Research Report Series
No. 107

WAGES AND EMPLOYMENT IN MANUFACTURING INDUSTRIES — A CASE STUDY OF PAKISTAN

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February 1978

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WAGES AND EMPLOYMENT IN MANUFACTURING INDUSTRIES — A CASE STUDY OF PAKISTAN

A labour surplus economy faces a dilema between the desire to raise wages and the desire to raise employment and cut into the surplus labour. It is not our purpose here to design an optimal wage policy which requires balancing of a variety of short-term and long-term considerations. The aim of the study is to provide empirical evidence on the wage-productivity-employment relationships in Pakistan's manufacturing industries at two digit level of classification, our method of studying these relationships will be the theory of production Via CES production function.

Wages

There has been a change in the average money wages in the Industrial sector and this might have resulted in significant substitution of other factors of production for labour. We will explore the effect on employment of wage increase in Pakistan's Manufacturing Industries.

Figure (1) (see next page) shows that average hourly earnings rose by about 104.5% between 1956-57 and 1969-70 from 36.91 to 75.47 paisa. The figure also enables us to compare this rise in earning with wholesale price index and cost of living index. It is apparant

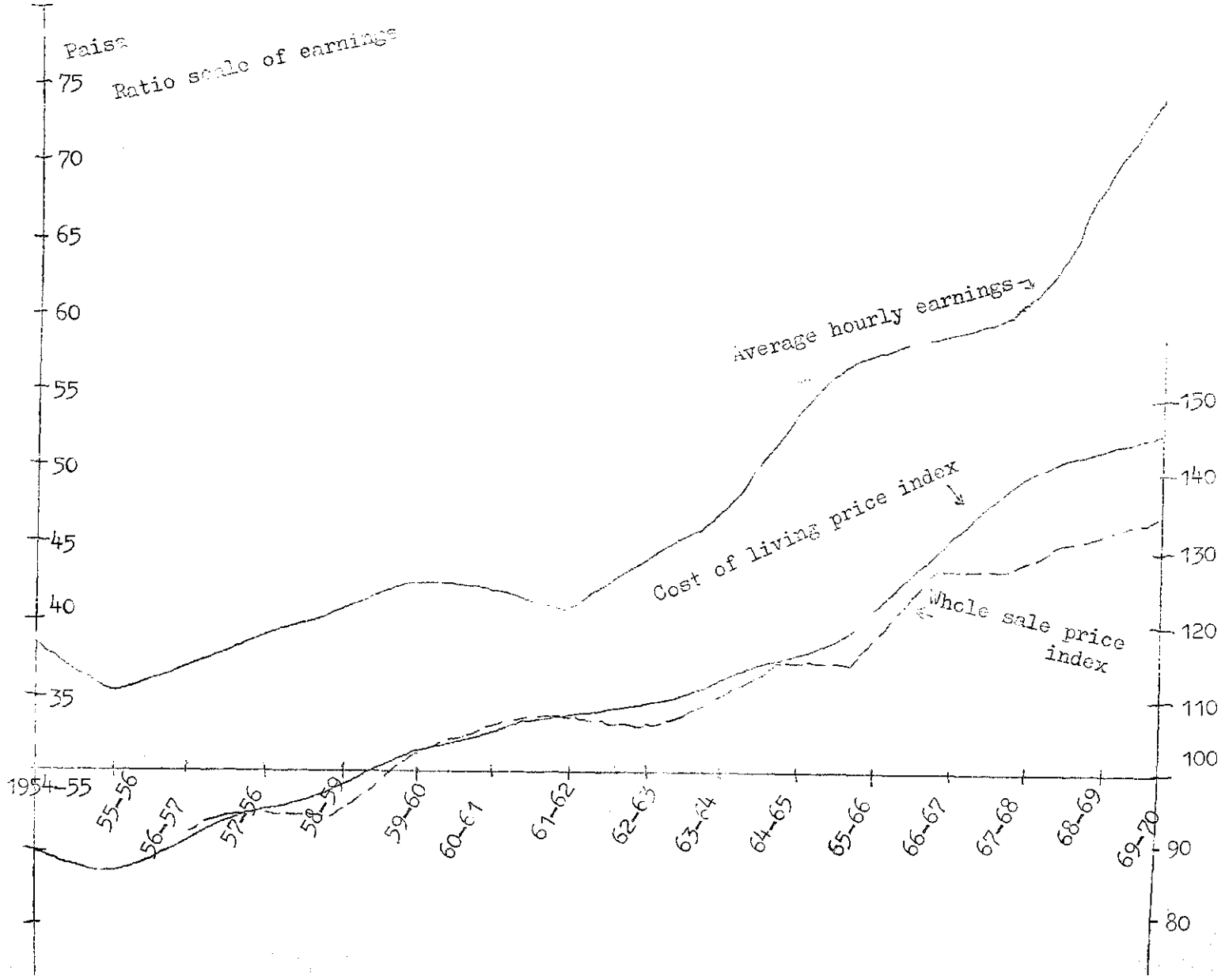
that the wholesale price index rose by about 46% and cost of living index rose by 60%. The implied rise in the real equivalent average hourly earning when we apply the cost of living index is 27.66% over the 14 years or an average annually commpounded rate of 1.76%.

