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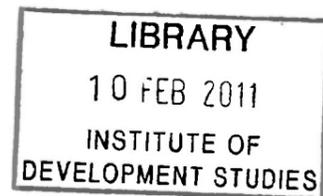
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WAGE RATE DETERMINATION WITH LIMITED  
SUPPLIES OF LABOUR IN DEVELOPING  
COUNTRIES: A COMMENT

by

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WAGE RATE DETERMINATION WITH LIMITED SUPPLIES OF LABOUR  
IN DEVELOPMENT COUNTRIES: A COMMENT

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In a recent article Moez and Bottomley [5] have set out a technique for analyzing wage determination when labour productivity is functionally related to the wage rate. They correctly point out that in a labour surplus economy wages will be established at a positive level which minimizes labour-unit cost. They also point out a case in which wages fall below the level at which labour costs are minimized. This conclusion depends only on their assumption of a backward bending supply curve of labour. The purpose of this note is to make explicit the conditions for labour cost minimization, briefly discuss the empirical evidence on the productivity-wage rate relationship and analyze the implication of the model for wage determination in the normal case of a forward rising supply curve of labour.

I will formalize their model by defining the following relationships :

$$L = \ell(w) \quad (1)$$

$$e = e(w), \quad e' > 0, \quad e'' < 0 \quad (2)$$

$$E = e(w) \cdot \ell(w) \quad (3)$$

$$C = \frac{w \cdot \ell(w)}{E} \quad (4)$$

where  $L$  is number of workers who offer their services at any given wage per man ( $w$ ),  $e$  is a measure of labour efficiency units supplied by each worker, ~~Efficiency units supplied by each worker~~  
~~Efficiency units supplied by each worker~~  $E$  is the total number of efficiency supplied at any given wage, and  $C$  is the average cost per efficiency unit supplied. We can assess the effect of a change in the wage level on the average cost per efficiency unit by calculating

$$\frac{dC}{dw} = \frac{e - we'}{e^2} = \frac{1 - \frac{w}{e}e'}{e} \quad (4)$$

It is obvious that the sign of  $\frac{dC}{dw}$  depends on whether  $\frac{w}{e}e'$ , the elasticity of labour efficiency units per worker with respect to the wage rate, is greater or less than unity.

The ~~question~~ question to be asked at this juncture is: What is the empirical evidence regarding the elasticity of labour efficiency per worker? The answer is that it is most certainly less than unity in the ~~the~~ relevant range of wages prevailing in most developing countries. Berg has admirably summarized the African evidence and concludes, "This analysis throws considerable doubt on the argument that increased incomes will lead to better health and to greater individual efficiency". [1,196]. If nutrition has an important effect on effort, direct provision of meals to workers will be more effective than increasing wages. With regard to the argument that higher wages increase individual efficiency through stabilization of the

work force, Berg also finds the argument less than convincing. Furthermore, recent estimates of the elasticity of average labour productivity with respect to wages have consistently found this elasticity to be positive and significant, but less than unity. [3] [4] [8]. It must be kept in mind that these estimates include not only the effect of wages on individual effort but also the effect of substitution of capital, skills, and organization for labour in response to changes in relative factor prices.

It remains true, however, that some individual firms may find the elasticity of labour effort with respect to differentially high wages to exceed unity because of the reduction of labour turnover, ability to select superior workers, and enhanced morale of workers who see many would-be replacements crowding around the factory gates. However, it seems unlikely that the elasticity will be high with respect to the general level wages in the entire "modern ~~the~~ sector".

Therefore, although it is true that this analysis leads to the conclusion that wages will be established at some positive labour-cost minimizing level in a labour-surplus economy, one is forced to rely much more heavily on institutional factors and government policy as the primary explanation of wage determination in such economies. [7],

[9].

Moes and Bottomley make a great point that if the supply curve of labour is backward bending, the wage may be established at a level lower than that at which labour costs would be minimized. While the analysis is correct, one must be surprised that one would be seriously considering backward bending supply curves in 1968. This unbeliever is hardly converted by their only evidence -- a 1960 article in the Wall Street Journal. Many good studies have been made of labour supply functions in recent years, one of the best of which is Dean [27], and all of the solid evidence points to forward rising supply curves of labour in developing African countries.

Figure 1 depicts the market determination of employment, wages, and efficiency with this model given the usual case of a forward rising supply curve of labour. Three different demand curves for labour services,  $D_0$ ,  $D_1$  and  $D_2$  are drawn.<sup>1</sup> Firms demand quantities of labour services (E) as a function of their cost (C). LL is the supply curve of labour as a function of the wage. Arbitrarily defining  $e = 1$  at A where  $\frac{W}{e} = 1$ , EE is the supply curve of efficiency units of labour as a function of the wage. It should be noted that EE will always be more elastic than LL. CAC is the average cost per efficiency unit of labour which falls to the left of A and rises to the right. It is single-valued with respect to E.

If the demand curve is  $D_1D_1$  and the labour market is competitive,  $E_1$  efficiency unit of labour will be hired at a cost per unit of  $C_1$ .<sup>2</sup> It can also be seen that  $E_1$  efficiency units will be supplied at a wage of  $W_1$  and this corresponds to  $L_1$  workers being hired at this wage. It is readily seen that if demand shifts to the level  $D_2D_2$ , labour units hired will increase to  $E_2$ , cost per unit rises to  $C_2$ , the wage rises to  $W_2$  and the number of workers hired rises to  $L_2$ . These equilibria are stable under normal assumptions of market adjustment. If wages are higher than the equilibrium level, there will be excess supply of efficiency units -- if the wage is lower than the equilibrium level there will be excess demand for efficiency units.

