

ON A PROPOSAL BY LIBERMAN
FOR ENTERPRISE INCENTIVE FUNDS

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This paper is circulated for discussion purposes only and
its contents should be considered preliminary.

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for Enterprise Incentive Funds (1)

1. Introduction

The theoretical work of Ward {15}, Domar {3} and Vanek {14} has recently generated much interest in the economics of the labour-managed or cooperative firm.⁽²⁾ The major empirical inspiration for this analysis has been the Yugoslav system of worker-managed enterprises.⁽³⁾ Although Domar's model was developed to analyse the Soviet collective farm, the microeconomics of the labour-managed firm seems to have provided few, if indeed any, insights in the case of the Soviet *industrial* enterprise.

Indeed, the analysis of the latter by Western economists has proceeded by a very different route. Moreover, given the salient characteristics of the industrial enterprise in the Soviet Union, especially before the reforms, this is hardly surprising. The seminal work in this area has been that of Ames {1} who viewed the Soviet industrial enterprise as essentially a constrained output maximiser. More recently the papers of Portes {13}, Gindin {6} and Keren {8} have provided major extensions to Ames' model as well as substantial innovations to encompass such problems as enterprise reactions to changes in prices and input plans, the impact of targets which are functions of past performance and the influence of taut plans and uncertainty on enterprise behaviour.

Two separate lines of approach to the analysis of the socialist firm can thus be distinguished - the labour-management/cooperative model in the case of Yugoslav firms and Soviet collective farms, and variations on the theme of output maximisation in the case of the Soviet industrial enterprise.

The purpose of this paper is the discussion of a proposal by Liberman {9, Ch. 4} for the reform of the system of enterprise incentive

funds in Soviet industry. An inspection of the Liberman proposal seems to suggest that the economics of the labour-managed firm, even in this context is not without relevance and, that if his scheme were to be adopted an amalgamation of the two approaches distinguished above might be necessary. Finally, some of the problems raised by taking this composite view of the Soviet industrial enterprise are discussed.

Liberman's proposal is outlined in the following section.

2. Liberman's Proposal

Liberman's critique of the existing system of enterprise incentive funds raises many issues which have already received detailed attention in the literature⁽⁴⁾ and need only be briefly mentioned here.

The system comprises three separate enterprise incentive funds - the material incentive fund (M.I.F.) which is the source of bonuses, the production development fund which finances "decentralised" investment and the socio-cultural and housing fund (S.C.F.) which is used for building and repair of housing, medical services to workers, equipment for canteens and kindergartens and for other similar purposes. The magnitude of these funds in the case of any particular enterprise depends on enterprise performance as measured by the various fund forming indices (e.g. "profit growth" and "profitability") and upon the norms which relate the size of the funds to these performance measures. Adjustments are also made for over and under-fulfillment of plans by the enterprise.⁽⁵⁾

Liberman argues that this system suffers from a number of defects. These include, the tendency of enterprises to seek safe unambitious targets because of the asymmetrical fashion in which over and underfulfillment of

targets are treated, the adverse effects on enterprise performance of unstable norms⁽⁶⁾ and certain features of existing schemes which have led enterprises to use expensive raw material inputs despite the availability of cheaper substitutes.

Lieberman's major argument, however, relates to the existence under the present scheme of two fund-forming indices namely "profit growth" and "profitability" and in some cases "sales growth" and "profitability".⁽⁷⁾ This, he argues has made the calculation of enterprise incentive funds rather complex. Moreover the complexity of the system is exacerbated firstly by the fact that there are three separate funds each with its own set of norms, secondly by the adjustments that have to be made for the degree of plan fulfillment and finally by the manner in which residual profits are taxed. He thus proposes that the system be simplified and that the simplification be such that the familiar anomalies are removed. Presumably the intention is not just to simplify calculation, but also to induce a pattern of behaviour by enterprises consistent with increasing society's welfare. Indeed such a view seems implicit in Lieberman's statement that "there must be uninterrupted operation of the mechanism which confirms in actual fact that the attainments of each collective and each working person in the interests of society are justly rewarded morally and materially and that any possible errors, inaccuracies, or deviations along this road will be corrected with the participation of the producers themselves."⁽⁸⁾

In place of the three existing funds he proposes the establishment of a single unified enterprise incentive fund to be determined in a fairly simple fashion. The total fund once determined would subsequently be allocated to various uses within the enterprise previously covered by the three separate funds.

Liberman sets out two major desiderata for his scheme:-

- (1) The size of the enterprise incentive fund should depend on "the effectiveness of production and the amount of labour inputs."⁽⁹⁾
- (2) An "increase in effectiveness (profitability) should always ensure an increase in the size of reward per employed person but in such a way that the share of profit paid to society rises rather than declines in the process."⁽¹⁰⁾

He argues that the first requirement is met by existing schemes and can continue to be satisfied by setting up the fund-forming formula so that the enterprise incentive fund is determined as a proportion of the wage fund (the enterprise's total wage bill). The wage bill is thus used as a measure or proxy for "the amount of labour inputs." The "effectiveness of production" is presumably to be reflected in the net profit : wage fund ratio (i.e. profit per rouble labour payments), since his proposal is that the enterprise incentive fund : wage fund ratio should be an increasing function of the profit : wage fund ratio.