The data for figure 1 are given below:

	Cost of living	Wholesale Price index	Average hourly earnings
1956-57	100.00	100.00	36.91
1957-58	104.49	105.45	38.82
1958-59	106.96	103.00	40.82
1959-60	112.00	123.21	42.61
1960-61	116.02	116.29	41.38
1961-62	117.93	116.16	40.77
1962-63	120.05	114.17	40.15
1963-64	122.97	118.04	46.67
1964-65	127.23	126.04	52.34
1965-66	131.15	124.35	57.19
1966-67	142.24	138.04	58.98
1967-68	153.88	139.50	60.00
1968-69	157.02	143.78	67.74
1969-70	160.16	146.73	75.47

Employment

During the past fifteen years of its planned development Pakistan has experienced a significant rate of economic growth. Between 1954-55 and 1967-68 gross national product (at constant prices) expanded at annual compound rate of 4.05%. However the effects of such growth in terms of employment generation are not equally good. The following table presents forecast of labour force and employment, during the third five year plan.


Paise
Ratio scale of earnings
75
70
65
60
55
50
45
40
35
Average hourly earnings
Cost of living price index
Whole sale price index
150
140
130
120
110
100
90
80
1954-55
55-56
56-57
57-58
58-59
59-60
60-61
61-62
62-63
63-64
64-65
65-66
66-67
67-68
68-69
69-70

Sector	(Thousands of Men Years) Additional Employment
Manufacturing	
i. Large Scale	255
ii. Small Scale and other	205
Total Manufacturing	460
Agriculture	1140
Construction	280
T le and Services	650
	2530

Employment in large scale Manufacturing as % of total employment 10.07.

Allocation to the large scale manufacturing in the third five year plan was 255000 which is 10.07% of total additional employment, If we rely on the CMI data, it appears from the statistics available that the employment in this sector and increased by 52029, approximately. Data on employment for 1968-69 was not available from CMI, therefore, the average of data for 1967-68 and 1969-70 was taken as a proxy for 1968-69.

Wages, Employment and Productivity

The level and structure of wage earnings influence labour productivity because high wage earnins serve as incentive to the workers and they often put in their best.

An, entrepreneur, wants to minimize his cost of production. The factor combinations in his production process are to a large extent determined by the relative prices of resource inputs. When wage earnings rise, proportionately more than the price of say

capital he uses more capital inputs by adopting labour saving techniques subject to the technical limitations of his production process. The level of employment is directly influenced by the level and movement of wage earnings.

The annual average rate of growth of employment between 1954-1959 was 16.8% slightly higher than 15.6% the annual rate of output growth. But this rate declined to 4% between 1959/60 and 1969/70 while output at factor cost rose by about 13.38%. The output elasticity of demand for labour thus works out to be 0.298% for this period. Implicit in these growth rates is the fact that labour productivity was increasing at an average of 8% per year,

Methodology

This methodology has already been used earlier in other studies for Developing Countries.

As mentioned earlier the aim of this study is to provide, empirical evidence on the wage-employment-productivity relationship using time series data (1954-70). Our method of studying these relationships will be the theory of production Via CES production function.

CES production function is typically give by

$$(1)\quad V = \gamma \left[\delta K^{-P} + (1-\delta) L^{-P} \right]^{\frac{-u}{p}}$$

The relationship that Arrow, Chenery, Minhas and Solow used to estimate, elasticity of substitution between labour and capital for cross-section data is:

(2) . $\text{Log}\left(\frac{V}{L}\right) = a + b \log W + e$

Equation (2) is derived from usuall profit maximization conditions in which perfectly competitive markets prevail and constant returns to scale are assumed.

