase further. In fact, during 1976-77, $R^2$ improved to a record level of 0.97.

Cotton Spinning, Weaving, Shrinking, Sanforising, Mercerising and Finishing of Cotton Textiles in Mills (231)

Wages per worker in the cotton spinning, weaving, shrinking, etc. industry are presented in Table-6.2. This table brings out significantly rising trend in wages per worker for almost all the states as well as for all-India.

For all-India, wages per worker increased by about 2 9 per cent overthe entire period of our study, the trend

rate being 2.24 per cent per annum. At the regional level, Bihar showed the highest increase in the annual trend rate of wages per worker of about 7.78 per cent, followed by Karnataka (6.35 per cent), Rajasthan(4.04 per cent) (4.04 per cent) and Punjab (3.77 per cent). In Madhya Pradesh, Kerala, West Bengal and Tamil Nadu, wages per worker increased by 1.78 to 3.13 per cent per annum. On the other hand, Andhra Pradesh, Harayana and Maharashtra experienced some what lower increase in wages per worker in this industry. Orissa was the only state which showed an overall decrease in the wages per worker in this industry. In fact, the annual trend rate of wages per worker in Orissa stands out at -1.06 per cent.

On the basis of the values of wages per worker during different years of our study, we notice a high degree of inter-regional wage variations in this particular industry. Nevertheless, variations in this industry are not as high as in the case of cotton ginning, cleaning and bailing industry. On an average, wages per worker is high in case of Maharashtra, Gujarat, Kerala and Madhya Pradesh, and low in case of Bihar, Harayana and Orissa. The co-efficient of variation of

TABLE-6.2

WAGE RATE PER WORKER INDUSTRY - 231

| Year | HRN | PJB | WB | BHR | INDIA |
|---|---|---|---|---|---|
| 1973-74 | 3.23 | 2.36 | 3.82 | 2.05 | 4.41 |
| 1974-75 | 3.16 | 2.58 | 3.74 | 2.43 | 4.33 |
| 1975-76 | 3.94 | 3.21 | 4.82 | 3.15 | 5.24 |
| 1976-77 | 3.04 | 3.27 | 4.13 | 2.94 | 4.86 |
| 1977-78 | 2.75 | 3.17 | 3.92 | 2.98 | 4.51 |
| 1978-79 | 3.69 | 3.20 | 4.68 | 3.40 | 5.08 |
| 1979-80 | 3.37 | 3.20 | 4.76 | 3.16 | 5.19 |
| 1980-81 | 3.69 | 3.24 | 4.89 | 3.98 | 5.52 |
| 1981-82 | 3.43 | 3.63 | 4.77 | 4.40 | 5.53 |
| 1982-83 | 4.05 | 3.92 | 5.35 | 4.31 | 5.69 |
| A.T.R. | 1.25 | 3.77 | 3.13 | 7.78 | 2.24 |

A.T.R. = ANNUAL TREND RATE.

TABLE-6.2 (Contd.)

WAGE RATE PER WORKER INDUSTRY - 231

(in thousand Rs)

| Year | GJT | TN | MHRS | UP | MP | KRTK | AP | RJST | KRL | ORS |
|---|---|---|---|---|---|---|---|---|---|---|
| 1973-74 | 4.94 | 4.60 | 5.01 | 3.36 | 4.50 | 3.05 | 4.53 | 3.53 | 4.21 | 3.66 |
| 1974-75 | 4.87 | 4.21 | 4.62 | 3.99 | 4.61 | 3.26 | 2.92 | 3.41 | 4.10 | 3.02 |
| 1975-76 | 5.65 | 5.31 | 5.92 | 4.23 | 5.24 | 3.44 | 3.34 | 4.31 | 5.23 | 3.22 |
| 1976-77 | 5.17 | 5.12 | 5.48 | 3.97 | 4.92 | 3.39 | 3.52 | 3.97 | 4.59 | 3.32 |
| 1977-78 | 4.88 | 4.65 | 5.01 | 3.79 | 4.60 | 3.19 | 3.16 | 4.04 | 4.05 | 3.15 |
| 1978-79 | 5.53 | 5.43 | 5.62 | 4.16 | 5.26 | 3.53 | 3.38 | 4.64 | 4.49 | 1.38 |
| 1979-80 | 5.58 | 5.20 | 5.84 | 4.56 | 5.09 | 4.17 | 3.40 | 4.74 | 5.38 | 2.70 |
| 1980-81 | 5.71 | 5.97 | 6.16 | 4.87 | 5.40 | 4.64 | 4.30 | 4.92 | 5.78 | 2.06 |
| 1981-82 | 5.92 | 5.82 | 5.89 | 5.37 | 5.70 | 5.24 | 4.52 | 5.27 | 5.58 | 3.10 |
| 1982-83 | 5.72 | 6.19 | 5.80 | 5.27 | 6.29 | 6.04 | 5.04 | 5.37 | 5.32 | 2.40 |
| A.T.R. | 1.89 | 1.95 | 1.45 | 4.11 | 2.23 | 6.35 | 0.28 | 4.04 | 1.78 | -1.06 |

A.T.R. = ANNUAL TREND RATE.

Contd.

TABLE-7.2 : WAGE-PRODUCTIVITY LINKAGE, IND-231

| Year | Constant of the Equation | Coefficient of Productivity | $R^2$ |
|---|---|---|---|
| 1973-74 | 1.50 | 0.26* (0.05) | 0.66 |
| 1974-75 | 1.42 | 0.03* (0.04) | 0.74 |
| 1975-76 | 2.11 | 0.35* (0.08) | 0.58 |
| 1976-77 | 1.00 | 0.43* (0.09) | 0.63 |
| 1977-78 | 1.59 | 0.34* (0.06) | 0.76 |
| 1978-79 | 1.64 | 0.32* (0.08) | 0.55 |
| 1979-80 | 2.17 | 0.23** (0.08) | 0.38 |
| 1980-81 | 2.09 | 0.29* (0.04) | 0.79 |
| 1981-82 | 2.66 | 0.14** (0.06) | 0.26 |
| 1982-83 | 1.68 | 0.37* (0.05) | 0.81 |

wages per worker as worked out for the major states where this industry is located, never stood below 18 per cent during the entire period of our study.