Liberman explains the scheme by means of an arithmetical table⁽¹¹⁾ which has been utilised in the construction of figure I below, where the rouble values of enterprise net profits, the wages fund and the enterprise incentive fund are denoted by Π , W and E respectively. It should be noted that enterprise net profits under the scheme are related to the rouble value of payments by the enterprise to the state budget T , by the identity $\Pi \equiv E + T$.

Figure I shows how $\frac{E}{W}$ and $\frac{E}{\Pi}$ vary for different levels of enterprise "profitability" or "effectiveness of production" as measured by the $\frac{\Pi}{W}$ ratio,

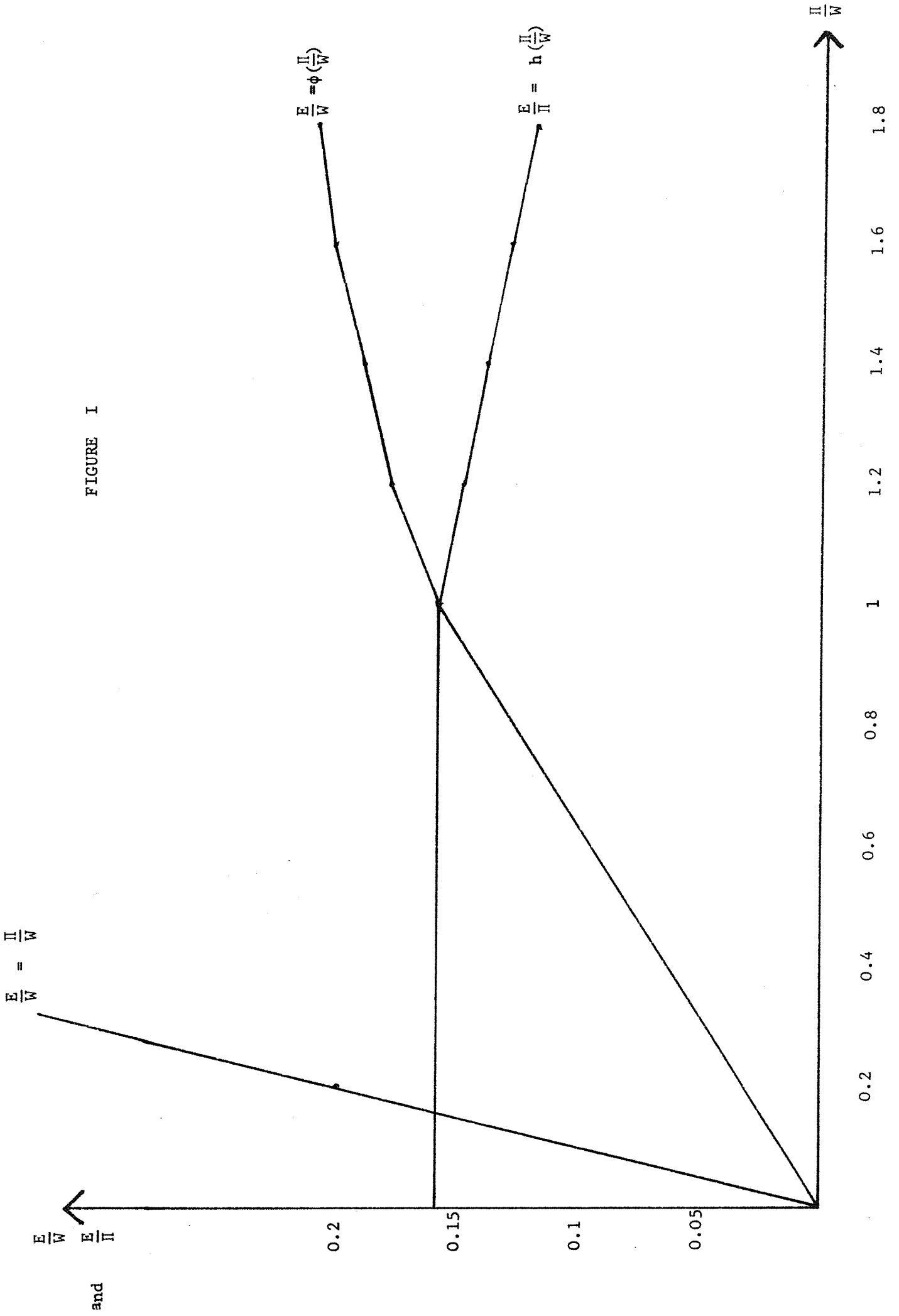


FIGURE I

and can be used to illustrate how Liberman's second requirement is met by the scheme. An increase in $\frac{\Pi}{W}$ leads to an increase in $\frac{E}{W}$ and therefore to an increase in reward per employee. (12) Moreover, for $\frac{\Pi}{W} > 1$, $\frac{E}{\Pi}$ is falling and thus $\frac{T}{\Pi}$, the state's share of profit is rising since $\frac{T}{\Pi} \equiv 1 - \frac{E}{\Pi}$. Liberman thus identifies "the share of profit paid to society" with enterprise payments from profit to the state budget.

