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CRITICAL NOTES ON THE THEORY
OF THE LABOUR-MANAGED FIRM
AND SOME MACROECONOMIC
IMPLICATIONS

BRANKO HORVAT

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računa o značaju i dometu kvantitativnih metoda. Dalji razvoj ekonomske teorije i metodologije omogućice bez sumnje potpunije i znatno egzaktnije sagledavanje efekata različitih međuzavisnosti u sferi proizvodnje.

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Effects on Output and Employment

Type of change	Neoclassical firm	Illyrian firm	U-maxim. firm	Yugoslav firm
Increase in wage rate	—	0	0	0
Increase in lump sum tax k	0	+	0,+	0
Increase in product price	+	—	0,—	+

The table tells us that the wage rate has no place in the Illyrian firm (which seems desirable on ideological grounds, since labour management eliminates wage slavery). Next, the lump sum tax has a positive effect, while the supply function is negatively inclined. The latter spells instability. Also, it is clear that under conditions of diminishing marginal productivity, the Illyrian firm will employ less labour than its capitalist competitor. And that implies a built in tendency towards underemployment and unemployment. More realistic production functions (Domar [1], Horvat [2]), with several variable factors, considerably reduce the undesirable effects. In the long run and with free entry the two firms behave again identically [6]. Yet in the short run the Illyrian economy seems to be more unstable and to provide less employment than the comparable (neoclassical) capitalist economy.

CRITICAL NOTES ON THE THEORY OF THE LABOUR-MANAGED FIRM AND SOME MACROECONOMIC IMPLICATIONS*

The Illyrian Firm

It is generally accepted that a capitalist firm tries to maximize profit. What about a labour-managed firm? The first to answer the question was Benjamin Ward [7]. He thought that rational behaviour would require that the firm maximize income per worker. He was not sure that workers really behave in this way and called his construct the Illyrian firm. E. Domar [1] and, in particular, J. Vanek [6] accepted the same answer and developed theoretical implications. In the process the Illyrian firm was transformed into a typical labour-managed firm.

In the one-product, one variable factor (labour) case, the production function is given by

$$(1) \quad q = f(x)$$

If k is a fixed cost item that has to be covered, income per worker is given by

$$(2) \quad y = \frac{pq - k}{x}$$

Maximizing y leads to the following first order equilibrium condition

$$(3) \quad pq' = y$$

If income per worker is equal to the wage rate, (3) is identical with the usual neoclassical equilibrium condition. If y includes profit as well — which is what the model assumes — the two conditions differ. The Illyrian firm behaves in a very different way as compared with its capitalist twin. The table summarizes the findings:

*) Slightly revised version of the paper presented to the conference on Teoria dell' impresa jugoslava autogestita e implicazioni macroeconomiche held in Istituto di studi e documentazione sull' Est Europeo (ISDEE), Trieste, November 1972. ISDEE will publish the paper in Italian in a book together with the proceedings of the conference.

The Utility maximizing Illyrian Firm

S. Parrinello [5] accepts the same basic behavioural assumptions, but tries to make the approach more general by introducing two risks: dismissal and employment risks. The workers dislike dismissing their fellow workers, and even more being dismissed themselves, and are not eager to employ new workers, because they may change the preference map of the collective in an undesirable way. Parrinello constructs two simple utility functions, by modifying the income per worker, as a target, by the effects of the two risks quoted,

$$(4) \quad \begin{aligned} U &= ye^{mr}, & -1 \leq r \leq 0, \\ U &= ye^{-nr}, & r \geq 0, \end{aligned} \quad r = \frac{x-x_0}{x_0}$$

where r is the relative change in employment, m is the coefficient of dismissal risk and n the coefficient of employment risk, $m, n > 0$.

If utility is maximized, the equilibrium conditions are now

$$(5) \quad \begin{aligned} pq' &= y - \frac{m}{x_0} (pq - k), & 0 \leq x < x_0 \\ pq' &= y + \frac{n}{x_0} (pq - k), & x > x_0 \end{aligned}$$

In the case where the two risks are absent, $m = n = 0$, (5) is, of course, identical with (3). When the risks are present, fewer workers will be dis-

missed than otherwise ($pq' < y$) and in the alternative case of new employment, fewer workers will be employed than otherwise ($pq' > y$). This result is, of course, not surprising, since the model assumes that the workers are reluctant to change employment in either direction.

The introduction of the two risks has rendered the behaviour of the firm indeterminate, though biased in the Illyrian direction, as shown in the third column of the table.

The Evaluation of the Illyrian Theory

Any meaningful theory has to pass two fundamental tests: the verifiability of assumptions test and the predictability test. A theory may pass both tests and may still not be a correct one. However, if it fails to pass one or both of them, it is surely not the correct one. The latter test is much simpler and more conclusive and so let me consider it first.