We shall use time-series data. Since their is no term in above mentioned relationship to allow for technical progress or the effects associated with passage of time, we let $\gamma = e^{\lambda t}$ where $e^{\lambda t}$ indicates the neutral technical progress. Thus time-series counterpart of (2) becomes

(3) $\log\left(\frac{V}{L}\right) = a + b \log W + ct + e$

Following P.J. Thryms we develop a more general model within the framework of CES production function.

Differentiating equation (1) with respect to labour and re-arranging we get:

$$\frac{\delta V}{\delta L} = U\gamma \frac{-P}{u} (1-\delta) \left(\frac{V}{L}\right)^{1+P} V^{P} \left[(1-u)/u\right]$$

Equating with $\frac{W}{P}$ we get

$$\frac{W}{P} = U\gamma \frac{-P}{u} (1-\delta) \left(\frac{V}{L}\right)^{1+P} V^{P} \left[(1-u)/u\right]$$

Thus

$$\left(\frac{V}{L}\right)^{1+P} = \frac{W}{P} \left[u\ \gamma^{P/u} (1-\delta)\right]^{-1} V^{-P} \left[(1-u)/u\right]$$

After taking logrithms and dividing by 1+p we arrive at our estimating equation as follows:

$$(4)\ \log\left(\frac{V}{L}\right) = \sigma \log\left[u\ (1-\delta)\ \gamma^{-P/u}\right]^{-1} + \sigma \log W + (-\sigma) \log P + \frac{(1-\sigma)(u-1)}{u} \log V$$

Where

$a = \sigma \log \left[u\gamma \frac{-P}{u} (\varphi - \delta) \right]^{-1}$ is constant

$\sigma = \frac{1}{1+P}$ is the elasticity of substitution between capital and labour

W = product wages

P = Industry's product price

u = The degree of return to scale

Letting $R = \frac{(1-\sigma)(u-1)}{u}$

and adding a term to take account of those forces which are associated with the passage of time, e.g. technical progress, equation (4) can be written as

(5) $\log \left(\frac{V}{L}\right) = a \quad b \log W - \log P + R \log V + Ct + c$

The manufacturing industries in Pakistan are characterized by imperfections in both the commodity and factor markets.[1] Foreign firms tend to pay higher than average wages while indiginous firms tend to pay lower than average wages. According to general formula worked out by Theil, the ommission of variable for market imperfections in estimation would bias the slope of log W-the elasticity of substitution -upwards, if the variable for market imperfections and log W are positively correlated across firms ownerships.

Neither value added nor average earnings will be deflated for price changes because there is no adequate delator available. Therefore, log P for price change will not be included in the estimating equation which means certain biases are introduced into the estimation of σ.

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[1] We wanted to add a variable for the market imperfections. The equation was of the following form: $\log \left(\frac{V}{L}\right) = a + b \log W + R \log V + \log M + ct + e$ .But due to unavailability of data, that variable was excluded.

An entrepreneur wants to minimize his cost of production; the factor combinations in his production process are to a large extent determined by the relative prices of resource inputs. When wage earnings rise proportionately more than the price of say capital he uses more capital inputs by adopting labour-saving techniques subject to the technical limitations of his production process. The level of employment is directly influenced by the level and movement of wage earnings. In our estimated model co-efficient of Log W will give the approximate measure of labour displacement by other factors of production due to increase in wages.

We mentioned earlier the relationship

$$R = \frac{(1 - \sigma)\ (u - 1)}{u}$$

Where R co-efficient is vendroon's co-efficient,
u is returns to scale and -is elasticity of substitution

For any given value of u greater than unity (increasing returns to scale) R is linearly decreasing function of . When we have constant returns to scale (u = 1) the term R log V drops out of estimating equation. Therefore, the elasticity of substitution will be estimated from the standard ACMS model. For any given value of u <1 (decreasing returns to scale) R is increasing function of elasticity of substitution.

We will calculate labour absorption percentage in the manufacturing industries based on R value from our model. - (R-1) will give the elasticity of employment with respect to output. From this labour absorption percentages will be calculated assuming 13% growth in value added. The following industry groups will be considered in this study.

1.	All Industries	2.	Food
3.	Beverages	4.	Tobacco
5.	Textiles	6.	Footwear and Wearing apparel
7.	Wood cork and Allied	8.	Furniture and fixtures
9.	Paper and paper products	10.	Printing & Publishing
11.	Leather	12.	Rubber
13.	Chemicals	14.	Non-metalls minerals
15.	Basic Matals	16.	Metal Products
17.	Machinery	18.	Electric Machinery
19.	Transport	20.	Miscellenous Industries

Data

The data has been taken from Second five year plan and the CMIs. The reliability of data is doubtful therefore the results can be regarded as tentative.

