THE ANALYSIS OF LABOUR FORCE STATISTICS

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In the book review section of *Tahqiqat-e Eqtesādi* Nos.17&18[1] M. H. Tammadun, reviewing Hussein Pirnia's book, *Scientific Thought and Social and Economic Development*[2], explains that the author's emphasis upon the methodology of scientific enquiry and its impact on social development, has led to a critical view of Western scholars who, in their theories of economic growth, "have failed to attribute to this factor, which may be labelled the method of thought or 'methodology', the importance it deserves." Whether this is true or not, I do not intend to answer. But there is no doubt that a more widespread adoption of precise scientific methods and the prudence and exactitude which they dictate for conclusions is of immense social and cultural value, especially in Irān.

Unfortunately, the vast gap between words and deeds cannot be filled by make-believe or repetition. In this respect, efforts like those of Hussein Pirnia are necessary, but alas, insufficient. To my mind, in order to facilitate adoption of the correct method of scientific research, two courses must be taken: firstly, model research based on scientific method; and secondly criticism of so-called "research" which in effect is void of any logical basis for scientific discovery. This type of "research" is, in fact, more dangerous than unpretentious discussions which have no claims on methodology, for under the banner of science it establishes traditions which, if left uncriticized, would replace the need criteria and values.

It is for this reason that I offer this critical note, hoping that it will be received in the same scientific spirit.

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The problems I wish to discuss are those raised by the article

1. 1969, Persian Edition, pp.233-240.
2. *Tafakor-e 'elmi va towse'e eqtesādi va ejtemā'i*, (Tehran. *entesharat-e morvārid*, 1347).

"Economic Growth and Labour Participation in Iran"[3] in which neither a correct analysis of theories of economic growth, nor a careful survey of the role of the labour force in Iran compared with other countries has been made. Moreover, despite the author's intention, there seems to be no relationship between the growth theories included at the beginning and the statistical observations made in the body of the article.

The discussion begins with an imperfect definition of a neo-classical production function known as the Cobb-Douglas production function, and throughout this is treated as the essence of the neo-classical theory of growth,whereas it is merely one of the assumptions. The author's main objection to this function is that "different stages of economic expansion cannot be separated from one another" through its manipulation.Apparently what is meant by "different stages of economic expansion" are the five stages of economic growth outlined by Rostow in his book, *Ihe Stages of Economic Growth.* Here two points can be made: Firstly, that a production function is distinct from an economic theory and non of the production functions applied in current economic analysis could differentiate stages of growth as they are distinguished by a historical socio-economic analysis.[4] But even if it were a theory of economic growth, and not merely the function, this criticism would still apply. Secondly, Rostow's stage theory is neither the only theory of stages of growth nor the first: and it is not clear why the shortcomings of the production function have been treated in relation to this particular theory.[5]

The Text

But the main section of the article has nothing to do with either the Cobb-Douglas function or even Rostow's stages of growth. Instead it includes ten tables of figures on labour participation in Irān and other countries, and interpretations of these. Statistics for other countries

3. Ahmed Koroos, Economic Growth and Labour Participation in Irān", *Tahqiqāt-e Eqtesadi* (English Edition),Vol.VII No.17, Winter 1970; pp.30-39.
4. For a discussion of production functions see,A. A. Walters,"Production and Cost Functions" *Econometrica,* April 1963.
5. Especially since its practical outcome is to attain growth through the take-off of light industries - a suggestion rejected by many developing countries, including Iran. For a criticism of Rostow's theory, see: H.J. Habakkuk's review of Rostow's *Stages of Economic Growth, Economic Journal,* 1961.

have been taken from an article in the *International Labour Review* By E. Denti.[6] But before turning to a discussion of these, two further comments on the assumptions are in order.

Firstly, the author asserts that "Some have contended that a $1,000 per capita GNP is a fair line of demarcation between a hypotensive economy and a mature one....", but makes no reference enabling us to identify the economists in question. Secondly, he claims that the ILO's criterion for development and underdevelopment is an agricultural labour force which comprises more, or less than, 45 per cent of the total labour force. But in fact this is not the ILO's suggestion at all. It is a rule of thumb devised by Ypsilanties, whose book was published by the ILO.[7] Furthermore, this criterion has been criticised by Denti (who refers to pp.255 and 526 of Ypsilanties) both in the text of his articles and in the notes.