The Illyrian theory predicts that an increase in price will reduce output, or at least leave it unchanged. *Nothing of the kind has been observed in the Yugoslav economy.* Increases in prices, as *signals of unsatisfied demand*, have been followed rather quickly by efforts to increase supply. It suffices to read newspapers to realize that.

The theory also predicts that a reduction of k will reduce supply. It is not possible to verify or reject this prediction without a special empirical enquiry. Yet when in the 1960's the six percent capital tax was abolished, I did not observe — and no one to my knowledge reported anything close to that — a depressing effect on output.

Finally, the theory predicts that the labour managed economy will be labour saving. The Yugoslav experience shows, on the contrary, chronic overemployment in the firms. The government is constantly lamenting about the «extensiveness» of production.

It is still possible to save the Illyrian theory by introducing special factors accounting for observed effects, while retaining the basic assumption about the per worker maximization. However, it is much simpler to replace the theory by another one, which corresponds to facts more directly. Besides, there is a universally accepted rule in scientific research which states that of two theories with equal predictive capacities, the simpler one is preferable.

As far as the basic behavioural assumption is concerned, my own experience has led me to postulate the following target function [2]

$$(6) \quad \pi = pq - [(d + \Delta d)x + k]$$

At the beginning of a new business year the workers' council sets the aspiration level of personal income to be achieved. The aspiration income consists of the last year's or some standard personal income (d) and a change, normally an addition, to be achieved in the current year (Δd). The aspiration income is a function of (a) expected sales, (b) incomes in other firms, (c) incomes in the last and earlier years, (d) labour productivity, (e) costs of living, (f) taxation policy and perhaps of some other factors.

Once the aspiration income has been decided upon, it becomes an obligatory target for the management. This means that for all practical purposes ($d + \Delta d$) performs the allocational role of the wage rate, without, however, being a wage rate. What the worker will actually get as his share in the firm's income may be different from the aspiration income, $d^* \cong (d + \Delta d)$, and depends on the business results of the firm. In fact, the actual Δd may turn out to be negative if the firm suffers losses. Thus instead of reducing employment the firm will simply reduce d , which is also observed behaviour.

Mathematically, (6) is identical to the standard neoclassical target function, and so the equilibrium conditions will be the same. Thus, at least qualitatively, the theory predicts the observed behaviour.

Maximizing Income Versus Maximizing Profit

Groups of Yugoslav economists have been engaged in long and bitter debates about whether a socialist firm maximizes income or profit. What can be said about that?

Suppose we deal with an Illyrian firm whose income per worker

$$y = \frac{pq - k}{x}$$

is represented as a sum of two components, the standard wage, w^s , and the profit per worker, $\frac{\pi}{x}$,

$$(7) \quad y = w^s + \frac{\pi}{x}$$

Since w^s is fixed, maximizing y implies maximizing $\frac{\pi}{x}$. In other words, maximizing income per worker and maximizing profit per worker come to the same thing. The behavioural and allocational consequences are the same.

Suppose we deal with the Yugoslav firm, and the production function depends on two variable factors, labour (x) and raw materials (z). The price of product (p) and of raw materials (c) is given. Suppose the target is to maximize the surplus which we may call conditionally the profit*

$$(8) \quad \begin{aligned} \pi &= pq(x, z) - [(d + \Delta d)x + cz + k] \\ \frac{\partial \pi}{\partial x} &= pq_x - (d + \Delta d) = 0, \quad pq_x = d + \Delta d \end{aligned}$$

$$\frac{\partial \pi}{\partial z} = pq_z - c = 0, \quad pq_z = c$$

The result is familiar: in equilibrium the value of the marginal product is equal to the price of the factor.

* Conditionally, because part of it will be used to adjust wages upwards or downwards.

If the aim is to maximize total net income

$$D = pq(x, z) - (cz + k)$$

$$(9) \quad \frac{\partial D}{\partial x} = pq_x = 0$$

$$\frac{\partial D}{\partial z} = pq_z - c = 0, \quad pq_z = c$$

the condition for the nonlabour factor is the same. But the labour equation is different and states that employment ought to be increased until the marginal productivity of the last worker falls to zero. Since overemployment is an empirical fact, it may be thought that $pq = 0$ describes the reality well. Yet I prefer to consider (8) as a more accurate description of normal behaviour and would explain overemployment (which implies $pq_x < d + \Delta d$) as a deviation due to strong pressures generated by the large latent unemployment.

Some Macroeconomic Implications

An extensive empirical enquiry into business cycles in Yugoslavia revealed that the labour-managed firm behaves differently from capitalist firms in a number of important aspects [3].