For the time series estimates data is available for the two digit level of industries from 1954 to 1970 with the exception of four years (1956. 1960-61. 1961-62. 1967-68). Product price indices have been taken from 25 years of Pakistan in statistics.

Following are the definitions of the variables used in the study.

1. Gross value added (V) Depreciation changes which depend on tax policy rather than on capital consumption, have not been deducted.

2. Employment (L): Employment includes production workers, other administrative and supervisory staff (and unpaid workers).

3. Wage Rate (W): Wage rate is the average wage obtained by dividing total employment cost (including wages, salaries and other cash and non-cash benefits) by the number of employees.

Results

Shahniaz et al 7_/ have done a similiar study. The first difference, between their study and this study is that they have taken into consideration thirteen industries only while we have considered twenty industries. Some important industries excluded from their study have been included.

Secondly their estimates of δ are insignificant in all cases except two. The problem is that of strong multicolliriearity of W and V with t as is evident from appendix table III. It seems that technological change, managarial skill and certain other factors are correllated with W and V. Therefore we have omitted t variable from our model. Thus the parameters of elasticity of substitution have become significant in all the cases. In Table I we have compared the estimates of of the two studies.

The third difference between their study and that of ours is that they have deflated the values of V and W by wholesale price index. The deflators are required for each industry,

Table 1

	Shahnaz's et al estimates of σ			Our Estimates of σ		
	Estimated of σ	t value	Level of significance	Estimate of σ	t value	Level of significance
All industries	-0.22	-0.97	-	1.80	13.89	Sig.
Textiles	0.46	1.31	insing	1.50	5.46	Sig.
Food	0.26	0.43	insing	-	-	-
Leather	0.49	0.51	insing	1.33	2.73	Sig.
Footwear	1.02	3.51	0.01	0.82	2.40	Sig.
Rubber	1.35	3.02	0.01	1.39	9.34	Sig.
Chemicals	1.59	1.43	insig	1.72	6.66	Sig.
Basic Metals	0.32	0.67	insig	1.32	5.85	Sig.
Non-Mattallic Mineras	-1.76	-1.35	-	1.94	4.85	Sig.
Printing & Publishing	1.52	5.25	0.01	1.55	9.95	Sig.
Electrical Machinery	0.87	4.11	0.01	1.35	10.31	Sig.
Beverages	-	-	-	2.01	2.96	Sig.
Tobacco	-	-	-	0.61	0.41	Sig.
Woodcork & Allied	-	-	-	1.85	3.96	Sig.
Furniture & Fixtures	-	-	-	0.84	4.37	Sig.
Paper & Paper Products	-	-	-	0.75	2.06	Sig.
Metal Products	-	-	-	1.31	7.60	Sig.
Machinery	-	-	-	1.41	15.76	Sig.
Transport Equipment	-	-	-	1.51	5.73	Sig.
Miscelleneous Industries	-	-	-	1.61	6.71	Sig.

separately. Since the deflators are not available for each industry, therefore we have not deflated these values which means certain biases are introduced into the estimates of . The bias of the slope of $W - \sigma -$ is downward (upward) if prices are negatively (positively) correlated with wages in inter-industry sense. In the light of above reasoning our estimating equation will be : (6) $\log (\frac{V}{L}) = a + B \log W + R \log V + e$.

The results of equqtion (6) from which we will calculate labour absorption percentages are given in table (2) for 18 industry groups, manufacturing sector as a whole and for miscellenous industries.

The coefficient of log W would be expected to be positive i.e. σ would be expected to be positive. It is evident from table (2) that coefficient of log W is positive in all the cases expect for leather and non-metallic minerals. The coefficient of log W measures the elasticity of labour displacement by other factor's of production due to increase in wages. For example table (2) shows that in the Metal Products Industry a 10 percent increase in wages would reduce employment (all other factor being equal) by 4.1 per cent. In Textile Industry a 10 percent increase in wages would reduce employment by 12.3 per cent, all other factors being equql.

The coefficient of v is positive in all industries and is significant at 5 percent level in fourteen industries and at 10 per cent level in two industries.