On the assumption that it will not, for analytical purposes, do gross injustice to the essentials of his scheme the linear segments of figure I may be replaced by a smooth continuous curve. The scheme may then be summarised as follows:-

$$\begin{aligned} \frac{E}{W} &= f\left(\frac{\Pi}{W}\right), \text{ where } f(0) = 0 & (1) \\ 0 &< f'\left(\frac{\Pi}{W}\right) < 1 \\ f''\left(\frac{\Pi}{W}\right) &< 0 \\ \frac{\Pi}{W} &\geq 0 \end{aligned}$$

These restrictions are sufficient to ensure that the enterprise's share in total profits falls whereas the state's share rises with increases in "profitability." (12)

It is also worth noting at this point that the elasticity of the incentive fund per rouble wage fund with respect to profits per rouble wage fund will be less than unity. At any point z on $f\left(\frac{\Pi}{W}\right)$ in figure II below $\frac{dE/W}{d\Pi/W} = f'\left(\frac{\Pi}{W}\right) < \frac{E}{\Pi}$. Thus the elasticity $\eta_E = f'\left(\frac{\Pi}{W}\right) \cdot \frac{\Pi}{E} < 1$.

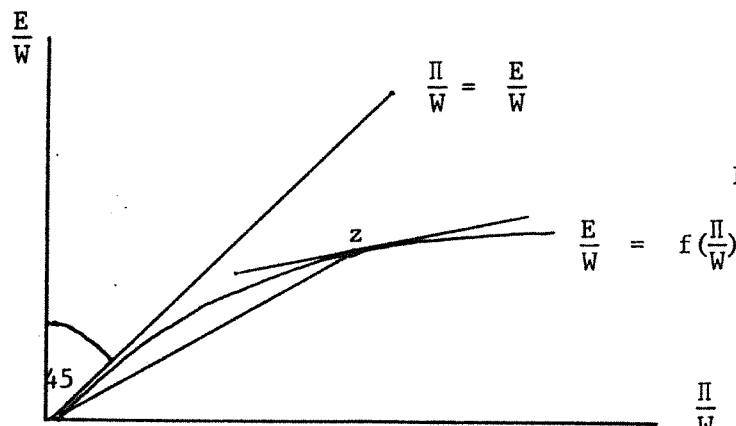


FIGURE II

In the next section Liberman's scheme, as summarised by equation (1), is examined in the light of the economics of the labour managed firm.

3. Liberman's Scheme and the Analysis of the Labour Managed Firm

It will be recalled that in the analysis of Ward, Domar and Vanek the labour-managed cooperative is viewed as attempting to maximise income per worker or member. For simplicity let it be assumed that the enterprise produces some output X and is constrained by the twice differentiable strictly concave production function $X = X(L,V)$ where L is the input of homogeneous labour (number of men) and V represents some equally homogeneous, non-labour factor input. Let output price (P), the wage per man (w) and the price per unit of the other factor of production (v) be exogenously determined by the state. Income per worker can then be seen as comprising two elements, w the state determined wage, and $\frac{\Pi}{L}$ the profit share per worker.⁽¹³⁾ With w assumed to be constant maximising income per worker is obviously equivalent to maximising per capita profits. If L and V are viewed as decision variables the relevant first order conditions for the maximisation of income per worker, $y = w + \frac{\Pi}{L} = w + \frac{PX - wL - vV}{L}$ are

$$y_L = \frac{LPX_L - w - \Pi}{L^2} = 0, \text{ whence } PX_L = w + \frac{\Pi}{L} \quad (2)$$

$$\text{and } y_V = \frac{1}{L} (PX_V - v) = 0, \text{ whence } PX_V = v \quad (3)$$

The intuitive rationale for these two conditions can be explained as follows. For any given value of V the employment of one extra worker will add $PX_L - w$ to profits. If this is greater than the existing level of per capita profits then the expansion of employment by one man will increase per capita profits. Thus employment will be increased until $PX_L - w = \frac{\Pi}{L}$, at which point profits per head and income per head are obviously maximised. Again, for any

given labour input, that input level of V which maximises total profits will also maximise profits per worker. Hence equation (3) yields the familiar condition that the value of the marginal product of the input is equated with the input price.

The formal similarity between this type of model and Liberman's scheme is evident if it is assumed that the enterprise under his system attempts to maximise the per capita value of the enterprise incentive fund (e) and thus income per worker. Note that in the case of homogeneous labour $W = wL$, whence from equation (1) $\frac{E}{L} = e = wf\left(\frac{\Pi}{wL}\right)$. The first order conditions for maximum e where $\Pi = P.X(L, V) - wL - vV$ are

$$e_L = w.f'\left(\frac{\Pi}{W}\right) \frac{wL(PX_L - w) - \Pi w}{w^2 L^2} = 0$$

whence $PX_L = w + \frac{\Pi}{L}$ (4)

and similarly,

$$e_V = wf'\left(\frac{\Pi}{W}\right) \frac{(PX_V - v)}{wL}$$

whence $PX_V = v$ (5)

