

CHAPTER-3

METHODOLOGY AND DATA DESCRIPTION

The methodology followed in this dissertation consists of several techniques of analysis such as simple percentage share, coefficient of variation, growth rate, employment elasticity and regression analysis. The state-wise distribution of gross value added (GVA) and employment generated in the organized sector were studied with the help of percentage shares. The technique of percentage shares was further used to examine whether the state-wise distribution of employment undergoes changes when employment is disaggregated into workers and non-workers. Similarly, the technique of percentage share was used to study the state wise distribution of compensation to employees at the levels of total employees, workers and non-workers. The percentage shares were calculated by dividing the state specific figures by all industries and multiplying by hundred.

To study the behaviour of variables such as output, employment, labour productivity¹ and wage rates over a period of time (2000-01 to 2009-10), the technique of compound growth rate (CAGR) has been used. The compound growth rate is computed by fitting an exponential function to the relevant data. An exponential trend equation is defined as:

$$Y = ab^t e^u$$

Where b is 1+g and g is the compound growth rate.

The semi natural logarithmic transformation of this function is:

$\ln Y = \ln a + \ln bt + u$ Which is a semi log linear function. And 'ln' is natural logarithm.

The values of the parameter a and b in this equation are estimated by using OLS method. CAGR is computed by using the formula:

$$\text{CAGR (g\%)} = (\text{anti-log } b - 1) * 100$$

¹ Labour productivity is defined as number of workers per unit of real value added (in real terms).

The technique of elasticity has been used to study the relationship between employment and output originating in the organized sectors of various states and at national level. Employment elasticity is computed as the ratio of growth rate in employment to growth in value added an elasticity of 1 implies that every 1% of GDP change is associated with 1% change in employment.

The Constant Elasticity of Substitution (CES) has been employed for empirical study. Empirical studies of CES production function and related formulae have emphasized its crucial role in determining, the behaviour of variety of economic models. In particular, this elasticity is central to the determination of factor demand elasticities and the trend of relative factor shares over time.² Although a variety of techniques have been developed for estimating the elasticity of substitution, most empirical studies up to 1971 have used log linear formula introduced by ACMS.

$$\ln (V/L) = a + \sigma \ln W + u$$

Where value added (V), labour quantity (L) and real wage (w) are observed variables for an industry and u is unobservable random distribution. The parameter σ is (under certain condition) the elasticity of substitution between labour and capital. The main advantage of this approach is that it avoids the use of often unavailable or difficult to compute capital services or service price of capital and 'ln' is nature logarithm. The empirical value of estimate of elasticity of substitution between the capital and labour in organised manufacturing in major state is very important to comprehend the extent of substitution possibility between labour and capital. So, it is required to understand the extent of substitution possibility.

For studying the interstate variations of labour productivity and wage rates of employees, workers and non-workers, the technique of coefficient of variation (C.V.) is used. The coefficient of variation is used to measure the extent of interstate disparities in respect labour productivity and wage rates in organised manufacturing. The coefficient of variation is calculated by dividing the standard deviation (S.D.) by the mean of observations i.e. $C. V. = S. D. / \text{mean}$. When multiplying by 100, it gives variation as percent of mean. The coefficient of variation is also used

²Arrow-Chenery-Minhas-Solow (ACMS) (1961) in their seminal article on CES functions list several economic issues where resolution depends on the elasticity of substitution.

to ascertain the extent of interstate variations in growth rate of labour productivity and wage rates of employees, workers and non-workers.

Kaldor³ hypothesized that higher output will induce higher labour productivity in manufacturing industries. There can be two different ways of looking at this hypothesis by using simple regression. One is to regress productivity growth (g_{pt}) on output growth (g_{mt}) and the other is to regress employment growth (g_{et}) on output growth (g_{mt}). The first can be specified as:

$$g_{pt} = a + b g_{mt} \quad \text{..... (3.1)}$$

The second can be derived as:

$$g_{et} = g_{mt} - g_{pt} = -a + (1-b) g_{mt} \quad \text{.....(3.2)}$$

The coefficient b in 1st or 2nd equation implies that $b = 1$ indicates that there is no variation in employment growth due to growth in output. The value $b = 0$ implies that there is no response of productivity growth due to change in output growth. We have estimated the following equations to know statistical relationship of growth of employees, workers, and non-workers on one hand and growth rate of output on the other. The equations are stated as:

$$G_e = a + b G_m + u \quad \text{..... (3.3)}$$

$$G_w = a + b G_m + u \quad \text{..... (3.4)}$$

$$G_{nw} = a + b G_m + u \quad \text{..... (3.5)}$$

Where G_e is growth rate of employees, G_w is growth rate of workers, G_{nw} is growth rate of non-workers and they denote the dependent variable in equation 3.3, 3.4, 3.5 respectively. G_m is growth rate of manufacturing output and it denotes the independent variable in all in above equations. And $\ln$ show natural logarithm is an error term and a & b are regression parameters.