In order to establish a linkage between wages and productivity, we regress wages per worker of the major regions where this industry is located, on their labour productivity and obtain the results as set out in Table- 7.2.

From the values of simple $R^2$ given in this table, it is evident that productivity is significant in explaining the trends in wages per worker in the cotton spinning, weaving, shrinking, etc. industry. Productivity explains about 66 per cent of the variations in wages per worker in 1973-74 and 74 per cent of the variations in 1974-75. In 1982-83, the value of $R^2$ was as high as 0.81 .

In 1979-80 and 1981-82, however, productivity explains only about 38 per cent and 26 per cent of the variations in wages per worker respectively.

Printing, Dyeing and Bleaching of Cotton Textiles(232)

In table-6.3 are set out wages per worker in printing,

dyeing and bleaching of cotton textiles. This table brings out significantly rising trend in wages for almost all the states as well as for all-India.

For all-India, wages per worker increased by about 35 per cent over the entire period of our study, i.e., 1973-74 to 1982-83. In fact, the value of wages per worker increased from 3.04 units in 1973-74 to 4.10 units in 1982-83, the annual trend rate being 2.15 per cent.

At the regional level, Karnataka showed the highest increase in the annual trend rate of wages per worker of about 7.77 per cent, followed by Rajasthan (7.03 per cent) and West Bengal (4.24 per cent). In Gujarat, Maharashtra, Tamil Nadu and Uttar Pradesh, wages per worker increased by about 2.08 to 2.66 per cent per annum. Harayana, however, registered a decline of -0.40 per cent per annum in the wages per worker trend.

On the basis of the values of wages per worker during different years of our study, we notice a high degree of inter-regional wage variations in printing, dyeing and bleaching of cotton textiles. Nevertheless, variations in this industry are not as high as in the case of cotton ginning , cleaning and bailing industry.

TABLE-6.3

WAGE RATE PER WORKER INDUSTRY - 232

(in thousand Rs)

| Year | MHRS | GJT | HRN | KRTK | TN | PJB | WB | RJST | UP | INDIA |
|---|---|---|---|---|---|---|---|---|---|---|
| 1973-74 | 3.42 | 1.94 | - | - | 3.05 | 2.48 | 2.02 | - | 1.87 | 3.04 |
| 1974-75 | 3.61 | 1.95 | - | 2.34 | 3.30 | 1.81 | 2.18 | 1.78 | 1.95 | 3.16 |
| 1975-76 | 4.64 | 2.32 | - | 3.74 | 3.47 | 2.50 | 2.25 | 1.43 | 2.29 | 3.89 |
| 1976-77 | 4.26 | 2.20 | 3.83 | 3.39 | 3.13 | 2.87 | 2.77 | 2.67 | 3.01 | 3.64 |
| 1977-78 | 4.27 | 2.15 | 3.59 | 2.99 | 3.14 | 3.19 | 2.48 | 2.47 | 2.76 | 3.58 |
| 1978-79 | 4.21 | 2.59 | 3.93 | 3.25 | 3.32 | 2.98 | 2.51 | 2.75 | 2.11 | 3.62 |
| 1979-80 | 4.51 | 2.50 | 3.66 | 4.04 | 2.70 | 2.92 | 2.78 | 2.75 | 2.73 | 3.62 |
| 1980-81 | 4.70 | 2.50 | 2.50 | 4.27 | 3.40 | 3.16 | 2.98 | 2.95 | 2.20 | 3.64 |
| 1981-82 | 5.05 | 2.41 | 4.06 | 5.34 | 3.72 | 3.91 | 3.36 | 2.98 | 2.79 | 3.95 |
| 1982-83 | 4.91 | 2.59 | 3.95 | 5.22 | 4.06 | 3.69 | 3.68 | 3.63 | 2.83 | 4.10 |
| A.T.R. | 2.95 | 2.46 | -0.40 | 7.77 | 2.08 | 2.28 | 4.24 | 7.03 | 2.66 | 2.15 |

A.T.R = ANNUAL TREND RATE.

TABLE-7.3: WAGE-PRODUCTIVITY LINKAGE, IND-232

| Year | Constant of the Equation | Coefficient of Productivity | $R^2$ |
|---|---|---|---|
| 1973-74 | 0.34 | 0.21* (0.04) | 0.84 |
| 1974-75 | 0.68 | 0.37* (0.08) | 0.79 |
| 1975-76 | 0.50 | 0.30* (0.07) | 0.74 |
| 1976-77 | 0.82 | 0.28* (0.05) | 0.80 |
| 1977-78 | 1.29 | 0.21 (0.16) | 0.25 |
| 1978-79 | 0.77 | 0.23* (0.06) | 0.58 |
| 1979-80 | 1.12 | 0.19* (0.04) | 0.81 |
| 1980-81 | 0.50 | 0.27* (0.06) | 0.63 |
| 1981-82 | 0.96 | 0.24 (0.04) | 0.90 |
| 1982-83 | 1.21 | 0.12** (0.04) | 0.45 |

On an average, higher wages per worker were noticed in the case of Maharashtra, Karnataka and Tamil Nadu. On the other hand, wages per worker were low in case of Rajasthan and Uttar Pradesh. The coefficient of variation of wages per worker as worked out for the major states where this industry is located stands at roughly between 20 per cent to 27 per cent during the entire period of our study.

