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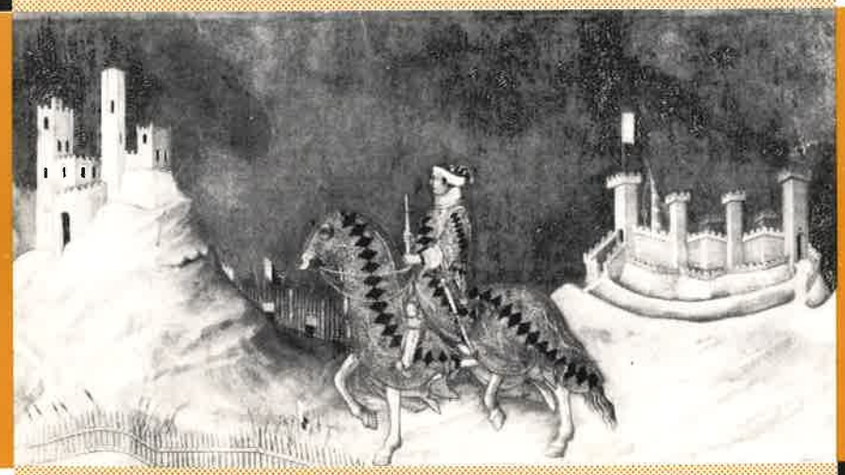
Domenico Mario Nuti

MERGER CONDITIONS AND THE MEASUREMENT OF DISEQUILIBRIUM IN LABOUR-MANAGED ECONOMIES



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MERGER CONDITIONS AND THE MEASUREMENT OF DISEQUILIBRIUM IN LABOUR-MANAGED ECONOMIES

Siena, aprile 1986

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Summary *

This paper attempts an indirect assessment of the maximum order of magnitude of possible inefficiency due to short run disequilibrium in labour deployment which conventional theory leads us to expect of labour-managed income-sharing firms and economies. Such inefficiency, defined as the proportion of labour revenue differentials across firms which could be bridged by labour redeployment between them, is assessed *indirectly* with reference to whether or not inefficiency can and actually does overstep the limits beyond which labour redeployment would take place automatically following mergers between enterprises. It is shown that as long as i) the level of average earnings is not inversely related to the size of firms' employment and ii) no mergers are observed involving labour surplus firms and caused by the existence of that surplus, the maximum order of magnitude of labour disequilibrium inefficiency (if any) will not exceed one half of income differentials across firms.

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A competitive market economy, or a sector of it, characterised by a substantial presence of labour-managed revenue-sharing firms, is subject to the possible occurrance in the short-run of economic disequilibrium of two kinds.

The first is the possibility of fixed capital (including human capital) in the whole economy (or sector) or in some firms being different from the long-term equilibrium level, or from the equilibrium which would have prevailed in the short term if expectations had been formulated correctly. This type of disequilibrium is common to any market economy, whether populated by labour-managed revenue-sharing firms or by traditional capital-managed wage-firms; of course outside of long run equilibrium there are bound to be differences between a wage and a labour-managed economy, even if they were otherwise identical as far as possible, but there is no theoretical or empirical suggestion that this kind of disequilibrium should be more intense, or more persistent, in either system.

The second kind of disequilibrium derives from the possibility of marginal labour productivity differing in different firms, even under perfectly competitive conditions, due to labour-managed revenue-sharing firms attempting to maximise net revenue per worker by equalising the marginal product of labour to that net revenue, which in the short run is bound to differ in different firms. This second kind of disequilibrium is definitely system-specific because competitive wage firms would instead tend to equalise the marginal product of the labour they employ to a uniform wage level. Standard analysis of labour managed firms and economies (as in the classic treatise by Vanek, 1970) leads us to expect disequilibrium in labour deployment to follow *any* kind of unexpected change, because of firms reacting to output and input price changes perversely, or at any rate more sluggishly than their capitalist counterparts. For instance, a rise in output price, raising average more than marginal product of labour because of unchanged overheads, will encourage employment reduction instead of expansion unless this effect is more than compensated for by changes in output mix induced by the price change. The issue is complicated by limitations (whether statutory, contractual or customary, but ever present) to the labour-managed enterprise's ability to shed workers in the short run which will make marginal and average revenue

differ within the same enterprise.