As a matter of fact it has no links with Rostow's theory of growth but rather with the stages of growth theory connected with the names of A.G.B Fisher, Colin G. Clark, and Simon Kuznets.[8] Very briefly,this point of view states that with the growth of the economy, the share of agriculture in the total labour force and national output declines, and that of industry rises.[9] But we should remember that the statistical data available for the developing countries are insufficient for the purpose of showing this trend. For instance, when 60 per cent of the labour force is engaged in agriculture, the figure for the effective labour force may be much less because of disguised unemployment.[10]

It may be helpful to begin with a hypothetical example in order to show the danger of drawing courageous conclusions from figures - as has

6. E. Denti. "Sex-Age Patterns of Labour Force Participation by Urban and Rural Populations", *International Labour Review*, Vol.98, No.6, December 1968. pp.525-550.
7. J.N. Ypsilanties, *World and Regional Estimates and Projections of Labour Force*, International Labour Office.
8. A.G.B. Fisher, *The Clash of Progress and Security*, (London: Macmillan, 1935). Colin G. Clark, *Conditions of Economic Progress* (London:Macmillan, 1957). Simon Kuznets, *Six Lectures on Economic Growth*,(Glencoe:Free Press, 1959).
9. Some doubts about the position of "services"have risen recently. I hope to contribute to their solution in a forthcoming article.
10. A condition in which the effect of any addition to the labour force on the output is either nil or negative i.e. managerial productivity $\leq$ o·

been done by the author in, for example, Table 1 of his article. The following are labour force statistics for a hypothetical city and its surrounding country side:

Total labour force	120
Employed labour force	100
Agriculture	70
Industry	20
Services	10
Unemployed	20

As the table shows, the shares of the various sectors in the employed labour force are 70 per cent, 20 per cent, and 10 per cent respectively. Now, let us assume that, in the following year, for some reason unknown to us, 20 farmers lose their jobs and join in the unemployed labour force. Our table would be modified accordingly:

Total labour force	120
Employed labour force	80
Agriculture	50
Industry	20
Services	10

And the share of the various sectors in the employed labour force will be:

Agriculture	$\frac{50}{80}$	x 100	=	62.5	per cent
Industry	$\frac{20}{80}$	x 100	=	25	per cent
Services	$\frac{10}{80}$	x 100	=	12.5	per cent

We can see that the share of agriculture has declined and that of industry and services has increased. But this is not brought about by progress (as understood by Fisher-Clark), but merely by unemployment. Unlike Aladdin's magic lamp, statistics can be misleading.

However, the problem of the role of the labour force has little directly to do with Rostow's stages of growth or the Fisher-Clark theory.[11] In his comments on Tables 2 and 3, which show the average urban male age-

11. Not at least, in an orderly scientific discussion.

specific activity rates by level of economic development of various regions, the author tries hard to establish proximity between the figures for Iran and those for Western Europe and the developed countries. No impartial witness could share this observation, and with a little more attention one can see that there is no significant disparity between the figures for the developed and the developing countries which could be generalised. Denti has seen the point clearly and writes that "... a study of all the countries together does not indicate that the degree of economic growth is an important factor in the activity of the urban male..."[12] Why, then, should one claim that "A quick glance at figures in this table indicates that Iran's male activity rates are closer, in general, to the rates of the developed countries than to the developing ones."? Notwithstanding that statistical analysis should be based upon analysis rather than "glances" neither would,in this case, prove the author's point.

Table 3, in which statistics are given according to geographical region, shows, as Denti has observed,a greater divergence between the developed and the developing countries; nevertheless, in proportion to the figures the differences are so small, and for various age-groups are so variable, that they can be considered to be of little significance.Therefore, the claim that "the rates for Iran are closer to rates for the Western European countries" does not seem to be justifiable. Moreover,firstly, Table 3 does not contain figures for Western Europe - they relate to Northern, Southern, and Eastern Europe -and secondly, close examination shows that the figures for Iran are altogether closer to those of Asia than otherwise.