Table (2)

	INDUSTRY GROUP	Constant	Log W	t Value	Level of Significance	log V	t Value	Level of Significance	R^2	F	D	VW	No. of observations
1.	All Industries	-3.96	1.31	3.42	.005	0.14	1.35	.100	0.96	106	1.607	.82	11
2.	Food	-2.55	0.26	0.95	.200	0.51	6.45	.005	0.98	325.11	1.60	.80	9
3.	Beverages	-1.61	0.85	0.85	.250	0.28	1.48	.100	0.67	6.22	1.82	.87	6
4.	Tabacco	2.08	0.39	0.52	.350	0.27	3.58	.025	0.81	6.74	2.59	.35	11
5.	Textiles	-2.13	1.23	1.68	.100	0.08	0.40	.350	0.77	13.59	2.19	.97	11
6.	Footwear & Wearing	0.87	0.38	1.29	.100	0.29	2.93	.010	0.71	9.60	2.64	.51	11
7.	Woodcork & Allied	-0.61	0.62	1.38	.150	0.29	3.45	.010	0.90	27.98	2.53	.88	8
8.	Furniture & Fixture	1.94	0.20	0.82	.250	0.31	3.00	.025	0.92	29.38	3.20	.80	7
9.	Paper & Paper Prod	2.18	0.22	0.32	.400	0.31	0.90	.250	0.55	2.43	1.06	.81	7
10.	Printing & Pub.	-3.41	1.30	5.21	.005	0.12	1.24	.150	0.92	53.22	2.20	.83	11
11.	Leather	-1.03	-0.50	-1.56	-	0.79	7.16	.005	0.92	50.21	2.84	.76	11
12.	Rubber	-0.72	0.61	1.93	.050	0.31	2.61	.025	0.96	78.90	2.28	.96	10
13.	Chemicals	-1.49	0.72	1.43	.100	0.28	2.22	.050	0.90	34.30	0.98	.92	11
14.	Non-Metallic Minerals	-0.60	-0.04	-0.06	-	0.47	3.55	.005	0.88	32.25	2.07	.95	11
15.	Basic Metals	-0.79	0.68	1.17	.150	0.25	1.19	.150	0.81	18.59	1.43	.95	11
16.	Metal Products	-1.23	0.41	2.03	.050	0.36	4.98	.005	0.96	117.59	2.36	.94	11
17.	Machinery	-1.56	0.93	5.56	.005	0.17	3.07	.010	0.98	244.86	1.68	.97	11
18.	Electrical Machinery	-1.12	0.90	9.84	.003	0.17	6.21	.005	0.98	321.93	2.21	.92	11
19.	Transport Equipment	-0.59	0.36	0.62	.300	0.36	2.15	.050	0.86	25.36	1.28	.85	10
20.	Miscellaneous Ind.	-4.61	0.85	2.26	.050	0.39	2.37	.025	0.90	36.92	1.66	.86	10

Regression was run with log w and log v as explanatory variables. The results of the regressions are given in Table (3) and Table (4).

From table(3)and table (4) we observe that either log w or log y is a possibly explanatory variable for value added per worker. However Table 2 indicates that there is multi-collinearity between log w and log v. Lawrence Klein has suggested a rule of thumb that multi-collnearity is tolerable if rvw<R, where R is square root of the co-efficient of multiple determination. We observe from Table (2) that rvw is less than R in fifteen industries except for Beverages, Textile, Paper and Paper products, Non-metalic minerals, and Basic metals and even these industries are nearly passing that criteria.

Labour Absorption Percentages

As mentioned earlier we will calculate labour absorption percentages from the coefficient of log V, which is:

$$R = \frac{(1-\sigma)(u-1)}{u}$$

Our estimate of u from the above monticned relationship suggest that assumption of constant returns to scale is not justified which leads us to the conclusion that results obtained from CES production function model, where log W is the only independent variable, become questionable.

TABLE (3)

S.No.	Industry Group	Constant	Log W	t Value	R^2
11.	All Industries	-4.47	1.80	13.89	0.96
2.	Beverages	-5.73	2.01	2.96	0.56
3.	Food	-	-	-	-
4.	Tobacco	5.45	0.61	0.41	0.40
5.	Textile	-2.47	1.50	5.46	0.77
6.	Footwear & Wearing app.	2.45	0.82	2.40	0.38
7.	Woodcork & Allied	-5.23	1.85	3.96	0.72
8.	Furniture & Fixtures	1.90	0.84	4.37	0.81
9.	Paper & Paper Products	3.45	0.75	2.06	0.46
10.	Printing & Publishing	-3.22	1.55	9.95	0.90
11.	Leather	-0.76	1.33	2.73	0.45
12.	Rubber	-1.37	1.39	9.34	0.92
13.	Chemicals	-3.92	1.72	6.66	0.83
14.	Non-Metallic Minerals	-5.48	1.94	4.85	0.72
15.	Basic Metals	-1.12	1.32	5.85	0.79
16.	Metal Products	-1.48	1.31	7.60	0.86
17.	Machinery	-2.90	1.41	15.76	0.96
18.	Electrical Machinery	-1.48	1.35	10.31	0.92
19.	Transport Equipment	-2.87	1.51	5.73	0.79
20.	Miscelleneous Industries	-2.79	1.61	6.71	0.83

