## Comments

# Employment Aspects of Industrial Growth: A Correction

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In the Summer 1974 edition of the *Pakistan Development Review*, Mr. Ishrat Hussain wrote an article on an aspect of Pakistan's industrialization that has aroused considerable interest and concern in other developing countries—the impact of technology and wage rate changes on the growth of industrial employment [2, 3 & 6]. While commending Mr. Hussain's efforts in having drawn attention to this aspect of our industrial strategy, it appears necessary to point out that his analysis contains an important error in the basic data. This note therefore is intended to correct the error in the data, rework the entire analysis, and suggest reasons why the conclusions drawn by Mr. Hussain are not warranted by the evidence he presents.

The principal error committed by Mr. Hussain was his failure to *add* the relevant variables for *Karachi* to the West Pakistan data in the Census of 1959-60.[1] For example, Table III of his article shows West Pakistan's fixed capital stock for All Industry as Rs. 918 million.[2] This is, of course, incorrect. West Pakistan's capital stock in 1959-60 was Rs. 952 million+Rs. 490 million (Karachi)=Rs. 1,442 million; and a similar correction factor applies to all other variables derived from the Census of that year. As it turns out, these corrections result in sufficiently large differences in the estimates of the Labour Displacement Effect and the regression equation of changes in labour productivity on changes in wage rates and net output. A re-examination of his empirical results therefore seems warranted.

In re-working the data, the first difference in the results appears in Mr. Hussain's estimate of the Labour Displacement Effect. In all fairness to

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[1]From 1954 to 1959-60, the Census published data on reporting establishments for West Pakistan and Karachi separately.

[2]There is an error here again; it should be Rs. 952 million.

Williamson and Sicat [7], Mr. Hussain would have done well to point out that the technique as applied provides, at best, a very *rough* indication of the extent to which changes in capital intensity due to factor price movements have displaced potential employment opportunities. While in principle the extent of substitution between capital and labour can be estimated from the observed changes in the capital labour ratio, it is difficult, in practice, to disentangle the influence of factor price induced changes, or pure factor substitution, from changes in technology which also affect the ratio. Although analytically distinct, these influences are highly interrelated with changes in technology serving to conceal or exaggerate the substitutability of capital for labour. Of course, changes in factor prices may originate in and fundamentally direct changes in technology itself. There is, therefore, a fairly difficult identification problem here and it is impossible to tell which influence has been predominant from a simple-minded interpretation of the observed changes in the capital labour ratio.

Given these conceptual difficulties, I have not considered it worthwhile to report in full the revised estimate of the total Labour Displacement Effect. Suffice to say however that the estimate, for what it is worth, shows a displacement effect which is much higher than originally estimated—about 59 percent against 44 percent, with the largest displacement in employment having occurred in the Food, Beverages, Rubber and Non-metal group of industries.

In the second part of his paper, Mr. Hussain estimates the impact of wage rate changes on employment growth via wage-induced changes in the capital labour ratio. This is essentially a cross-section analysis based on changes in the variables between two periods, 1959-60 and 1969-70. To eliminate the effects of short-term variations in the data, the base year is the average for 1959-60 and 1962-63, while the terminal year is the average of 1967-68 and 1969-70. All data are in current prices.

In revising the data for 1959-60, three refinements seem warranted. First, the choice of 1962-63 to be included along with 1959-60 for the base year seems a peculiar one given the availability of the Census of 1958. In the analysis that follows, the base year is the average for 1958 and 1959-60. Second, it is incorrect to state that only one product price index exists for all manufacturing activity when sufficiently disaggregated industry-specific price data are available [4 and 5]. While it is true that matching the price and product classification is not ideal, the use of these price indexes as an approximation to relative price changes between industries appears to be valid. Third, the sample has been extended to include 28 industry groups,[8] a refinement I considered desirable given the highly aggregative nature of the industry classification used by Mr. Hussain.

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[8]The industries in the sample are: Sugar; Edible Oils; Beverages; Cotton Textiles; Silk and Rayon; Dyeing and Bleaching; Footwear; Wood, Cork; Furniture; Paper; Printing; Leather; Rubber; General Chemicals; Soaps; Fertilizer; Paints and Varnishes; Pharmaceuticals; Cement; Basic Metals; Cutlery; Utensils; Machinery except Electric; Electric Fans; Cycles; and Cotton Ginning.

In constructing the data from the Census reports, it should be noted that net output (or Census value added) cannot be expressed in real terms directly by simply deflating the series by the product price index but only through the "double deflation" technique, i.e. gross output and intermediate inputs separately calculated in constant rupee terms and the latter subtracted from the former. However, this would have required a large volume of very tedious computations with perhaps little change in the overall results.