Interesting results follow from the regression of wages per worker of the major regions where this industry is located, on their labour productivity. The coefficients of regression as given in Table-7.3. indicate that productivity is significantly related to rise in wages per worker over time.

Productivity explains about 84 per cent of the variations in wages per worker in 1973-74 , the initial year of our study. During 1974-75 to 1976-77 also, productivity explains 74 per cent to 80 per cent of the variations in wages per worker in this industry. In 1977-78 and again in 1982-83, however, the value of $R^2$ is not very high. This shows that during these two years, productivity has not been able to explain variations in wages per worker significantly.

## Production of Khadi and Weaving and Finishing of Cotton Textiles in Hand-looms other than Khadi

Ratios of wages per worker in production of Khadi and weaving and finishing of cotton textiles in hand-looms other than Khadi are presented in Table-6.4. This table clearly brings out a significant rise in wages per worker in various states as well as in all-India.

At the all-India level, wages per worker ratio registered an increase of about 40 per cent over the entire period of our study. Its annual trend rate stood at about 2.08 per cent per annum. At the regional level, Andhra Pradesh registered an increase of about 77 per cent over the entire period of our study, the annual trend rate being 2.71 per cent. In West Bengal also, wages per worker increased by about 48 per cent over the entire period of our study, the annual trend rate being 2.22 per cent. In Kerala, however, wages per worker increased by only about 1.19 per cent per annum.

In Uttar Pradesh, between 1975-76 and 1982-83, wages per worker increased by about 22 per cent. Here the trend rate of increase stood at 1.51 per cent per annum. And in Karnataka, between 1978-79 and 1982-83,

TABLE-6.4

WAGE RATE PER WORKER INDUSTRY - 235

(in thousand Rs)

| Year | KRL | WB | UP | AP | PJB | KRTK | INDIA |
|---|---|---|---|---|---|---|---|
| 1973-74 | 2.41 | - | - | 1.06 | 0.21 | - | 1.80 |
| 1974-75 | 1.87 | 1.99 | - | 0.89 | - | - | 1.73 |
| 1975-76 | 2.41 | 2.43 | 2.19 | 1.26 | - | - | 1.80 |
| 1976-77 | 2.30 | 1.54 | 2.27 | 1.32 | - | - | 1.89 |
| 1977-78 | 1.93 | 2.12 | 2.04 | 1.43 | 0.25 | - | 1.87 |
| 1978-79 | 2.29 | 2.70 | 2.39 | 1.57 | 0.79 | 1.02 | 1.90 |
| 1979-80 | 2.25 | 2.55 | 2.52 | 1.51 | 0.41 | 1.04 | 1.94 |
| 1980-81 | 2.58 | 2.70 | 2.55 | 1.78 | 0.43 | 1.09 | 2.19 |
| 1981-82 | 2.57 | 2.74 | 2.44 | 1.15 | 0.31 | 1.55 | 2.05 |
| 1982-83 | 3.19 | 2.94 | 2.68 | 1.88 | 0.38 | 1.59 | 2.54 |
| A.T.R. | 1.19 | 2.22 | 1.51 | 2.71 | 9.30 | 7.01 | 2.08 |

A.T.R = ANNUAL TREND RATE.

TABLE - 7.4 : WAGE - PRODUCTIVITY LINKAGE - IND-235

| Year | Constant of the Equation | Coefficient of Productivity | $R^2$ |
|---|---|---|---|
| 1973-74 | -0.26 | 0.59* (0.05) | 0.98 |
| 1974-75 | 0.31 | 0.21* (0.05) | 0.70 |
| 1975-76 | 0.92 | 0.22 (0.14) | 0.43 |
| 1976-77 | 1 28 | 0.21 (0.12) | 0.30 |
| 1977-78 | 1.07 | 0.24* (0.05) | 0.66 |
| 1978-79 | 1.17 | 0.28* (0.05) | 0.75 |
| 1979-80 | 1.29 | 0.28* (0.07) | 0.62 |
| 1980-81 | 1.11 | 0.22* (0.05) | 0.65 |
| 1981-82 | 1.18 | 0.32* (0.08) | 0.68 |
| 1982-83 | 1.22 | 0.27* (0.04) | 0.85 |

NOTE: Figures in brackets are standard errors of respective coefficients.

* Significant at 1% level.

wages per worker increased by about 7.01 per cent per annum.

In order to establish a linkage between wages and productivity, we have regressed wages per worker of the major regions of this industry, on their labour productivity and obtained the results as set out in Table- 7.4.

From the values of simple $R^2$ given in this table, it is evident that in 'production of Khadi & Weaving and finishing of cotton textiles in hand-looms other than Khadi', productivity is significant in explaining the trends in wages per worker in almost all the years of our study, except 1975-76 and 1976-77.

It is interesting to note that in 1973-74, productivity explains almost 98 per cent of the variations in wages per worker. In the last year of our study also, productivity explains nearly 85 per cent of the variations in wages per worker. In 1974-75 and 1975-76, however, the value of $R^2$ turns out to be only 0.43 and 0.30 respectively, indicating insignificance of productivity in explaining variations in wages per worker in these years. In all the other years of our study, the value of $R^2$ is fairly high (between 0.62 to 0.75).

## Weaving and Finishing of Cotton Textiles in Power-looms

In Table-6.5 are set out the ratios of wages per worker in'weaving and finishing of cotton textiles in power-looms' . The table brings out significantly rising trend in wages for almost all the major states as well as for all-India.

For all-India,wages per worker increased by about 31 per cent over the entire period, (i.e., 1973-74 to 1982-83), the annual trend rate being 2.72 per cent.