TABLE (4)

REGRESSION RELATING VALUE ADDED PER WORKER TO VALUE ADDED

S.No.	Industry group	Constant	Log V_t	Value	R^2
1.	All Industries	-1.75	0.49	5.59	0.90
2.	Food	-	-	-	-
3.	Beverages	2.72	0.40	3.49	0.64
4.	Tobacco	4.97	0.27	4.02	0.81
5.	Textile	0.54	0.38	4.50	0.69
6.	Footwear & Wearing	2.64	0.35	4.04	0.64
7.	Woodcork & Allied	2.52	0.38	6.85	0.88
8.	Furniture & Fixture	2.31	0.38	7.90	0.92
9.	Paper and Paper Products	2.30	0.40	2.41	0.53
10.	Printing & Publishing	0.57	0.52	4.51	0.69
11.	Leather	2.23	0.66	9.20	0.90
12.	Rubber	0.28	0.52	10.72	0.94
13.	Chemicals	0.95	0.44	7.22	0.86
14.	Non-Metalic Minerals	0.45	0.47	8.65	0.88
15.	Basic Metals	0.23	0.47	5.86	0.79
16.	Metal Products	0.55	0.49	13.09	0.94
17.	Machinery	0.30	0.45	10.29	0.92
18.	Electrical Machinery	1.72	0.38	6.49	0.[illegible]
19.	Transport Equipment	0.40	0.46	7.35	0.86
20.	Miscellenesous Industries	4.48	0.71	6.87	0.85

All the estimates of R (coefficient of log V), except four, are significant. Based on the values of R we have calculated the labour absorption percentages which have been presented in table (5); taking 13% as growth rate of value added.

Labour absorption percentages, for Kenya are given in table (6). We can not compare them directly with those of Pakistan because of difference in the classification of industries. However we can get a rough idea as to how Pakistan's labour absorption percentages compare with those of Kenya.

After examining table 5 and table 6 we reach the conclusion that labour absorption percentages for Pakistan are higher than those of Kenya.

Conclusion and Policy Implications

One of the reason or higher labour absorption percentages in Pakistan's manufacturing than those in Kenya's manufacturing is difference in the growth rates of value added between the two countries. For Pakistan's we took 13% as growth in value added while for Kenya it has been taken as 8%.

Average rate of growth of employment between 1959/60 and 1969/70 was 4 percent while output value added at factor costs rose by about 13.38%. The labour absorption capacity of Pakistan's manufacturing industries may be judged therefore to have been rather limited.

TABLE (5)

S.No.	Industry Group	R	-(R-1)	Labour Absorption percentages assuming 13% growth in V
1.	All Industries	0.14	0.86	11.18
2.	Food	0.51	0.49	6.37
3.	Beverages	0.28	0.72	9.36
4.	Tobacco	0.27	0.73	9.49
5.	Textiles	0.08	9.92	11.96
6.	Footwear & Wearing	0.29	0.71	9.23
7.	Woodcork & Allied	0.29	0.71	9.23
8.	Furniture & Fixture	0.31	0.69	8.97
9.	Paper & Paper Products	0.31	0.69	8.97
10.	Printing Publishing	0.12	0.88	11.14
11.	Leather	0.79	0.21	2.73
12.	Rubber	0.31	0.69	8.97
13.	Chemicals	0.28	0.72	9.36
14.	Non-Metals	0.47	0.53	6.89
15.	Basic Metals	0.25	0.75	9.75
16.	Metal Products	0.36	0.64	8.32
17.	Machinery	0.17	0.83	10.79
18.	Electrical Machinery	0.17	0.83	10.79
19.	Transport Equipment	0.36	0.64	8.32
20.	Miscellenecus Industries	0.39	0.61	7.93

TABLE (6)