1. Since capital is socially owned, risk and uncertainty are greatly reduced. As a consequence, the work collective, performing the role of an entrepreneur, shows a much higher propensity to invest and to increase employment — aiming at a fast expansion of output — than is the case in the capitalist environment. Hence, a high rate of investment, often not matched by adequate financing, and overemployment are to be expected.

2. Since the firm is collectively managed, there is a great reluctance to dismiss fellow workers. In general the firm prefers to reduce wages rather than dismiss workers. But before wages are reduced, the firm will exhaust all its internal reserves and credit possibilities. If the workers are not dismissed, they must produce. And if there is no market, they will produce for inventories. On both counts in a recession aggregate demand will be higher than in a comparable capitalist environment. In the acceleration phase of the cycle firms will decumulate inventories, which is again opposite to the behaviour of capitalist firms. Consequently, a labour managed economy is inherently more stable.

3. Because of 1. and 2. the firm will tend to produce even when it cannot sell immediately and or continue to sell its products even when the buyers cannot pay immediately. Thus one should expect large involuntary inventories and trade credits, particularly in the recession phase. This may generate cycles of severe illiquidity which would render monetary policy completely ineffective.

4. In the acceleration phase unit costs will tend to decrease and in the recession phase they will tend to increase. Thus we should expect stable prices when the rate of growth is high (except in booms, when demand pull inflation becomes operative) and rising prices when the market is slack.

5. Without regulatory activities of policy making authorities wage rates for the same type of work will tend to differ more than in a capitalist economy. Intrasectoral differences are beneficial, because they imply adjustment to local conditions, making it possible for the firm to survive. However, intersectoral differences are highly undesirable because they reflect the violation of the basic distributional principle: distribution according to work. Since this principle is deeply ingrained in a labour managed economy, any violation generates counteracting forces. Since productivity increases at very different rates in different sectors, the slow sectors will not be able to absorb wage increases and will have to increase prices. Thus in an unregulated or inefficiently regulated labour managed economy there will be strong inflationary pressures of the cost push type. On the other hand, because of the absence of the fundamental employer-employee conflict, it is much easier to control a cost push inflation in a labour managed environment than in a capitalist environment.

6. For obvious reasons self-management creates an aversion against large units. The openness of self-management makes collusive trade practices difficult or impossible. Thus in a labour managed economy one should expect strong pressures towards decentralization and against cartelization and monopolization.

*Institute of Economic Studies,
Beograd*

Branko HORVAT

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**O PROBLEMU ODREĐIVANJA KOEFICIJENATA LINEARNIH
PROGRAMA OPTIMIZACIJE VIŠEFAZNE PROIZVODNJE PREMA
KRITERIJUMU DOHOTKA**

1. OPIS ZADATKA

Opšti zadatak optimizacije proizvodnje po kriterijumu dohotka matematički se izražava odgovarajućim sistemom linearnih nejednačina i to¹⁾

— za funkciju kriterijuma

$$c_1 x_1 + c_2 x_2 + \dots + c_n x_n = z \rightarrow \max.$$

— us uslove

$$a) \quad q_{11} x_1 + q_{12} x_2 + \dots + q_{1n} x_n \leq b_1$$

$$q_{21} x_1 + q_{22} x_2 + \dots + q_{2n} x_n \leq b_2$$

$$q_{m1} x_1 + q_{m2} x_2 + \dots + q_{mn} x_n \leq b_m$$

$$b) \quad x_1 x_2 \dots x_n \geq 0$$

gde je

c_j = iznos (odgovarajuće kategorije) dohotka po jedinici j -tog proizvoda;

x_j = količina proizvodnje j -tog proizvoda ($j = 1, 2 \dots n$);

q_{hj} = angažovanje h -tog kapaciteta po jedinici j -tog proizvoda;

b_h = h -ti kapacitet ($h = 1, 2 \dots m$).

Međutim, za svako praktično postavljanje programa optimizacije proizvodnje po kriterijumu dohotka neophodno je konkretno izračunavanje svakog od elemenata datih u ovom opštem zadatku. Pored toga mora se imati u vidu da od kvaliteta proračuna svakog od ovih elemenata zavisi i krajnji rezultat i da je to suštinski deo rada u optimizaciji svakog programa proizvodnje. Kada se jednom izvrši postavljanje programa optimizacije dohotka u nekom preduzeću, do samog izbora asortimana proizvodnje po količini i vrsti proizvoda mislimo da je moguće dosta jednostavno doći primenom odgovarajućeg metoda za rešavanje ovakvih zadataka. Iz tih razloga u ovom delu rada posebno ćemo obraditi metode konkretnih proračuna koeficijenata ovog opšteg zadatka optimizacije proizvodnje i to za preduzeća višefazne proizvodnje.

¹⁾ O postavljanju opšteg zadatka optimizacije videti:

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Napomena: Spisak svih dosad objavljenih separata vidi u katalogu
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