The two conditions⁽¹⁴⁾ are, of course, formally identical with equations (2) and (3). They may be explained as follows. Firstly, for any given input level of V the employment of one extra man will add $f'\left(\frac{\Pi}{W}\right) \cdot (PX_L - w)$ to the total enterprise incentive fund. This is because $(PX_L - w)$ will be added to profits and if this is multiplied by $f'\left(\frac{\Pi}{W}\right)$, (which might be called the "marginal retention rate"), the product is of course the increment in the incentive fund which results from a marginal increase in employment. Similarly, the existing per capita value of the incentive fund will be the product of the

marginal retention rate and per capita profits. Thus if $f'(\frac{\Pi}{W}) \cdot (PX_L - w) > f'(\frac{\Pi}{W}) \cdot \frac{\Pi}{L}$ the enterprise will expand employment because, by so doing, the per capita incentive fund can be increased, and if $f'(\frac{\Pi}{W}) \cdot (PX_L - w) < f'(\frac{\Pi}{W}) \cdot \frac{\Pi}{L}$ the employment level will contract. It follows that $PX_L = w + \frac{\Pi}{L}$ is, once again, the necessary condition as far as labour is concerned, even although in this case $\frac{E}{L}$ is being maximised. The explanation of equation (5) is even simpler. Given the wage rate and the labour force the size of the enterprise incentive fund is a monotonically increasing function of profits above. Therefore that input level of V which maximises total profit will also maximise E the profit retained for the enterprise incentive fund, and consequently $\frac{E}{L}$.

It might thus be argued that if a Soviet industrial enterprise playing Liberman's 'rules of the game' could purchase desired inputs at constant prices, sell any desired output at state-determined prices and moreover aimed to maximise the per capita value of its enterprise incentive fund, then its behaviour could be described within the framework provided by existing models of the cooperative firm. This argument, however seems to have a number of severe limitations. These are best discussed at a later stage since certain other features of Liberman's scheme are worthy of prior consideration.

It has already been shown that Liberman's scheme shares one important common feature with schemes which have been implemented - the incentive fund(s) is(are) determined as a proportion of the wage fund. This has produced a number of criticisms and amendments to schemes in operation. Moreover Soviet economists have not been alone in their criticism. Ellman, referring to 'early' versions of the formulae has argued "ceteris paribus, the larger the wages fund the larger the M.I.F. and S.C.F. This provides an enterprise seeking to maximise its incentive fund with an incentive for the wasteful use of labour. This has been recognised by the authorities and measures to deal

with it have been taken".⁽¹⁵⁾ Similar points have been made by Nove⁽¹⁶⁾, Campbell⁽¹⁷⁾ and others. Liberman is very much aware of this type of criticism and of the possibility of its application to his proposed scheme since he notes that "some persons (Kulagin in particular) believe that the measure of profit on the basis of its percentage relation with the wage fund will prompt the enterprise to increase the size of the wage fund".⁽¹⁸⁾

At first sight these arguments do not appear directly relevant to Liberman's scheme since they seem to imply that the enterprise will, in some sense, employ a larger labour force than is desirable. Indeed, if it is assumed that the profit maximising firm is the implicit standard of comparison in the minds of at least some of the critics then, given equations (4) and (5) it is tempting to dismiss these criticisms outright. In the case of profit maximisation the marginal rate of substitution between the two inputs V and L would be $\frac{-dL}{dV} = \frac{v}{w}$. On the other hand, if the enterprise were maximising e , the per capita value of the incentive fund the marginal rate of substitution would be equated with $\frac{v}{w + \Pi/L}$. Assuming positive profits in both cases $\frac{v}{w + \Pi/L} < \frac{v}{w}$. Thus to produce the same level of output the enterprise would use less L and more V if it were maximising e than it would if it were attempting to maximise profits (or minimise costs) at that same output level.⁽¹⁹⁾

The source of this conclusion seems to lie with the different maximands which have sometimes explicitly, but more often implicitly, been attributed to the Soviet enterprise. If it is assumed, as Ellman obviously does (see above) that the Soviet enterprise seeks to maximise its *total* incentive fund, then the forces determining its input levels of L and V may well be different.

This can be illustrated with reference to Liberman's proposal. The maximand now becomes $E = wLf\left(\frac{\Pi}{W}\right)$ and setting $E_L = E_V = 0$, produces

the following necessary first order conditions. (20)

$$E_L = wf\left(\frac{\Pi}{W}\right) + f'\left(\frac{\Pi}{W}\right) \left[PX_L - w - \frac{\Pi}{L} \right] = 0$$

whence $wf\left(\frac{\Pi}{W}\right) = f'\left(\frac{\Pi}{W}\right) \left[w + \frac{\Pi}{L} - PX_L \right]$ (6)

$$E_V = wLf'\left(\frac{\Pi}{W}\right) \frac{PX_V - v}{W} = 0$$

whence $PX_V = v$ (7)