At the regional level, Maharashtra recorded the highest increase in the annual trend rate of wages per worker of about 4.92 per cent, followed by Gujarat (3.27 per cent). In Orissa, Tamil Nadu and West Bengal, wages per worker increased at about 2.02 per cent to 2.98 per cent per annum.

In case of this industry also, we notice wide spread inter-regional wage variations during different years of our study. On an average, wages per worker is higher in Maharashtra, Gujarat and Tamil Nadu. On the other hand, wages per worker is fairly low in U.P. and Orissa. In fact, the coefficient of variation of wages per worker as worked out for the major states where this

TABLE - 6.5

WAGE RATE PER WORKER INDUSTRY - 236

(in thousand Rs)

| Year | TN | ORS | MHRS | WB | GJT | UP | KRL | INDIA |
|---|---|---|---|---|---|---|---|---|
| 1973-74 | 1.79 | 1.89 | 2.00 | - | - | 1.46 | 1.99 | 1.75 |
| 1974-75 | 1.53 | - | 2.31 | 1.63 | 1.47 | 1.52 | 1.76 | 1.66 |
| 1975-76 | 2.29 | 1.71 | 3.07 | 2.17 | 2.47 | 1.49 | - | 2.11 |
| 1976-77 | 2.31 | 1.77 | 2.06 | 2.38 | 2.31 | 1.31 | - | 2.05 |
| 1977-78 | 1.84 | 1.89 | 2.04 | 1.60 | 1.45 | 1.74 | 2.53 | 1.80 |
| 1978-79 | 2.75 | 2.22 | 2.12 | 1.97 | 2.40 | 2.06 | 2.66 | 2.20 |
| 1979-80 | 2.49 | 2.33 | 2.98 | 1.81 | 2.67 | 1.39 | 2.42 | 2.26 |
| 1980-81 | 2.23 | 1.82 | 2.54 | 2.17 | 2.27 | 1.48 | 2.40 | 2.02 |
| 1981-82 | 2.05 | 1.96 | 3.54 | 2.27 | 2.21 | 1.57 | 2.36 | 1.96 |
| 1982-83 | 2.19 | 3.09 | 4.00 | 2.42 | 2.18 | 1.68 | 1.35 | 2.29 |
| A.T.R. | 2.64 | 2.02 | 4.92 | 2.98 | 3.27 | 1.91 | -2.38 | 2.72 |

A.T.R = ANNUAL TREND RATE.

TABLE-7.5 : WAGE - PRODUCTIVITY LINKAGE, IND-236

| Year | Constant of the equation | Coefficient of labour Productivity | $R^2$ |
|---|---|---|---|
| 1973-74 | 0.49 | 0.39* (0.06) | 0.80* |
| 1974-75 | 0.71 | 0.18** (0.05) | 0.65* |
| 1975-76 | 0.29 | 0.41*** (0.18) | 0.54 |
| 1976-77 | 0.68 | 0.29* (0.06) | 0.76 |
| 1977-78 | 1.33 | 0.18* (0.05) | 0.70 |
| 1978-79 | 1.11 | 0.22** (0.10) | 0.36 |
| 1979-80 | 1.48 | 0.15*** (0.07) | 0.37 |
| 1980-81 | 1.46 | 0.14 (0.10) | 0.26 |
| 1981-82 | 0.56 | 0.31* (0.06) | 0.73 |
| 1982-83 | 0.49 | 0.32* (0.04) | 0.89 |

NOTE: Figures in brackets are standard errors of respective coefficient.

*Significant at 1% level, **Significant at 5% level, ***Significant at 10% level.

industry is located, is as high as 30 per cent during 1982-83.Only in1978-79, the value of the coefficient of variation was relatively lower (12 per cent).

As observed for other industries, the regression of wages per worker on labour productivity in weaving and finishing of cotton textiles in power-looms, yields significant results, as indicated in Table-7.5.

From the values of simple $R^2$ given in this table, it is evident that productivity is significant in explaining the trends in wages per worker in weaving and finishing of cotton textiles in power-looms. Productivity explains about 80 per cent of the variations in wages per worker in 1973-74. The value of $R^2$ stands at more than .50 in all the next four years of our study. In 1981-82 and 1982-83 again, productivity explains nearly 73 per cent and 89 per cent of the variations in wages per worker respectively. Between 1978-79 and 1980-81, however, productivity is explaining less than 50 per cent of the variations in wages per worker.

In this way, on the basis of regressions of wages per worker on labour productivity, we find that wages per worker are significantly influenced by labour productivity in all the five cotton textile industries of India; in almost all the years of our study.

# CHAPTER - 6

## CONCLUSIONS

For the successful monitoring of economic progress, whether at the macro or the micro level, it is essential to make scientific appraisal of the trends in productivity . the efficiency with which resources are converted into goods and services. Productivity ratios have been accepted not only as measures of performance but also as important means of motivating improvements in productive efficiency of the economy as a whole. A rising productivity connotes several things - higher wage rates, larger and growing employment potential, price stability and greater levels of living.

The relationship between productivity and wages has been an important theme in economic theory. There are varying approaches ranging from postulating a positive relationship between trends in production per worker and wages, to the theoretical exercise in devising a principle of equality between marginal productivity and wages. These approaches proceed on the assumption of direct and automatic relation between a rise in productivity and a rise in wages. On the other hand, it is sometimes argued that there is no

such automatic adjustment which makes wages rise in direct response to a rise in productivity; the relation, to the extent it exists, is indirect: through the effects of productivity on wage-determining factors. Nevertheless, the contention that high level of wages can ultimately result only from a rising level of productivity is indisputable.