Granting the theoretical possibility of system-specific disequilibrium under labour-management the problem remains of assessing its quantitative signifiance in general and with reference to specific cases. What are the earnings losses due to inefficient labour deployment in a labour-managed economy or sector? Or, put in another way, *what is the proportion of labour income differentials across firms due to restrictive employment policies?*

Michal Kalecki used to say that economics consists half of theoretical propositions without empirical verification and half of empirical regularities without theoretical explanation; labour-management economics is worse because the bulk of the subject consists of theoretical propositions about the alleged short-run inefficiency of the system which are neither verified nor quantified empirically. In the vast literature accumulated on labour-managed economies (see Bartlett-Uvalic, 1985) only a very small section is devoted to the quantitative significance of disequilibrium in labour deployment; the few empirical studies available follow the production function approach and suffer from its general limitations and the problems raised by disequilibrium, not only in the allocation of labour but also in firms' access to capital (especially in the case of Yugoslavia where the cost to firms of their capital endowment is low and capital is effectively rationed, giving rise to a third kind of disequilibrium).

This paper attempts an *indirect* assessment of the maximum order of magnitude of the possible inefficiency due to short run disequilibrium in labour deployment which conventional theory leads us to expect of labour-managed firms and economies. Such inefficiency, defined as the proportion of labour revenue differentials across firms which could be bridged by labour redeployment between them, is assessed *indirectly* with reference to whether or not inefficiency can and actually does overstep the limits beyond which labour redeployment would take place automatically following mergers between enterprises. It is shown (using and developing the results of Nuti, 1985) that, *as long as i) the level of average earnings is not inversely related to the size of firms' employment and ii) no mergers are observed involving labour surplus firms and caused by the existence of that surplus, the maximum order of magnitude*

of labour-disequilibrium inefficiency (if any) will not exceed one half of income differentials between firms.

Let us consider a population of n labour-managed firms, labelled $i = 1, 2, \ldots, n$. Prices are taken as given and constant and value variables are in money terms. We use the following notation and relationships:

L_i = membership = employment

q_i = value of output, given at the fixed prices by the production function

$$(1) \qquad q_i = F_i(L_i), \qquad F'_i > 0 \quad F''_i < 0$$

A_i = fixed overhead costs

y_i = average net income per head

$$(2) \qquad y_i = \left[F_i(L_i) - A_i \right] / L_i = y_i(L_i)$$

Firms wishing to maximise net income per head of their members will aim at a desired (equilibrium) membership L^*_i, given by the first order condition

$$(3) \qquad y_i(L^*_i) = F'_i(L^*_i).$$

Disequilibrium in labour deployment in the labour managed market economy (or sector) involves

$$(4) \qquad F'_j \neq F'_k$$

for a number of pairs (j, k) of firms. Moreover, for each firm in the economy condition (3) may or may not be satisfied, i.e. firms may have fewer or (more probably, since it is easier to recruit than dismiss) more workers than their desired membership.

Let us now consider two firms, 1 and 2, for which condition (4) holds, and analyse

the consequences of a hypothetical merger between them. We label $\tilde{L}$, $\tilde{y}$ and $\tilde{F}'$ pre-merger actual membership, net income per head and marginal product of labour, and $\hat{L}$, $\hat{y}$ and $\hat{F}'$ the corresponding post-merger magnitudes. Without loss of generality we label 1 the enterprise with the lower marginal labour product, or

$$(4') \qquad \tilde{F}'_1 < \tilde{F}'_2$$

Thus redeployment following a hypothetical merger would take place from 1 to 2, up to the point characterised by employment $\hat{L}_1$ and $\hat{L}_2$ for which

$$(5) \qquad \hat{F}'_1 = \hat{F}'_2$$

though of course now the two firms are regarded as subdivisions of the resulting unit. We define λ as the number of redeployed workers, or

$$(6) \qquad \lambda = \tilde{L}_1 - \hat{L}_1 = \hat{L}_2 - \tilde{L}_2$$

Total gains from the hypothetical merger and labour redeployment are called G and given by

$$(7) \qquad -G = \int_{L_2}^{L_2+\lambda} F'_2 dL_2 - \int_{L_1-\lambda}^{L_1} F'_1 dL_1$$