Condition (7) can be explained precisely as before. Given the level of the labour input the total enterprise incentive fund is a monotonically increasing function of profits alone. Thus that input level of V which maximises total profit will maximise E . Hence, once again the employment level of V will be increased until the value of its marginal product is equal to its price. In order to interpret equation (6) it may be noted that an increase in the labour force has two analytically separable effects on the size of the enterprise incentive fund. Firstly it affects the size of the fund through its influence on the wage bill and secondly it affects the size of the fund in as much as profits per rouble wages are changed. Thus given some fixed stock of V , and a low initial level of L , as L is increased E will be increasing since both the total wage bill and $\frac{\Pi}{W}$ can be expected to be rising. However, as the labour force is increased further the expectation is that beyond some employment level, $\frac{\Pi}{W}$ will start to fall. Noting that the enterprise cannot be in equilibrium as long as both W and $\frac{\Pi}{W}$ are still rising, it follows that E will be maximised at the labour force at which the marginal influences on E of the two separate effects discussed above are exactly equal but of opposite sign. This will be so when the marginal increase in E which results from a ceteris paribus change in the wage fund by w (i.e. the change in the wage fund results from the employment of one

more man) is equal to the marginal reduction in E which results from a ceteris paribus fall in $\frac{\Pi}{W}$ due to the employment of one more man. This essentially describes the economic content of equation (6).

It is fairly easy to compare equation (6) with the profit maximising counterpart $PX_L = w$. The former may be rewritten as

$$PX_L = w + \frac{\Pi}{L} - \frac{E}{L} \left[\frac{1}{f'(\frac{\Pi}{W})} \right] = w + \frac{\Pi}{L} \left[1 - \frac{1}{\eta_E} \right]$$

where η_E is the elasticity of the incentive fund per rouble wage fund with respect to profits per rouble wage fund. Since it has already been shown that $\eta_E < 1$ it follows that $PX_L < w$, and this of course may be the sense in which it has been argued that maximisation of the incentive fund implies an overextension of the labour input. Moreover inspection of (6) and (7) suggests that any given level of output will not be produced in a cost minimising fashion

The optimal ("short run") labour input levels when the maximand is the total incentive fund, the per capita incentive fund and total profits can be compared diagrammatically in figure III, if V is assumed fixed at a given level. Note that PX_L will cut $w + \frac{\Pi}{L}$ at $w + (\frac{\Pi}{L})_{\max}$, because at that point $\frac{d}{dL} (\frac{\Pi}{L}) = \frac{L(PX_L - w) - \Pi}{L^2} = 0$ and therefore $PX_L = w + (\frac{\Pi}{L})$. In figure III⁽¹⁹⁾ below L_e is the labour force which is optimal when the per capita value of the enterprise incentive fund is being maximised, L_{Π} is the optimal labour force when profits are being maximised and L_E is optimal if the maximand is the total enterprise incentive fund. Note that for a given V , L_E will be unambiguously larger than L_{Π} because as we have already shown in the case of the former $PX_L < w$. It may also be concluded from the diagram that the closer $\eta_E = \eta_E(L)$ is to unity the less will be the divergence between L_E and L_{Π} .⁽²¹⁾ In the limiting case where $\eta_E(L) = 1$ the two will of course be identical because a 1% change in profits will imply a 1%

change in the incentive fund and thus maximisation of either will yield the same optimal L . This case is ruled out by Liberman's two requirements (1) and (2) above which constrain η_E to be always less than unity.