S.No.	Industry Group	Labour Absorption percentages 8% growth in Value added.
1.	Food	2.2
2.	Tobacco and Beverage Industries	-7.6
3.	Textile clothing and footwear Industries	1.2
4.	Sawn timber furniture	0.02
5.	Paper and Paper Products	1.4
6.	Leather and Rubber Products..	1.7
7.	Basic Industries, Chemicals..	2.0
8.	Clay products, glass product.	4.0
9.	Metal Products	5.3
10.	Machinery and Transport.....	13.7
11.	Miscellaneous Manufacturing..	6.1

As pointed out in [6] if the industrial labour absorption is considered a major social objective, shifts in manufacturing structure towards decreasing labour use, such as those observed in Pakistan's manufacturing need to be reversed, implying the adoption of policy measures that will promote small scale production in labour using industries, with proper recognition of the interdependance among industries in terms of input requirements and distribution of output. There are important limitations, however, on the extent to which such policy guidelines can be applied. For one thing, resource allocation within the manufacturing sector also bears on policy objectives other than employment generation. For example higher productivity would be associated with the economics of large scale production. In such a case "Walking on two legs policy" could be beneficial i.e. exploiting both the benefits from the economies of scale in particular industries and the high employment generating potential of small production in other industries with a view to minimizing the social cost of producting a given vector of commodities.

Appendix I

$$\text{Log } \left(\frac{V}{L}\right) = a + b \text{ log } W + e$$

Regression relating Value added per worker to average earnings

S.No.	Industry	Constant	Log W	Value t	Level of Significance	R^2	F	D
1.	All Industries.....	-4.47	1.80	13.89	.005	.96	193	2.20
2.	Beverages	-5.73	2.011	2.96	.025	0.56	8.75	2.56
3.	Food	.....	.....	.....	.....	.....	.....	.....
4.	Tobacco	5.45	0.61	0.41	.350	0.04	0.16	1.19
5.	Textiles	-2.47	1.50	5.40	.005	0.77	29.80	2.32
6.	Footwear and wearing apparel....	2.45	0.82	2.40	.025	0.38	5.74	1.84
7.	Woodcork & allied..	-5.23	1.85	3.96	.005	0.72	15.67	1.07
8.	Furniture & Fixture	1.90	0.84	4.37	.005	0.81	19.05	3.05
9.	Paper & Paper Products	3.45	0.75	2.06	.05	0.46	4.23	1.86
10.	Printing publishing	3.22	1.55	9.95	.005	0.90	99.00	2.73
11.	Leather	0.70	1.33	2.73	.025	0.45	7.47	2.05
12.	Rubber	1.37	1.39	9.34	.005	0.92	87.23	2.80
13.	Chemical	3.92	1.72	6.66	.005	0.83	33.34	0.89
14.	Non-Metallic Minerals	5.48	1.94	4.85	.005	0.72	23.51	1.79
15.	Basic Metals	1.12	1.32	5.85	.005	0.79	34.18	1.61
16.	Metal Products	1.48	1.31	7.60	.005	0.86	57.77	1.77
17.	Machinery	2.09	1.41	15.76	.005	0.96	248.26	1.28
18.	Electrical Machinery	1.48	1.35	10.31	.005	0.92	106.33	1.71
19.	Transport Equipment	2.87	1.51	5.73	.005	0.79	32.87	1.40
20.	Miscelleneous Ind.	2.79	1.61	6.71	.005	0.83	45.03	2.10

Appendix II

$$\text{Log}\left(\frac{V}{L}\right) = a + R \log V + e$$

Regression relating Value added per worker to Value added

S.No.	Industry group	Constant	Log V	t Value	Level of significance	R^2	F	D
1.	All Industries	1.75	0.43	9.59	.005	0.90	92	0.91
2.	Beverages.....	.....	.....	.....	.....	.....	.....	.....
3.	Food	2.72	0.40	3.49	.005	0.64	12.19	1.21
4.	Tobacco	4.97	0.27	4.02	.010	0.81	16.18	2.17
5.	Textiles	0.54	0.38	4.50	.005	0.69	20.22	1.47
6.	Footwear and wearing apparel	2.64	0.39	4.04	.005	0.64	16.32	2.60
7.	Woodcork & Allied	2.52	0.38	6.85	.005	0.88	46.93	2.60
8.	Furniture & Fixtures.....	2.31	0.38	7.90	.005	0.92	62.27	2.54
9.	Paper and Paper Products.....	2.30	0.40	2.41	.050	0.53	5.80	0.98
10.	Printing & Publishing	0.57	0.52	4.51	.005	0.69	20.34	1.79
11.	Leather	2.23	0.66	9.20	.005	0.90	84.62	2.37
12.	Rubber	0.28	0.52	10.72	.005	0.94	114.88	2.23
13.	Chemicals.....	0.95	0.44	7.22	.005	0.86	95.54	1.05
14.	Non-Metalic Minerals	0.45	0.47	8.65	.005	0.88	74.77	2.07
15.	Basic Metals....	0.23	0.47	5.86	.005	0.79	34.41	1.33
16.	Metal Products.	0.55	0.49	13.09	.005	0.94	171.45	1.47
17.	Machinery	0.30	0.45	10.29	.005	0.92	105.98	1.12
18.	Electrical Machinery.....	1.72	0.38	6.49	.005	0.83	42.15	1.92
19.	Transport Equipment.....	0.40	0.46	7.35	.005	0.86	54.06	1.41
20.	Miscellaneous Ind.	4.48	0.71	6.87	.005	0.85	47.24	2.11