³Das, P. (2007) 'Economic Reform, Output and Employment Growth in Manufacturing: Testing Kaloder's Hypothesis'

Economic and Political Weekly, 29 September vol.42, no.39.

DATA DESCRIPTION:

The data has been drawn mainly from Annual survey of Industries (ASI)⁴, vol.-1, over time period 2000-01 to 2009-10 which published by Central Statistics Office (CSO), Department of Ministry Statistics and Programme Implementation (MOSPI), Government of India. The ASI consists primarily of all factories which are required to be registered under sections 2m (i) and 2m(ii) of the Factories Act 1948. Information on different characteristics in the registered sector is processed by the CSO.

Variable Construction

We have used Gross Value Added (GVA) which is arrived by deducting total input from gross value of output as the proxy for output which has been converted in real terms from nominal value by deflating Wholesales Prices Index (WPI) for manufactured products at constant price 2004-05 which is obtained by Reserve Bank of India (RBI), the Handbook of Statistics on Indian Economy. The choice of 2004-05 prices is a matter of convenience as it is one of the middle years of chosen time period 2000-01 to 2009-10. We have measured employment in numbers of employees,⁵ workers⁶ and non-workers⁷ in lakhs. We have also used emoluments⁸, wages⁹ and non-workers wages¹⁰ of employees, worker and for non-workers, are considered as proxy for

⁴The Annual Survey of Industries (ASI) is the principal source of industrial statistical in India. It provides statistical information to assess and evaluate, objectively and realistically, the changes in the growth, composition and structure of organised manufacturing sector comprising activities related to manufacturing processes, repair services, gas and water supply and cold storage.

⁵Employees include all workers and non-workers.

⁶Workers are defined to include all persons employed directly or through any agency whether for wages and engaged in any manufacturing process or in cleaning any part of machine or engaged in repair & maintenance or premises used for manufacturing process etc.

⁷Non workers include all persons holding clerical or supervisory or managerial positions and engaged in administrative office. (Including persons those receiving wages and others all family members those are not paid.)

⁸Total Emoluments is defined as the sum of wages and salaries, employers' contribution as provident fund and other funds and workmen and staff welfare expenses.

⁹Wages and Salaries are defined to include all remuneration in monetary terms and also payable more or less regularly in each pay period to workers as compensation for work done during the accounting year. It includes (a) direct wages and salary (i.e., basic wages/salaries, payment of over time, dearness, compensatory allowance, house rent and other allowances), (b) remuneration for the period not worked (i.e., basic wages, salaries and allowances payable for leave period, paid holiday, lay-off payments and compensation for unemployment, if not paid from sources other than employers), (c) bonuses and ex-gratia payment paid both at regular and less frequent intervals (i.e., incentive bonuses, good attendance bonuses, productive bonuses, profit sharing bonuses, festival or year-end bonuses, etc.). It excludes lay off payments which are made from trust or other special funds set up exclusively for this purpose i.e., payments not made by the employer. It also excludes imputed value of benefits in kind, employer's contribution to old age benefits and other social security charges, direct expenditure on maternity benefits and crèches and other group benefits.

¹⁰ Non worker wages defines as difference between total emoluments and wages and salaries of workers.

wages which have been deflected by same WPI at constant prices 2004-05 to convert in real terms.

To estimate labour productivities for employees, workers and non-workers, we have calculated by dividing Real Gross Value Added (RGVA) by total employees, workers and non-workers respectively. Labour productivity (V/L) is real GVA per unit of labour. To estimate wage rates of employees, workers and non-workers, we have calculated by dividing real emolument, real wages for worker and wages for non-workers by total employees, workers and non-workers respectively. Wage rate is real wage per unit of labour.