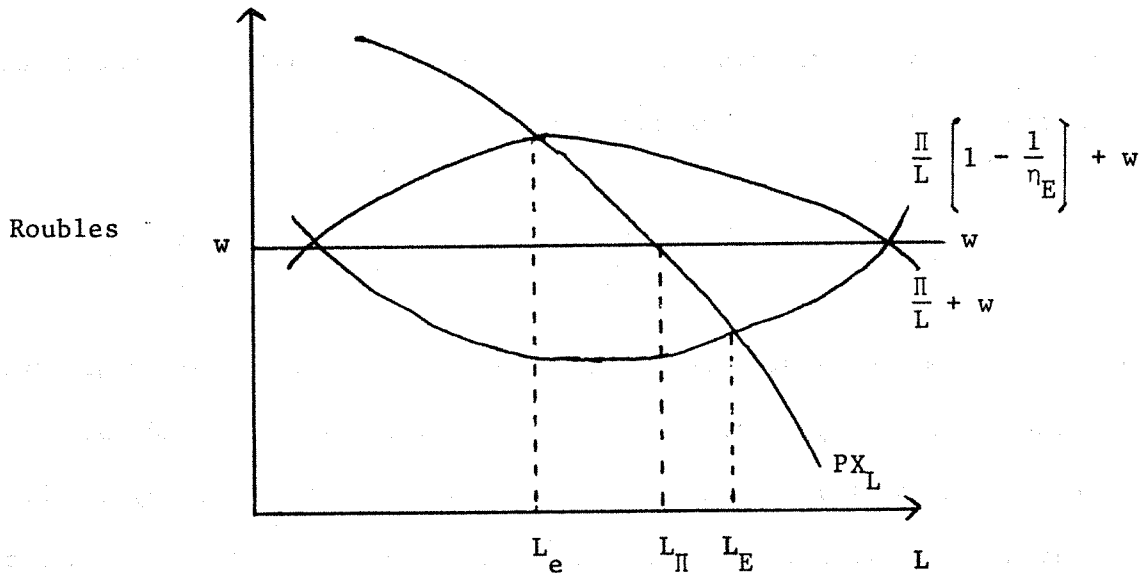


FIGURE III

Given that optimal input levels will vary depending upon the particular maximand assumed, it is important to ask which maximand Liberman has in mind. The case for assuming that it is e rather than E seems quite strong, because having raised the possibility that the enterprise may be induced to increase the size of the wage fund, Liberman states "the relatively smaller the wage fund is the higher profit will be as a per cent of wages and the greater the total incentive per rouble wages will be."⁽²²⁾ It thus looks as though it is the total incentive per rouble wages which matters as far as he is concerned. Moreover it is but a small step from this to say, that if the implicit maximand is profits per rouble wages, then under conditions of homogeneous labour it is profits per head or at least retained profits per head (e) which the enterprise will seek to maximise.

However if it is reasonable to suggest that the implicit maximand is e it seems puzzling that wages or the wages fund should appear at all

in the fund forming formula. Surely it is much simpler to set it up so that $e = \frac{E}{L} = F\left(\frac{\Pi}{L}\right)$?

An answer to this particular puzzle may possibly be found once again in the theory of labour-managed firm. So far the labour force has been assumed to be perfectly homogeneous. When the homogeneity assumption is dropped the problem which emerges, as far as static analysis is concerned, is of course that of redefining the maximand to take account of labour of different skills. In his examination of the diversified labour case Vanek⁽²³⁾ tackles this problem by assuming a distribution schedule which sets out the relative proportions in which any net profit will be divided among labour of different skills or "grades". These proportions are assumed to be constant so that the income which a worker or (say) the second skill category, is always (say) 1.15 times the income received by the worker in the lowest skill category. He shows that under these conditions if there are only two grades of labour then using the above example the maximand for the labour-managed firm becomes

$$y = \frac{\text{REVENUE} - \text{COSTS}}{L_1 + 1.15 L_2} \quad \text{where } L_1 = \text{number of workers in lowest grade} \quad \text{and} \\ L_2 = \text{number of workers in second grade}$$

Vanek's distribution schedule is thus in essence a device for aggregating labour of different skills and converting them so that the total labour force is being expressed in "grade 1 equivalents". Now, it is interesting to reflect that this is precisely what the Soviet wage system attempts to do in which as Nove⁽²⁴⁾ has said "All workers are divided into grades, the government settles the wage of grade one (the lowest) and each step upwards is calculated by coefficients which are also laid down by the government."

The rationale for deflating E and Π by the total wage fund is then

obvious. The wage fund for any enterprise employing n grades of labour where the L 's refer to numbers employed and the w 's to their respective wage rates is

$$W = L_1 w_1 + L_2 w_2 + \dots + L_n w_n$$

Given the set of coefficients a_2 to a_n this may be rewritten as

$$\begin{aligned} W &= L_1 w_1 + L_2 a_2 w_1 + L_3 a_3 w_1 + \dots + L_n a_n w_1 \\ &= w_1 \left(L_1 + a_2 L_2 + a_3 L_3 + \dots + a_n L_n \right) \\ &\quad (a_n > \dots a_3 > a_2 > 1) \end{aligned}$$

Thus with w_1 given it may be argued that the deflation of Π and E by the total wage fund is equivalent to using a Vanek-type distribution schedule. The difference in the present case, of course is that the Vanek schedule might emerge after much prolonged discussion and voting by the members of the firm whereas as the one under discussion is simply imposed by the state, as a by-product of its decisions on wage coefficients.

It seems extremely unlikely that Liberman had a labour-management model at the back of his mind when making his proposals for the reform of enterprise incentive funds. However it does seem that there is a remarkable consistency between his scheme and that model. Indeed it might well be argued that if his scheme were adopted the analysis of Vanek, Ward and Domar might begin to play a part in the approach taken by, at least some western economists to the Soviet industrial enterprise. Unfortunately, there are a large number of complications which prevent any simple transposition of these models to the Soviet context. Some indication of these problems is given in the following concluding section.

Constraints and Complications

Like its profit-maximising analogue the simple theory of the labour-managed firm has been subject to criticism and qualification⁽²⁵⁾ and few would argue, even now, that it has achieved its ultimate steady-state position in the literature. Since the problems of the model are fairly well known, comment is restricted here to those difficulties which are arguably peculiar to the Soviet context.

The assumption that the relevant maximand is simply $\frac{E}{L}$ or $\frac{E}{W}$ is deficient in a number of respects.