Because of internal redeployment of labour, condition (5) replaces condition (4') and we know that

$$(8) \qquad G > 0.$$

We can express G as

$$(9) \qquad G = \hat{L}_1(\hat{y}_1 - \tilde{y}_1) + \tilde{L}_2(\hat{y}_2 - \tilde{y}_2) + \lambda\,(\hat{y}_2 - \tilde{y}_1),$$

total gains being equal by definition to the change in total revenue of the workers remaining in firm 1, plus the change in total revenue of original workers in firm 2, plus the increase in the income of transferred workers. We can rewrite this as

$$(9') \qquad G = \hat{L}_1(\hat{y}_1 - \tilde{y}_1) + \hat{L}_2(\hat{y}_2 - \tilde{y}_2) + (\tilde{y}_2 - \tilde{y}_1)$$

Could these obvious gains be sufficient to induce the two firms to actually merge? For a merger to take place total gains G would have to be sufficiently high to allow all workers - who according to labour management principles should be treated equally after the merger - to be paid an income per head at least equal to the highest of pre-merger incomes per head; otherwise workers of the richer firm will refuse to merge (This requirement is neglected by Ireland and Law, 1982 in their treatment of mergers in the labour-managed economy; see Nuti, 1985). Define R as the amount necessary to bring the members of the lower paid firm to the income level of the other; unless condition (3) is satisfied for *both* firms the ranking of marginal products of labour in different firms will not necessarily correspond to the ranking of their income per head; thus

$$(10) \qquad R = \max\left[\tilde{L}_1(\tilde{y}_2 - \tilde{y}_1), \tilde{L}_2(\tilde{y}_1 - \tilde{y}_2)\right].$$

For a merger to have the support of the membership of both firms the condition

$$(11) \qquad G \geqslant R$$

must be satisfied; in which case, after merger, income per head $\hat{y}$ is

$$(12) \qquad \hat{y} = (\tilde{y}_1\tilde{L}_1 + \tilde{y}_2\tilde{L}_2 + G)/(\tilde{L}_1 + \tilde{L}_2) \geqslant \tilde{y}_1, \tilde{y}_2$$

For an analysis of merger conditions we must distinguish between two cases:

i) *Both firms have reached equilibrium membership.* In this case condition (11) cannot be satisfied and no merger would occur. In fact, in this case, equation (3) is satisfied and together with equation (4') would identify firm 2 as the richer co-operative, therefore

(10') $\quad R = L_1(\tilde{y}_2 - \tilde{y}_1).$

Labour redeployment would make both firms (now subdivisions of the merged unit) experience a decrease in average income per head produced by the members attached to them, i.e. in equation (9') the first two terms of the right hand side are negative and therefore

(13) $\quad 0 < G < \lambda(\tilde{y}_2 - \tilde{y}_1) \leqslant \tilde{L}_1(\tilde{y}_2 - \tilde{y}_1) = R$

since λ by definition cannot exceed the whole of enterprise 1 membership.

This obstacle to redeployment can be - and sometime is in the Yugoslav experience - circumvented by firms subcontracting part of their production processes, or by firms splitting into BOALs (or Basic Organisations of Associated Labour, as they are called in Yugoslavia; see Sacks, 1980 and 1983) loosely connected between themselves and with BOALs belonging to other firms, without the requirement that all BOALs should have uniform revenue per head and with the possibility of cross payments and cross subsidisation within the same firm through a central fund connecting the firm's BOALs. These arrangements are limited to suitable groups of products and do not eliminate entirely the inefficiency of labour deployment deriving from equation (4), but inequality (13) can perhaps explain their popularity.