There have been a number of studies on productivity, wages as well as productivity - wage link in the manufacturing industries in India. In the present study, however, we have limited ourselves to examine these matters in the context of cotton textile industry only. The cotton textile industry is amongst the oldest and largest manufacturing industries in India. It has the single largest weight in the index of industrial production and is one of the largest export industries.

Cotton textiles are a large group consisting of the mill and decentralized sector. The mills are of two kinds, spinning mills which produce only yarn and composite mills which produce both yarn and cloth. The decentralized sector consists of hand-looms, power-looms and Khadi. The National Industrial Classification(NIC), however, has divided the cotton textile industry of

India into eight industries at three-digit level. With a view to study the disaggregated trends in the manufacture of cotton textiles, we selected five out of these eight cotton textile industries for our purpose. These are -

(i) Cotton ginning, cleaning and bailing,

(ii) Cotton spinning, weaving, shrinking, sanforising, mercerising and finishing of cotton textiles in mills

(iii) Printing, dyeing and bleaching of cotton textiles

(iv) Production of Khadi & weaving and finishing of cotton textiles in handlooms other than Khadi.

(v) Weaving and finishing of cotton textiles in power-looms.

The selection was done on the basis of an industry having an adequate dispersal through space.

We have defined the primary objectives of our study as -

1. To study the productivity trends in these cotton textile industries and

2. To study the wage trends and to study the influence of productivity on wage rates in these industries.

In order to study the productivity trends in these industries, we worked out both the partial factor productivity and total factor productivity measures. Partial factor productivity ratios were prepared for three important factors, namely, labour, capital and raw materials. Labour productivity was measured as gross value added per worker; capital productivity was measured as gross value added per unit of fixed capital and raw materials productivity was measured as output per unit of input(other than labour and capital ) consumed. On the other hand, the two alternative measures of total factor productivity as used in the present study are Kendrick and Translog indices. We have also estimated the Cobb-Douglas production function in different cotton textile industries of India.

For studying the trends in wages, we worked out wages per worker in all the five cotton textile industries at three-digit level, for all-India as well as for the states where these industries are chiefly located. On the other hand, in order to find out the influence of productivity on wages, we regressed wages per worker of the different states on their respective labour productivities.

The main findings of this study are as follows:-

Partial Productivity Trends:

Labour productivity showed increasing annual trend rates for all-India as well as for the majority of the states. The exceptions, however, are Maharashtra and Punjab in the cotton ginning, cleaning and bailing industry; Gujarat and Harayana in cotton spinning, weaving, shrinking, etc industry and Kerala in Weaving and finishing of cotton textiles in power-looms. These states have experienced downtrend in labour productivity. This downtrend in labour productivity is really a matter of concern to us, especially in case of Maharashtra and Punjab in the cotton ginning, cleaning and bailing industry and Gujarat in the cotton spinning, weaving, shrinking, etc. industry(because these are very important states in terms of their contribution to the gross value added in these industries).

Usually, growth of labour productivity was high in those regions where wage rate and capital intensity are were also growing. The main examples are, Tamil Nadu, Harayana and Rajasthan in the cotton ginning, cleaning and bailing industry; Maharasthra , Uttar Pradesh and Madhya Pradesh in the cotton spinning, weaving, shrinking etc.

industry and almost all the states in the rest of three cotton textile industries. But labour productivity was decreasing only in those states where either capital intensity was declining or wage rate was declining or both. We may, thus conclude that the factors which seem to be related to the growth of labour productivity in the majority of the states in the cotton textile industries were coupled with the growth of capital intensity and wage rate.

Capital productivity showed decreasing trend rates for all-India as well as for the majority of the states in the cotton textile industries. The exceptions, however, are Gujarat, Punjab, Karnataka and Andhra Pradesh in the cotton ginning, cleaning and bailing industry; Tamil Nadu and Uttar Pradesh in the printing, dyeing and bleaching of cotton textiles; Uttar Pradesh again in the production of Khadi and weaving and finishing of cotton textiles in hand-looms other than Khadi and Gujarat in the weaving and finishing of cotton textiles in power-looms. These states have experienced uptrend in capital productivity.

Capital productivity and capital intensity in these cotton textile industries were found to be inversely

related in most of the states. The states which experienced positive annual trend rates in capital intensity, were the states where capital productivity showed negative or stagnating annual trend rates. On the other hand, the states which experienced negative annual trend rates in capital intensity, were the states where capital productivity showed positive annual trend rates. We thus conclude that the factor which seems to be responsible for the declining annual trend rates of capital productivity in the majority of the states in the cotton textile industries, is the rise in capital intensity.

So far as the raw materials productivity in the cotton textile industries is concerned, it did not register any significant trend( uptrend or downtrend) in most of the states as well as in India as a whole. The exceptions, however, are Karnataka in the cotton ginning, cleaning and bailing industry; West Bengal in the printing, dyeing and bleaching of cotton textiles; Karnataka and West Bengal again in the production of Khadi and weaving and finishing of cotton textiles in hand-looms other than Khadi and Kerala in the weaving and finishing of cotton textiles in power-looms. These are the states where raw materials productivity had shown significant downtrends.

It seems that the insignificant growth in raw materials productivity in these cotton textile industries for most of states as well as for all-India, has resulted mainly because of the stagnant level of technology and the slowly increasing(or even decreasing) efficiency of labour and capital. In fact, if we do not equip these age old cotton textile industries with modern machines, tools and technology and if the efficiency of labour and capital in these industries remain almost stagnant, we should not and we cannot expect the raw materials' productivity to increase significantly. The use of the aggregated estimates of the raw materials(instead of working out the productivities of fuels, materials, etc., separately) in this study may be other cause of this stagnating trend in the raw materials productivity.