Have these facts been overlooked in order to "prove" that Iran should be regarded as a developed country? If so, is such statistical chauvinism permissible?

It would be cumbersome refer to all the tables individually, but if he were to analyse them, the discriminating reader would find similar points of discrepancy. I shall, therefore, mention only two further points. Firstly, in Table 7, the level of activity of the rural Iranian female is compared with that of 40 developed and developing countries,and since the figures for Iran are generally lower than those for other countries, it is concluded that "we do not rely on our female labour force to

12. E. Denti *op.cit.* p.529.

play an active part in the drive towards economic growth. A closer look at the average figure for the 40 countries would tend to modify this view. As both developed and developing countries are included, the average may not be representative of either category. For instance, the average for the age-group 15-19 for the 40 countries is 31.2. Assume that this is an average of the figures, say, 124 and 50.0 for the developing and developed countries respectively. In this case the level of activity of the rural Irānian female is only lower in relation to the developed, and not the developing countries. Further, we should not forget that housekeeping is also an economic activity - unpaid family labour - in the absence of which the employment of servants, or commercial services (laundries etc.) is necessary. Were it possible to demonstrate the economic importance of this kind of activity, the figures for Irān would be much higher than those shown in the table.

Secondly, on the basis of Table 8, which shows the level of activity of the urban Irānian female to be much lower than in developed countries, it is concluded that, "there is no reason to establish a chain of cause and effect between the two entities." I have no objection to this statement: it may very well be correct. But why is it that in one case where an "observation" of the slightest similarity has been made, a casual relationship has been unhesitatingly established, whereas, in the other, where the figures for Iran are, on the average, 30 per cent lower than those for developed countries, cry is made for scientific prudence and exactitude?

Conclusion

In conclusion the article once more takes up the discussion of the production function - a discussion which has no bearing on the main text and the comments it includes. To be fair, in order to tackle this part of the article, a separate critical note must be written on pure theories of economic growth (whether classical, neo-classical, Harrod-Domar, Kaldor etc.) Suffice it to say that: i) Kaldor's Technical Progress Function, which is implicitly but not explicitly the point, is not a theory of growth, but simply an axiom for his two different growth models; ii)where the Technical Progress Function is non-linear, it may not be integrated,

and cannot therefore be reduced to any kind of production function; iii) the fact that the Technical Progress Function can be integrated is because it is a differential function. That its non-linear form may not be integrated has nothing to do with the integral of partial derivatives of the Cobb-Douglas production function. I said that its non-linear form (which differentiates Kaldor's theory of growth from that of the neo-classicals) may not be reduced to *any production function*. The author has confused this with the problem of integrating partial derivatives of the Cobb-Douglas production function; iv) if we take the linear form of the Technical Progress Function it can be integrated and its integral is the Cobb-Douglas function;[13] v) Kaldor has assumed the linear form of the Technical Progress Function for the sake of simplicity and has therefore opened himself to the criticism that his theory of growth is actually a converted form of the neo-classical theory.

Appendix

1. The proof that Kaldor's Technical Progress Function, where linear, may be integrated and reduced to the Cobb-Douglas function, is as follows:

Technical Progress Function $\frac{1}{y} \cdot \frac{dy}{dt} = f\left(\frac{1}{k} \cdot \frac{dk}{dt}\right)$

$y = \frac{Y}{L} \qquad k = \frac{K}{L}$

Y = product (income) K = capital L = labour force.

Hypotheses: the above function is linear.

Theorem: the above function may be reduced to the Cobb-Douglas Function.

According to the axiom $\frac{1}{y}\frac{dy}{dt} = a + \alpha \frac{1}{k}\frac{dk}{dt}$

Therefore $\frac{d}{dt}(\log y - \alpha \log k) = a$

Therefore $\frac{d}{dt}\left(\log \frac{y}{k^{\alpha}}\right)$

Consequently $y = Ae^{at}k^{\alpha}$

and this is a form of the Cobb-Douglas function.

13. This is proved in the Appendix.