Appendix III

$$\text{Log}\left(\frac{V}{I}\right) = a + b \log W + R \log V + Ct + e \quad \text{(Values not deflated)}$$

S.No.	Industry Group	Constant	Log W	t Value	Level of significance	Log V	t Value	Level of significance	Coefficient of t	t Value	Level of sig.	R^2	F	D	rv't	No. of Obs.
1.	All industries	-2.29	1.85	9.69	.005	0.02	0.44	.350	0.02	-1.27	-	0.96	62.21	2.54	.81	11
2.	Food	-2.82	4.06	2.68	.025	-0.76	-1.91	-	0.02	0.126	-	0.59	3.31	2.63	.82	11
3.	Beverages	-2.05	0.78	1.53	.450	0.51	4.68	.350	0.13	-4.30	-	0.92	22.40	2.54	.92	9
4.	Tobacco	-2.42	-0.78	-0.12	-	0.86	2.63	.400	-0.178	-1.840	-	1.94	9.196	3.369	.99	11
5.	Textiles	-1.40	0.64	0.88	.250	0.35	1.48	.100	-0.05	-1.74	-	0.85	12.37	2.24	.95	11
6.	Footwear & Wearing apparel	0.04	0.42	1.32	.150	0.31	2.72	.025	0.01	-0.50	-	0.72	5.89	2.78	.90	11
7.	Wood cork & Allied	-0.67	1.175	2.28	.050	0.073	0.483	.350	0.077	1.645	100	0.92	25.92	2.97	.91	8
8.	Furniture & Fixture	-0.973	0.24	0.90	.250	0.427	2.08	.100	-0.031	-0.68	-	0.94	17.14	3.45	.92	7
9.	Paper & Paper Products	3.43	-0.188	-0.248	-	0.161	0.454	.350	0.070	1.161	200	0.69	2.212	1.473	.93	7
10	Printing & Pub.	-2.05	1.29	6.52	.005	0.205	2.44	0.025	-0.045	-2.41	-	0.96	58.66	2.38	.95	11
1	Leather	-1.57	0.10	0.27	.400	0.70	7.26	.005	-0.07	-2.37	-	0.96	54.54	2.72	.85	11
	Rubber	-0.38	0.62	1.81	.100	0.320	2.45	.025	-0.01	-0.33	-	0.96	45.87	2.2	.92	10
1	Chemicals	-0.80	0.37	1.50	.100	0.45	6.31	.005	-0.07	-5.06	-	0.98	101.70	2.83	.85	11
	Metallic Minerals	-0.53	0.08	0.15	.450	0.53	4.60	.005	-0.042	-2.07	-	0.94	32.68	3.06	.92	11
15.	Basic Metals	-0.53	0.61	0.92	.200	0.30	1.01	.200	0.013	-2.27	-	0.83	10.98	1.41	.95	11
16.	Metal Products	-0.15	0.89	2.78	.025	0.11	0.689	.300	0.05	1.80	1000	.98	101.48	2.19	.98	11
17.	Machinery	-0.10	0.639	2.87	.050	0.34	2.381	.050	0.03	-1.28	-	0.98	177.06	1.74	.97	11
18.	Electrical Mach.	-0.53	0.90	9.03	.005	0.18	4.33	.005	-0.00	-0.26	-	0.98	186.04	2.31	.97	10
19.	Transport Equipment	-0.50	-0.09	-0.188	-	0.60	3.58	.010	0.10	-2.37	-	0.92	28.58	2.17	.85	11
20.	Miscellaneous Industries	-3.42	0.70	5.54	.005	0.63	10.00	.005	0.08	-8.00	-	0.98	23.8	2.24	.90	11

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