Total Factor Productivity Trends:

Both the Kendrick and Translog indices of total factor productivity showed a general uptrend over the entire period of our study, for all-India as well as for the various states - in almost all the cotton textile industries at three-digit level. The exceptions however, are Gujarat, Kerala, Maharasthra and Punjab in the cotton spinning, weaving, shrinking etc. industry;

West Bengal in the printing, dyeing and bleaching of cotton textiles; Punjab and Andhra Pradesh in the production of Khadi and weaving and finishing of cotton textiles in hand-looms other than Khadi and Kerala again in the weaving and finishing of cotton textiles in power-looms. In these states, the Kendrick and Translog indices of total factor productivity showed either a declining or a stagnating trend rate.

As it was expected, generally the highest annual trend rates of these TFP indices were registered in those states which had recorded significant positive increase in both the labour and capital productivities. Some of the important examples are, Andhra Pradesh in the cotton ginning, cleaning and bailing industry, Uttar Pradesh in the printing, dyeing and bleaching of cotton textiles and Gujarat in the weaving and finishing of cotton textiles in power-looms. These are the states which experienced tremednous increase in the annual trend rates of the TFP indices and it was found that both the labour and capital productivities in these states were showing positive annual trend rates.

A striking feature of the computed TFP indices is their close correspondence for all-India as well as

for the different states over the period 1973-74 to 1982-83. The peaks and troughs synchronize practically in all cases.

Production Function Estimates:

In the cotton ginning, cleaning and bailing industry and in the cotton spinning, weaving, shrinking etc. industry, the Cobb-Douglas production function is not supported by the data as the value of $R^2$ corrected for degrees of freedom is generally not good for many states. However, in the other three cotton textile industries(i.e, industry-232, 235 and 236), the fit is generally good for most of the states as revealed by the high values of $R^{-2}$.

Capital coefficients are significant in case of Andhra Pradesh, Madhya Pradesh and Tamil Nadu in the cotton ginning, cleaning and bailing industry; Madhya Pradesh again in the cotton spinning, weaving, shrinking etc. industry; Karnataka and Uttar Pradesh in the printing dyeing and bleaching of cotton textiles; West Bengal in the productionoof Khadi and weaving and finishing of cotton textiles in hand-looms other than Khadi and Gujarat and Tamil Nadu in the weaving and

finishing of cotton textiles in power-looms.

On the other hand, labour coefficients are significant in case of Gujarat, Maharashtra and Rajasthan in the cotton ginning, cleaning and bailing industry; Harayana, Maharasthra and Punjab in the cotton spinning, weaving, shrinking, etc. industry; Maharasthra, Rajasthan and Tamil Nadu in the printing, dyeing and bleaching of cotton textiles and Andhra Pradesh and Punjab in the production of Khadi and weaving and finishing of cotton textiles in handlooms other than Khadi.

Trends in Wages Per Worker:

Wages per worker have shown increasing annual trend rates for all-India as well as for the majority of the states in all the five cotton textile industries at the three digit level. The exceptions, however, are Maharasthra and Punjab in the cotton ginning, cleaning and bailing industry; Orissa in the cotton spinning, weaving, shrinking, etc. industry; Harayana in the printing, dyeing and bleaching of cotton textiles and Kerala in the weaving and finishing of cotton textiles in power-looms. In these states, wages per worker have shown downtrends.

On an average , wages per worker were found to be highest in the cotton spinning , weaving , shrinking etc., industries and lowest in the cotton ginning, cleaning and bailing industry. We have also noticed inter-regional wage variations in these cotton textile industries. Cotton ginning, cleaning and bailing industry showed a very high degree of inter-regional wage differentials. In fact, the coefficient of variation of wages per worker in this industry, as worked out for the important states, never stood below 35 per cent during the entire period of our study. Similarly, other cotton textile industries have also recorded wide spread inter-regional wage differentials (although not as high as in the case of cotton ginning, cleaning and bailing industry).

Wage-Productivity Linkage:

On the basis of the regressions of wages per worker on labour productivity, we found that wages per worker have been significantly influenced by labour productivity in all the five cotton textile industries of India at the three-digit level; in almost all the years of our study. The exceptions, however, are 1979-80 in case of cotton ginning, cleaning and

bailing industry; 1979-80 and 1980-81 in case of the cotton spinning, weaving, shrinking, etc. industry; 1977-78 and 1982-83 in case of printing, dyeing and bleaching of cotton textiles; 1974-75 and 1975-76 in case of the production of Khadi & Weaving and finishing of cotton textiles in hand-looms other than Khadi and 1978-79, 1979-80 and 1980-81 in case of weaving and finishing of cotton textiles in power-looms. These are the years during which labour productivity could not explain the trends in wages per worker significantly (the value of $R^2$ was less than 50 per cent). But irrespective of these exceptions, we may conclude that wages and productivity are significantly related in cotton textile industries of India.

An evident policy implication which follows from the main finding of this study is that significant rise in wage rate can be secured by increasing labour productivity and capital intensity. In its crude form this statement implies that wages may be rightly linked to labour productivity measured in terms of gross value added per worker.