Complications attach to the "rules" for the subdivision of the enterprise incentive fund among its various uses within the enterprise. Obviously the behaviour of the enterprise will not be invariant with respect to the way in which it is permitted to allocate the fund among "production and development" uses, current bonuses for workers and managers and "sociocultural and housing" uses. It certainly does not appear that the enterprise would, under the scheme, be free to choose its own allocation for Liberman explicitly states "there can be no excessive 'enrichment' of enterprises even when they have a very high profitability level. When the economic incentive fund is large the share of expenditures on sociocultural measures and on housing construction can be increased."⁽²⁶⁾ Resultant behaviour might be very complex because it will depend firstly upon the trilateral trade-off of present "private" consumption (current bonuses) versus present social consumption (housing and sociocultural expenditure) versus future values of the enterprise incentive fund itself (which will depend in part on the volume of resources the enterprise currently puts to production and development uses). Secondly it will depend on the enterprises' assumptions about the conditions under which the planners may *impose* a particular allocation of the fund.

As Ellman has pointed out one feature of the "reforms" has been the imposition of output targets and other centrally-determined desiderata as necessary side conditions to be met before receipt of managerial bonuses. It might thus be, that if Liberman's scheme were applied the interests of workers and managers might be quite different and although the Soviet manager might have an interest in achieving high values of $\frac{E}{L}$ or $\frac{E}{W}$ he might equally well be concerned with his output performance. (27) Indeed, depending on the relative power of his workers it might be argued that it is more realistic to see him as an output or sales maximiser constrained to earn some minimum level of $\frac{E}{W}$ to keep the workers happy. (28) Again in different circumstances the manager might well be viewed a maximising $\frac{E}{L}$ or $\frac{E}{W}$ subject to producing a level of output satisfactory to the planners and satisfactory to himself in the sense that it will not be calculated to provoke the planners into imposing "tougher" future output targets. In short the degree of decentralised democratic decision-taking implicit in the labour-management models may need substantial qualification in the Soviet context.

Supply side constraints may also enter the picture for the Soviet enterprise does not as yet, have complete freedom to determine its own wages fund since planners have been loathe to relinquish control over a variable which might affect the degree of repressed inflation at macroeconomic level. Again the enterprise may well be constrained from the supply side by limited availability of non-labour inputs, the vast bulk of which are still centrally allocated. Indeed with centrally allocated inputs and a fixed wage fund it might be very hard to escape the pessimistic conclusion that the sole function of an enterprise incentive fund is as an accounting device for the distribution of total profit, earned at that level of output which the Soviet manager, caught between limited factor availability on the supply side and over ambitious targets set by planners on the demand side, ends up by producing.

The argument that it has other functions and can be an influence on

resource allocation rests on the assumption of a world in which enterprise's have rather more initiative than that implied in the last paragraph.

Is it too much to suspect that Liberman has such a world in mind?

Footnotes

- (1) The author would like to thank Keith Cowling and Norman Ireland for helpful comments and suggestions.
- (2) The papers by Dubravcic {4}, Meade {11} and McCain {10} testify to this interest.
- (3) Of course, as Vanek's title {14} suggests, much of the theory is quite general. Moreover he argues "the labour-managed system need not even be socialist". op.cit.p.7.
Vanek also states, op.cit. p.6, "the Yugoslav economy is thus the the principal aspiration of our study." The same is obviously also true of Ward's pioneering contribution {15}.
- (4) See for example Ellman's excellent summary and evaluation of the system of enterprise incentive funds in {5}, Ch. 8.
- (5) The method of calculation of the funds is described by Ellman {5}, Ch. 8.
- (6) Ellman {5} p.143, also emphasises this point."An enterprise which does well in one year is likely to have its norms reduced in the following year".
- (7) For an explanation of these terms, see Horwitz {7} or Ellman {5}, Ch. 8. The "profitability" concept here differs from that used by Liberman in his proposed scheme.
- (8) Liberman {9} Ch. 4, p.130.

- (9) Liberman, op.cit. p.140.
- (10) Liberman, op.cit. p.140.
- (11) Liberman's Table is reproduced in the Appendix, section A.
- (12) Liberman in fact states that his "scale" is a tabular expression of the function $y = b \log (x - c)$ where y is the enterprise incentive fund as a percentage of the wage fund, x is profit as a percentage of the wage fund and b and c are constants.
- (13) Models of the cooperative often assume that the worker's only source of income in his profit share, in which case the relevant maximand in terms of the present notation is $\frac{PX - vV}{L}$. The wage rate is included in workers' income in the text because it facilitates discussion of the Liberman scheme. Liberman certainly does not envisage the replacement of wages by a profit share. Indeed under existing schemes it is a common criticism that the size of material incentives paid from the relevant fund is small relative to wages. (cf Ellman {5} Ch. 8)
- (14) For second order conditions, see Appendix, section B.
- (15) Ellman {5} p.140.
- (16) Nove {12} p.200.
- (17) Campbell {2} "It is claimed that tying the normative to the wage fund has discouraged cost cutting reductions of the work force." It is interesting to note that Campbell shares Liberman's in many respects. Of the system of funds he says "in its full

complexity it is an insanely baroque creation."