The fact that $0 < G < R$ at the same time confirms the existence of a disequilibrium inefficiency because $G > 0$ and sets a maximum limit R to its size. Suppose the two firms considered have the same size, measured by employment,

therefore equal to half of joint employment L,

(14) $\quad L = \tilde{L}_1 + \tilde{L}_2.$

It then follows from (13) and (10') that

(15) $\quad (G/L)/(\tilde{y}_2 - \tilde{y}_1) < 1/2$

i.e. the part G/L of income differential $(\tilde{y}_2 - \tilde{y}_1)$ that can be attributed to disequilibrium inefficiency in labour deployment is less than 1/2 for any pair of firms that have achieved their desired membership. If the size of the poorer firm, $\tilde{L}_1$, is smaller than that of the richer firm, $\tilde{L}_2$, inequality (15) will hold *a fortiori*, because its right hand side could be repalced by $\tilde{L}_1/L < 1/2$. Thus, as long as the size of earnings is not inversely related to the size of firms, (15) holds. This is likely to be the case, for tough "small" may be "beautiful" it is hardly ever relatively more profitable than "big" (indeed if small were profitable there would be no need for its beauty to be proclaimed).

ii) *At least one firm has not reached equilibrium membership.* There is now no reason why the ranking of marginal products of labour should be necessarily the same as the ranking of average earnings; thus either firm 1 or 2 can be richer and equation (10) cannot be replaced by (10'). Unlike the previous case, at least one of the two firms *can* experience an increase in the average product of its post-merger membership, if firm 1 is a labour surplus firm that manages to shed workers through after-merger redeployment, or firm 2 is a labour-deficit firm that obtains new workers through such redeployment. It is therefore possible now for G to equal and exceed R, satisfying condition (11) and making possible labour redeployment through merger. It should be noted that labour-deficit firms can always obtain new workers drawing them from the pool of unemployed or from lower paid workers in poorer firms so that they will notionally consider, as relevant for the purpose of defining R, not

their $\tilde{y}$ but their y^*. For this kind of merger to be attractive one of the two firms is bound to be a labour-surplus firm. Paradoxically labour redeployment in these conditions can allow firms to respond perversely to price changes and therefore reduce, instead of improving, systemic efficiency; though they can also improve efficiency if the wish to shed workers is due to a non-perverse reaction to price change, as may occur as a result of substitution effects in input or output mix. Either way, if no merger of this kind is observed it must be inferred that (11) is not satisfied; in the case of equal size firms and, as we have seen in the previous case, *a fortiori* if firms' earnings are not inversely related to size,

$$(16) \qquad G < 1/2\, L \mid \tilde{y}_2 - \tilde{y}_1 \mid$$

and inequality (15) holds in the more general form

$$(15') \qquad (G/L)/(\mid \tilde{y}_2 - \tilde{y}_1 \mid) < 1/2.$$

If mergers motivated exclusively by the internalisation of the dubious economy of shedding workers *did* tale place we could still argue that - at the very worst - these mergers bring labour surplus firms to or near to their desired membership, i.e. to a position no worse than that involved in the previous case. If we observed such mergers the doubt would remain, however, that the economy might reach and - as such mergers recur - maintain peaks of inefficiency greater than those defined by (15'). Because there has never been any suggestion, in Yugoslavia or anywhere else, that any such systemic mergers involving labour surplus firms and motivated by that surplus have ever taken place, the question does not arise.

We have shown that as long as i) the level of earnings is not inversely related to the size of firms and ii) no mergers are observed involving labour-surplus firms, even if firms are not at their equilibrium membership the maximum order of magnitude of labour-disequilibrium inefficiency (if any) measured by the share of income dif-

ferentials across firms which would be bridged by labour redeployment between them will not exceed one half; it is interesting to note that this proposition is compatible with the empirical findings of Estrin-Svejnar, 1984.

Finally it is worth stressing that: i) the merger condition expressed by (11) holds for *any* type of merger in a labour managed economy, including those which do occur and are caused by economies of scale or the redeployment of capital or other non systemic factors; ii) the part of income differentials which is not specifically attributed to inefficient labour allocation is due to the structure of cost and productivity of different firms, which is determined by prices and their particular production functions; specific causes may be identified (such as rationing of underpriced capital in Yugoslavia) but anything affecting short-term quasi-rents of firms may be responsible for residual income differentials; iii) the whole analysis is based on the usual premises that labour-managed firms maximise net revenue per man and respond quickly and without friction to market incentives; of course it may be that the behaviour of labour managed firms and the constraints to which they are subjected should be modelled differently but, in that case, the presumption of short-term inefficiency of the labour-managed economy would have to be rejected together with the conventional model.

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