# APPENDIX



TABLE - 1.1

REGIONAL SHARE IN GROSS VALUE ADDED, TOTAL FIXED CAPITAL AND TOTAL WORKERS EMPLOYED INDUSTRY-230

(In percentage)

| Region | Year | GVA | FCT | WT |
|---|---|---|---|---|
| A.P. | 1973-74 | 0.77 | 3.88 | 5.01 |
| | 1982-83 | 1.62 | 9.74 | 14.26 |
| Gujarat | 1973-74 | 27.05 | 42.41 | 39.83 |
| | 1982-83 | 27.85 | 32.57 | 32.31 |
| Harayana | 1973-74 | 5.93 | 3.95 | 2.31 |
| | 1982-83 | 3.69 | 3.60 | 1.42 |
| Karnataka | 1973-74 | 4.85 | 4.86 | 6.38 |
| | 1982-83 | 4.36 | 3.91 | 4.62 |
| Maharashtra | 1973-74 | 23.97 | 23.48 | 22.16 |
| | 1982-83 | 17.52 | 23.93 | 25.81 |
| M.P. | 1973-74 | 7.91 | 4.93 | 8.47 |
| | 1982-83 | 8.16 | 6.22 | 8.31 |
| Rajasthan | 1973-74 | 5.97 | 5.28 | 3.71 |
| | 1982-83 | 4.51 | 8.13 | 2.96 |
| Punjab | 1973-74 | 9.46 | 6.41 | 3.69 |
| | 1982-83 | 8.96 | 6.40 | 3.34 |
| Tamil Nadu | 1973-74 | 13.21 | 4.37 | 8.04 |
| | 1982-83 | 8.00 | 5.19 | 6.56 |
| All-India | 1973-74 | 100 | 100 | 100 |
| | 1982-83 | 100 | 100 | 100 |

GVA- Gross value added. FCT = Total fixed capital and WT = Total workers employed.

TABLE - 1.2

REGIONAL SHARE IN GROSS VALUE ADDED, TOTAL FIXED CAPITAL and TOTAL WORKERS EMPLOYED

INDUSTRY-231

(in percentage)

| REGION | YEAR | GVA | FCT | WT |
|---|---|---|---|---|
| A.P. | 1973-74 | 1.93 | 3.35 | 0.98 |
| | 1982-83 | 2.85 | 3.67 | 3.00 |
| Bihar | 1973-74 | 0.13 | 0.39 | 0.25 |
| | 1982-83 | 0.21 | 0.92 | 0.38 |
| Gujarat | 1973-74 | 24.83 | 25.06 | 21.37 |
| | 1982-83 | 26.48 | 23.76 | 27.37 |
| Harayana | 1973-74 | 0.79 | 1.38 | 1.03 |
| | 1982-83 | 1.10 | 1.93 | 1.79 |
| Karnataka | 1973-74 | 0.37 | 4.10 | 4.77 |
| | 1982-83 | 3.71 | 3.00 | 3.81 |
| Kerala | 1973-74 | 1.66 | 1.87 | 1.44 |
| | 1982-83 | 1.68 | 2.80 | 1.71 |
| M.P. | 1973-74 | 4.62 | 3.53 | 6.59 |
| | 1982-83 | 7.08 | 3.22 | 5.88 |
| Maharashtra | 1973-74 | 31.62 | 25.95 | 28.79 |
| | 1982-83 | 16.89 | 19.86 | 16.76 |

Table Contd.....

Table - 1.2 (Contd)

(in percentage)

| REGION | YEAR | GVA | FCT | WT |
|---|---|---|---|---|
| Orissa | 1973-74 | 0.57 | 0.65 | 0.77 |
| | 1982-83 | 1.35 | 0.54 | 0.53 |
| Punjab | 1973-74 | 1.12 | 1.16 | 1.29 |
| | 1982-83 | 1.06 | 1.45 | 1.18 |
| Rajasthan | 1973-74 | 2.05 | 3.17 | 2.34 |
| | 1982-83 | 2.47 | 2.61 | 2.46 |
| Tamil Nadu | 1973-74 | 15.13 | 15.60 | 11.72 |
| | 1982-83 | 19.66 | 21.98 | 15.56 |
| U.P. | 1973-74 | 4.42 | 7.09 | 7.39 |
| | 1982-83 | 7.41 | 7.19 | 9.08 |
| West Bengal | 1973-74 | 4.12 | 4.15 | 5.67 |
| | 1982-83 | 5.28 | 4.90 | 6.70 |
| ALL-INDIA | 1973-74 | 100 | 100 | 100 |
| | 1982-83 | 100 | 100 | 100 |

TABLE-1.3

REGIONAL SHARE IN GROSS VALUE ADDED, TOTAL FIXED CAPITAL AND TOTAL WORKERS EMPLOYED.

INDUSTRY-232

(In percentage)

| Region | Year | GVA | FCT | WT |
|---|---|---|---|---|
| Gujarat | 1973-74 | 13.25 | 17.33 | 13.53 |
| | 1982-83 | 27.22 | 31.35 | 34.37 |
| Haryana | 1973-74 | - | - | - |
| | 1982-83 | 13.06 | 7.90 | 7.94 |
| Karnataka | 1973-74 | - | - | - |
| | 1982-83 | 8.83 | 7.94 | 3.59 |
| Maharashtra | 1973-74 | 64.41 | 54.07 | 62.96 |
| | 1982-83 | 33.64 | 24.82 | 35.05 |
| Punjab | 1973-74 | 2.38 | 1.37 | 2.30 |
| | 1982-83 | 3.06 | 1.51 | 3.15 |
| Rajasthan | 1973-74 | - | - | - |
| | 1982-83 | 2.10 | 2.86 | 3.28 |
| Tamil Nadu | 1973-74 | 4.00 | 3.72 | 5.02 |
| | 1982-83 | 6.02 | 7.03 | 5.44 |
| U.P. | 1973-74 | 2.65 | 5.00 | 4.64 |
| | 1982-83 | 1.90 | 2.22 | 1.54 |
| West Bengal | 1973-74 | 1.09 | 1.45 | 2.05 |
| | 1982-83 | 2.36 | 10.38 | 3.13 |
| All-India | 1973-74 | 100 | 100 | 100 |
| | 1982-83 | 100 | 100 | 100 |