Given these adjustments, estimation of the Harris-Todaro model relating changes in labour productivity to changes in wage rates and net output yields

$$\text{Log}\left(\frac{V}{L}\right)_i = -0.4640 + 0.6364 \text{ Log}\left(\frac{W}{L}\right)_i + 0.53117 \text{ Log } V_i$$

$$(0.3698) \quad (0.19075) \quad (0.12119) \qquad \bar{R}^2 = .7161$$

$$(-1.3) \quad (3.3) \quad (4.4) \qquad N = 28$$

where V/L=index of real net output per head (value added at constant factor cost) with the average of 1958 and 1959-60=100.0; W/L=index of total wage and salary compensation per head; V=index of real net output, and i=1,2,3, ...28. The figures in parentheses directly below the regression coefficients are the standard errors, and below them, the respective *t*-values. Both the coefficient of W/L and V are significant at more than the .005 level (critical *t*-value for 28-3 degrees of freedom at the .005 level is 2.787 based on a two-tailed test). A comparison of the results in equation(1) with a similar equation estimated by Mr. Hussain[4] reveals an interesting difference. While the coefficient of W/L is almost similar, the impact of differential changes in net output (V) on productivity growth *is* significant implying that changes in productivity are strongly associated with the realization of potential scale economies and output-induced technical progress.

The principal conclusion that Mr. Hussain derives from a significant wage elasticity coefficient is that "...increasing money wage rates seem to have induced substitution of capital for labour... and biased choice of techniques in favour of relatively capital intensive techniques" (p. 215). Surely this statement is not warranted by the evidence he presents. To interpret a significant wage elasticity coefficient as a rigorous production function parameter (in fact as the elasticity of substitution between labour and all other factors of production), requires clear demonstration of the hypothesis that the observed increase in labour productivity has been primarily caused by capital labour substitution which, in turn, reflects entrepreneurial response to a rising wage rate.[5] On the other hand, if the increase in labour productivity can be shown to be due to factors other than capital deepening, then the importance of a rising ratio of wages to capital costs has been grossly overstated. Indeed the very foundations of the Harris-Todaro specification would appear to be weakened.

For Pakistan, there is little evidence of the extent to which changes in labour productivity can be explained by capital deepening, a limitation which is undoubtedly due to the severe difficulties in attempting to measure accurately changes in the capital stock. In a recent attempt to explore this hypothesis [1], it was estimated that only a little over 40 percent of the increase in labour productivity is explained, in a statistical sense, by changes in the capital labour

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[4]Mr. Hussain's equation (in the present notation) was:

$$\text{Log}\left(\frac{V}{L}\right)_i = -0.550 + \underset{(3.3)}{0.730} \text{ Log}\left(\frac{W}{L}\right)_i + \underset{(1.2)}{0.240} \text{ Log } V_i \qquad \bar{R}^2 = .560, \; N = 18$$

where the coefficient of Log V is insignificantly different from zero.

[5]Strictly speaking what is required is a measure of the *relative* increase in wages, (w/r), where r = cost of capital.

ratio.[6] Even allowing for fairly substantial errors in the measurement of the capital stock, it would appear that the burden of explanation of differential productivity growth between industries must fall on factors other than the substitution of capital for labour, for example, in the unequal incidence of rates of technical progress, scale economies, the differential growth of labour and management skills, etc.[7]

Until further empirical studies on the determinants of productivity growth between industries are undertaken, a policy of wage restraint as advocated by Mr. Hussain and the kind of casual empiricism from which he derives such a conclusion, should be considered with the greatest of reserve.

## References


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5. Pakistan. Central Statistics Office. *25 Years of Pakistan in Statistics,* 1947-1972. Karachi. 1972.
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[6]The equation was:

$$\left(\frac{rV}{L}\right)_i = \underset{(1.996)}{5.286} + \underset{\substack{(0.185)\\(3.7)}}{0.689}\left(\frac{rk}{L}\right)_i \qquad \bar{R}^2 = .420 \quad N = 19$$

where the notation is as before and $\left(\frac{rk}{L}\right)_i$ denotes changes in the capital labour ratio. The equation was estimated from a cross-section of 19 two- and four-digit industries between 1959-60/1967-68. Note that the equation suggests that even if rK/L were zero, productivity would still increase by about 5.3 percent per annum.

[7]Equation(1) reinforces this presumption quite independent of the evidence in [1].