

A Condition for Unemployment

by

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Arbeitspapier Nr. 23

1982

Institut für Volkswirtschaftslehre
Technische Hochschule Darmstadt



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The purpose of this note is to derive a necessary and sufficient condition for unemployment in the model analyzed in Schlicht (1978).

The productivity curve introduced in Schlicht (1978)

$$1) \quad \alpha = \alpha(v, e) \quad \alpha_v > 0, \alpha_{vv} < 0, \alpha_e < 0, \alpha_{ve} > 0$$

describes the average productivity of a given type of worker in a typical firm as a function of the relative wage v and the relative excess demand e for this kind of labor. The relative wage rate v denotes the ratio between the wage w paid by the firm and the average wage level W prevailing in the economy for this kind of labor, i.e. $v := w/W$; relative excess demand e is the ratio between excess demand (positive or negative) E and total supply S , i.e. $e = E/S$.

1) I thank U. Schlieper for helpful criticism of my earlier argument which gave me the motivation for the present considerations.

The motivation of the productivity curve (1) has many aspects. In the earlier paper I concentrated on the argument that above-the-average wages as well as high unemployment reduce turnover and, hence, increase productivity. But it has been pointed out that "other considerations might lead to a similar relationship, e.g. direct productivity effects of wage incentives or the possibility to get workers with better background characteristics for a higher wage". (Schlicht 1978 p. 340). These aspects have been explored by other writers in detail in particular models (Salop 1979, Solow 1979, Weiss 1980, Stoft 1982, Shapiro/Stiglitz 1982), and there are still other arguments which could be used (e.g. Schlicht 1980, 1981). The main advantage of the above formulation (1) seems to me to be that it does not rely on one particular derivation but takes into account all these various influences of relative wages and excess supply on productivity simultaneously. Hence it is perhaps better suited for empirical investigations.

Given (1), the firm will minimize for a given average wage rate W and a given rate of excess demand e output per dollar, i.e. α/vW with respect to the relative wage level v . This implies the equilibrium condition

$$2 \quad \alpha_v(v, e)v = \alpha(v, e)$$

Furthermore, the typical firm will pay just average wages in equilibrium and we have

$$3 \quad v = 1$$

Hence (2) and (3) boil down to

$$(4) \quad \alpha_v(1, e) = \alpha(1, e)$$

In Schlicht (1978) it has been argued that the underlying adjustment process is stable. Hence (4) can be taken as determining the state of relative excess demand e . The earlier analysis has been somewhat unclear, however, concerning the conditions which will lead to unemployment $e < 0$. Furthermore, the analysis is not very appropriate if an excess demand solution $e > 0$ turns out to prevail since rationing has not been introduced explicitly.

The aim of the present note is to give a simple condition for unemployment, i.e. for the solution e of (4) being strictly negative. In order to do that, the elasticity of productivity with respect to wage changes is introduced. It is defined as

$$(5) \quad \eta(v, e) = \frac{\partial \alpha}{\partial v} \cdot \frac{v}{\alpha}$$

From (1) it follows that

$$(6) \quad \eta_e > 0$$

Since (4) can be re-written as

$$(7) \quad \eta(1, e) = 1$$

We can conclude that a necessary and sufficient condition for unemployment is

$$(8) \quad \eta(1, 0) > 1$$

i.e. that the elasticity of productivity with regard to wage changes in the typical firm exceeds unity in "Walrasian" equilibrium.

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