- (18) Liberman op.cit. p.146.
- (19) Dubravcic {4} makes a similar point in his discussion of cooperative models. In the text it is assumed that the enterprise in both cases is constrained (e.g. by the state) to produce the same output level. However if it is free to vary output levels it will not normally be in equilibrium on the same isoquant in both cases. When $\frac{E}{L}$ is the maximand it will use less labour but will produce a lower level of output than under profit maximisation. This case will be perfectly analogous with that discussed by Ward {15} p.580, 581. The criticisms however obviously remain ambiguous. It is perhaps apposite at this point to refer the interested reader to the comments of Meade {11} on the optimality of the cooperative system and in particular to the important role played by the entry of new firms. Setting up the conditions for entry might pose serious problems in a planned economy.
- (20) For second order conditions, see Appendix, section C.
- (21) For simple exposition it has been assumed in figure III that $\eta_E = 0.5$, hence the symmetry of the curves around w . It is also assumed that positive profits are earned at L_e , L_{II} and L_E .
- (22) Liberman, op.cit. p.147. Since Liberman also quotes Sukharevskii's contention that basing incentives and taxes on the profit wage fund ratio "would make the use of machines in the place of manual labour more advantageous" it seems unlikely that the implicit maximand is E.

- (23) Vanek {14} Ch. 11.
- (24) Nove {12} p.132.
- (25) See for example Dubravcic {4}, Meade {11} and McCain {10}.
- (26) Liberman op.cit. p.144.
- (27) Much will depend on the rules for the allocation of bonuses from the enterprise incentive fund to workers and managers. Liberman makes no statement on this point but a conflict of interests is obviously possible.
- (28) There are obvious parallels with capitalist firms here and in particular with those models which suggest conflict between the interests of managers and shareholders. There might well be an argument that "managerial capitalism", in some sense at least, is not unlike "socialism with incentives".

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A P P E N D I X

A. Liberman's Table*

Groups	Calculated (Net) Profit in % of Wage Fund	For attaining the lower boundary of the interval				In addition, for the difference between profit actually received and profit corresponding to the lower boundary of the interval	
		Paid to the Budget		Left to the Enterprise		Paid to the Budget in % of addit- ional profit	Left to the Enterprise in % of additional profit
		In % of Total Net Profit	In % of Wage Fund	In % of Total Net Profit	In % of Wage Fund		
**	$\frac{\Pi}{W} \cdot 100$	$\frac{T}{\Pi} \cdot 100$	$\frac{T}{W} \cdot 100$	$\frac{E}{\Pi} \cdot 100$	$\frac{E}{W} \cdot 100$	$\frac{\Delta T}{\Delta \Pi} \cdot 100$	$\frac{\Delta E}{\Delta \Pi} \cdot 100$
1	From 0 to 100	-	-	-	-	84	16
2	From 100 to 120	84	84	16	16	90	10
3	From 120 to 140	85	102	15	18	92	8
4	From 140 to 160	86	120.4	14	19.6	94	6
5	From 160 to 180	87	139.2	13	20.8	96	4
6	From 180 and above	88	158.4	12	21.6	98	2

* Source: Liberman {9} p.143

** This row which uses the notation of the text has been added to the table

B. Maximisation of $e = \frac{E}{L} = wf\left(\frac{\Pi}{W}\right)$

The two first order conditions are

$$e_L = f'\left(\frac{\Pi}{W}\right) \cdot \left(\frac{L\Pi_L - \Pi}{L^2}\right) = 0 \quad (1)$$

and
$$e_V = f'\left(\frac{\Pi}{W}\right) \cdot \frac{\Pi_V}{L} = 0 \quad (2)$$

Further differentiation and simplification yields

$$e_{LL} = f'\left(\frac{\Pi}{W}\right) \cdot \frac{PX_{LL}}{L}$$

$$e_{VV} = f'\left(\frac{\Pi}{W}\right) \cdot \frac{PX_{VV}}{L}$$

and
$$e_{VL} = f'\left(\frac{\Pi}{W}\right) \cdot \frac{PX_{VL}}{L}$$

Assuming strict concavity of the production function then

$$e_{LL} < 0 \quad , \quad e_{VV} < 0$$

and
$$e_{LL} \cdot e_{VV} > (e_{VL})^2$$

C. Maximisation of $E = Wf\left(\frac{\Pi}{W}\right)$

The two first order conditions are

$$E_L = wf\left(\frac{\Pi}{W}\right) + f'\left(\frac{\Pi}{W}\right) \left(\frac{\Pi_L}{L} - \frac{\Pi}{L}\right) = 0$$

and $E_V = f'\left(\frac{\Pi}{W}\right) \cdot \Pi_V = 0$

Further differentiation and simplification yields

$$E_{LL} = f'\left(\frac{\Pi}{W}\right) \cdot PX_{LL} + \frac{1}{W} \cdot f''\left(\frac{\Pi}{W}\right) \left(\frac{\Pi_L}{L} - \frac{\Pi}{L}\right)^2$$

$$E_{VV} = f'\left(\frac{\Pi}{W}\right) \cdot PX_{VV}$$

and $E_{VL} = f'\left(\frac{\Pi}{W}\right) \cdot PX_{VL}$

Assuming strict concavity of the production function and recalling that $f''\left(\frac{\Pi}{W}\right) < 0$ it can be shown that

$$E_{LL} < 0 \quad , \quad E_{VV} < 0$$

and $E_{LL} E_{VV} > (E_{VL})^2$