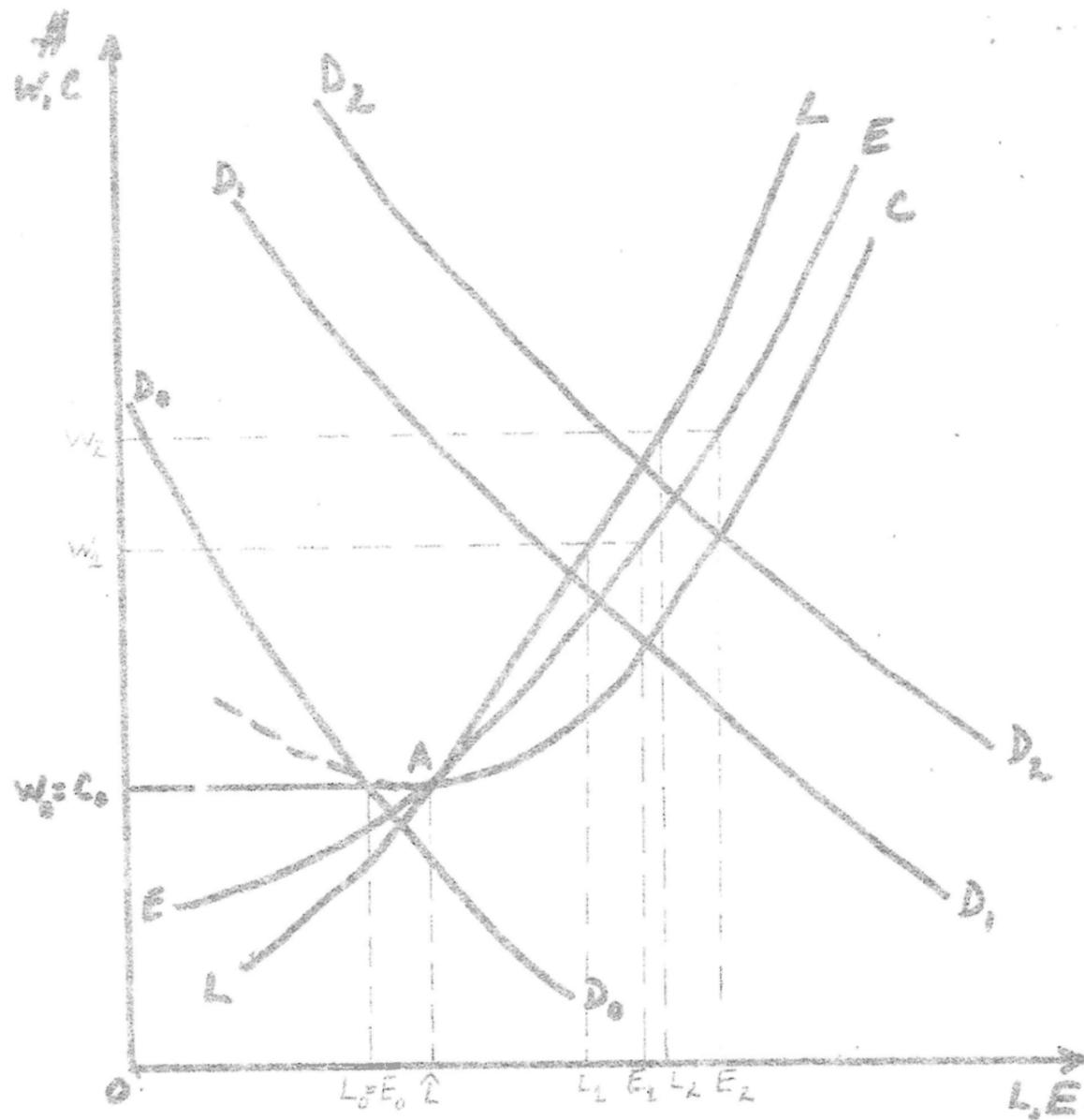


Figure 1.

The standard comparative-static propositions that arise from conventional supply-demand analysis of labour markets hold true for this model in the range of labour scarcity. The novel feature here is that although market adjustment takes place through numbers hired and wages paid per worker, demand is defined in terms of efficiency units of labour and costs per efficiency unit. Given our definition of an efficiency unit of labour and the assumption that the elasticity of effort with respect to wages is less than unity to the right of point A in Figure 1, it follows that wages and costs per efficiency move together in that region and that cost per efficiency unit will be less than wage per man.

If, however, the demand curve intersects OC to the left of A we have an explanation of positive wage levels in a labour-surplus economy. As shown in Figure 1, if the relevant demand curve is  $D_0D_0$ , labour cost will be minimized by paying a wage  $W_0 = C_0$  and  $L_0$  workers will be hired each providing 1 efficiency unit of labour. At this point  $L - L_0$  workers would be openly unemployed. This is a stable equilibrium. If some firms hired unemployed workers at wages lower than  $W_0$  they would discover that costs per unit of labour were increasing and would therefore reduce the numbers employed. It seems reasonable to assume that over a period of trial and error firms would discover that the wage rate  $W_0$  results in lower efficiency-unit costs than any lower wage,

thus the wage would not fall and unemployment would persist. Therefore the portion of CAC left of A (drawn as a broken line) is not applicable and the relevant curve relating efficiency units supplied with their average cost is the solid curve,  $C_2AC$ . This diagram would seem to be both simpler and more directly related to market behavior than the earlier diagram of Leibenstein. [6].

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FOOTNOTES

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1. Demand curves are determined by technological factors and commodity market structure. If commodity markets are competitive, the demand curve will be the value-of-marginal-product curve; if monopolistic it will be the marginal - value-product curve.
2. If the labour market is monopsonistic, equilibrium will be the at the point of intersection between the appropriate demand curve and the curve that is marginal to  $\bar{C}$  AC.