TABLE - 1.4

REGIONAL SHARE IN GROSS VALUE ADDED, TOTAL FIXED CAPITAL AND TOTAL WORKERS EMPLOYED
INDUSTRY-236

(in percentage)

| Region | Year | GVA | FCT | WT |
|---|---|---|---|---|
| Gujarat | 1973-74 | - | - | - |
| | 1982-83 | 5.58 | 2.66 | 6.77 |
| Kerala | 1973-74 | 6.50 | 6.09 | 9.28 |
| | 1982-83 | 0.05 | 22.09 | 10.02 |
| Maharashtra | 1973-74 | 3.77 | 4.24 | 3.99 |
| | 1982-83 | 20.01 | 13.11 | 11.68 |
| Orissa | 1973-74 | 6.13 | 10.16 | 8.38 |
| | 1982-83 | 25.80 | 21.48 | 15.39 |
| Tamil Nadu | 1973-74 | 11.96 | 7.81 | 15.17 |
| | 1982-83 | 27.61 | 29.84 | 29.47 |
| U.P. | 1973-74 | 54.29 | 64.22 | 44.16 |
| | 1982-83 | 5.01 | 4.35 | 7.10 |
| West Bengal | 1973-74 | - | - | - |
| | 1982-83 | 8.25 | 3.02 | 11.45 |
| ALL-INDIA | 1973-74 | 100 | 100 | 100 |
| | 1982-83 | 100 | 100 | 100 |

TABLE-2.1

CAPITAL INTENSITY AND WAGE RATES, INDUSTRY - 230

(ANNUAL TREND RATE)

| State | Capital Intensity (%) | Wage Rate (%) |
|---|---|---|
| AP | -0.69 | 3.64 |
| GJT | -1.28 | 2.08 |
| HRN | 4.86 | 1.40 |
| KRTK | -0.61 | 1.60 |
| MHRS | -1.90 | -0.80 |
| MP | 0.88 | 1.87 |
| PJB | -1.86 | 1.28 |
| RJST | 2.31 | -0.64 |
| TN | 2.02 | 1.99 |
| ALL-INDIA | -0.87 | 1.02 |

TABLE-2.2

CAPITAL INTENSITY AND WAGE RATE INDUSTRY- 231

(ANNUAL TREND RATE)

| State | Capital Intensity (%) | Wage Rate (%) |
|---|---|---|
| AP | 1•79 | 0.28 |
| BHR | 6.74 | 7.78 |
| GJT | 2.95 | 1.89 |
| HRN | 1.81 | 1.25 |
| KRL | 8.20 | 1.78 |
| KRTK | 4.49 | 6.35 |
| MHRS | 7.09 | 1.45 |
| MP | 5.34 | 2.23 |
| ORS | 6.13 | -1.06 |
| PJB | 8.99 | 3.77 |
| RJST | 3.16 | 4.04 |
| TN | 6.69 | 1.95 |
| UP | 3.67 | 4.11 |
| WB | 6.61 | 3.13 |
| ALL-INDIA | 5.40 | 2.24 |

TABLE-23

CAPITAL INTENSITY AND WAGE RATE INDUSTRY- 232

(ANNUAL TREND RATE)

| State | Capital Intensity (%) | Wage Rate (%) |
|---|---|---|
| GJT | 2.41 | 2.46 |
| HRN | 1.38 | -0.40 |
| KRTK | 2.77 | 7.77 |
| MHRS | 2.49 | 2.59 |
| PJB | 1.35 | 2.28 |
| RJST | 8.82 | 7.03 |
| TN | 2.68 | 2.08 |
| UP | 8.98 | 2.66 |
| WB | 14.95 | 4.24 |
| ALL-INDIA | 5.09 | 2.05 |

TABLE-2.4

CAPITAL INTENSITY AND WAGE RATE INDUSTRY- 235

(ANNUAL TREND RATE)

| State | CApital Intensity (%) | Wage Rate (%) |
|---|---|---|
| AP | 7.09 | 2.71 |
| KRL | 2.25 | 1.19 |
| PJB | 10.82 | 9.30 |
| UP | -4.68 | 1.51 |
| WB | 4.71 | 2.22 |
| ALL-INDIA | 6.18 | 2.08 |

TABLE-2.5

CAPITAL INTENSITY AND WAGE RATE INDUSTRY - 236

(ANNUAL TREND RATE)

| State | Capital Intensity (%) | Wage Rate (%) |
|---|---|---|
| GJT | -1.80 | 3.27 |
| KRL | 9.92 | -2.38 |
| ORS | 3.76 | 2.02 |
| TN | 6.07 | 2.64 |
| UP | 3.92 | 1.91 |
| WB | 0.89 | 2.98 |
| ALL-INDIA | 2.72 | 2.71 |

TABLE-3.

**Inter Regional Wage Differentials**

**(coefficient of variation)**

**(Wages per worker %)**

| Year | Ind.230 | Ind.231 | Ind.232 | Ind.236 |
|---|---|---|---|---|
| 1973-74 | 46.64 | 23.37 | 23.91 | 10.85 |
| 1974-75 | 48.18 | 20.79 | 27.78 | 16.36 |
| 1975-76 | 51.60 | 22.04 | 24.15 | 23.35 |
| 1976-77 | 46.06 | 20.42 | 19.85 | 18.78 |
| 1977-78 | 37.96 | 19.21 | 20.30 | 17.29 |
| 1978-79 | 43.50 | 27.11 | 20.90 | 12.09 |
| 1979-80 | 37.88 | 22.71 | 21.11 | 21.55 |
| 1980-81 | 42.98 | 23.74 | 23.52 | 15.78 |
| 1981-82 | 40.25 | 17.62 | 23.92 | 22.75 |
| 1982-83 | 35.08 | 20.92 | 22.14 | 30.09 |

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