
Summary. A microeconomic model of the dynamic optimal adjustment of a competitive labor-managed firm to a change in output price is developed using optimal control theory. The employment behavior of such a firm is compared to that of a profit-maximizing firm. The model predicts that an increase in price implies a decrease in employment at first in the labor-managed firm to be followed by an increase in employment up to the long-run equilibrium level. This differs from the behavior of the profit-maximizing firm which expands continuously in such a situation.

1. Introduction

A peculiarity of the competitive labor-managed firm in its pure static Illyrian form is its low short-run elasticity of supply in comparison with the competitive profit-maximizing firm. In the pure static case of the one-product firm in which labor is the only variable factor, the short-run supply curve of a competitive labor-managed firm even bends backwards, as many authors from Ward (1958) onwards have shown.

However, in the longer term when capital is also variable, the long-run tendency towards capital expansion and corresponding labor expansion may eventually counteract the short-run contraction in labor that is caused by a price increase. In the present chapter this process of adjustment to a price increase will be discussed first in static terms in Section 2 and then in dynamic terms in Section 3.

More specifically the aim of this paper is to develop a marginalist-type model of the dynamic adjustment of a competitive labor-managed firm to a change in output price. The purpose is to gain some insight into the dynamic employment behavior of such a firm and how its behavior in this respect differs from that of a profit-maximizing firm.
2. Static Case

The goal of a competitive pure labor-managed firm (Ward, 1958, Vanek, 1970) is to maximize income per unit of labor, i.e.

\[
\Pi_{LM} = \frac{pq - rK}{L}
\]  

(1)

where

- \( \Pi_{LM} \) = income per unit of labor
- \( p \) = price of output (or value added per unit of output)
- \( q \) = output quantity
- \( r \) = user cost of capital
- \( K \) = capital input
- \( L \) = labor input

Following Vanek (1970, p. 1) the term "labor" is used here to include everyone working in the economic unit studied.

Let us first analyze the short-run case and thereafter the long-run case.

2.1 Short Run

In the short run, i.e. with fixed capital, labor is expanded until the marginal value product of labor is no longer greater than the average labor income, i.e.

\[
pq_L = \Pi_{LM}
\]  

(2)

where alphabetical subscripts denote partial differentiation.

Relation (2) is represented graphically in Figure 1 for two price levels \( P_1 \) and \( P_2 \) where \( P_2 > P_1 \).

For a given \( L \) (and \( K \)), it is quite clear from (1) and (2) that a price increase from \( P_1 \) to \( P_2 \) will shift \( pq_L \) less than \( \Pi_{LM} \) and thus the intersection \( L^+ \) of the \( pq_L \)-curve and \( \Pi_{LM} \)-curve in Figure 1 will move to the left, i.e. optimum employment will decrease, \( L_2^+ < L_1^+ \). As output in the short run is directly determined by employment in the model, the supply curve will thus surprisingly have negative price elasticity (Ward, 1958, Vanek, 1970).

Assuming diminishing returns to labor in the production function, i.e. \( q_{LL} < 0 \), the second-order conditions for a maximum are satisfied because the \( pq_L \)-curve in Figure 1 then cuts the \( \Pi_{LM} \)-curve from above, and the \( \Pi_{LM} \)-curve will have the general increasing-decreasing shape shown in Figure 1.