

THE FIRM IN ILLYRIA: MARKET SYNDICALISM

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The discussion of the feasibility of socialism has long been closed with apparently quite general agreement that an economy will not inevitably collapse as a result of nationalization of the means of production. On the theoretical side the clinching argument was probably made by Barone shortly after the controversy began [2]. Probably the best known of the arguments on the other side of the question, that of Mises [15], was published twelve years after Barone's paper and gave rise to a new set of arguments, among them those of Taylor, Lange and Lerner [11] [12]. Lange in fact explicitly (though perhaps with a touch of irony) developed market socialism as a counterexample for Mises' assertions.

Today one might be inclined to take market socialism as something more than a theoretical counterexample. But as a serious proposal for social reform it leaves some important questions unanswered. For example the problem of the emergence of a bureaucracy in whose hands the economic power is largely concentrated was raised by Lange himself. Another unanswered question has to do with the behavioral response of decision-makers to such directives as the rules for determining output and changing price. Will the rules be simply obeyed or will various means of simulating compliance while serving other ends be developed?

These two questions are of special interest today as one watches some Eastern European countries groping toward a less centralized form of economic organization, and as one watches Western European socialists struggle with the implications for democracy (and efficiency) of further nationalization. In the present paper a few of the implications of one possible alternative form of industrial organization are explored. In this model the means of production are nationalized and the factories turned over to the general management of elected committees of workers who are free to set price and output policy in their own material self-interest. The nature of the resulting price and output

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decisions are investigated and compared with those obtained in the competitive capitalist (or market socialist) model.

The assumptions of the model bear a close resemblance to the legal status of the industrial firm in Yugoslavia in recent years. Consequently some of the organizational arrangements of a "market syndicalist" economy can be described most conveniently by citing laws on the statute books in Yugoslavia, as is done in Section I. Toward the end of the paper some comments are made as to the extent of deviations of firm behavior in Yugoslavia from that of the theorems of our model. It seems that Illyria is in fact an alternative to the existing system in Yugoslavia as well as to those in Western and the rest of Eastern Europe.

I. *Legal Aspects of a Market Socialist Economy*

The legal framework of the Yugoslav economy has been undergoing such rapid and repeated overhaul during the past seven years that it is difficult to pin down the provisions that are relevant at any one point in time. In what follows reference is mainly to the year 1954. Of first importance in releasing the firm from its former Stalinist constraints was the new planning system.¹ Federal and republican plans no longer prescribed output norms for firms and industries. Figures in the central plan represented generalized expectations rather than explicit norms. The firm itself in its own "independent" plan set its own goals for the year and even then was not penalized for failure to fulfill these targets.

The firm was not only empowered to set its own rate of production but was also made responsible for its sales. The compulsory distribution plan was abolished [17, No. 17, 1952, item 169], and the firm was permitted to enter freely into contracts for the sale of its output and the purchase of raw materials. Prices had gradually been released from central control until here too the firm had the right to price its own products "on the basis of market conditions."² Price controls still existed in 1954 but only for a narrow range of commodities.³

With output norms no longer available for the purpose, the new criterion of successful performance of the firm became profitability, that is to say, the ability to earn enough in revenue to cover costs at

¹ [17, No. 58, 1951]. The 1954 plan is published in [17, No. 13, 1954, item 146].

² This had been carried out for certain classes of firms and industries during 1950-51 (for example price-setting in the case of textile products by the price bureaus of the Ministry for Domestic Trade was abolished by a decree published in [17, No. 48, 1951, item 454]). The general statute appears in [17, No. 32, 1952, item 382].

³ Prices of some industrial raw materials (e.g., pig and cast iron and sawn timber) were fixed by decree during 1954 [17, No. 20, item 221; No. 26, item 295; No. 32, item 407]. The Federal Price Office was re-established early in 1955 [17, No. 22, 1955, item 225] but there was no significant increase in the number of controlled prices at the time.

the existing market prices. The term "revenue" means roughly what it would mean to an American businessman. However, the term "costs" requires some discussion in view of certain aspects of the wage system and of the fact that the state retained ownership of the means of production.

Labor cost was defined by law [17, No. 52, 1953, item 439] and was based on the average level of skill of workers in the industry. Industries were divided into eight groups on this basis and the labor cost per worker-month set for each group. For example, a coal mining concern, falling in Group III, was assigned a calculated (*obračunski*) wage of 8,100 dinars per worker-month. If the firm employed a staff of 100 for a full month of work, labor cost would be 810,000 dinars for the month. The calculated wage was not the same thing as the contractual wage, which was the basis on which a worker was hired. This latter could be set freely by the firm. The distinction was that the contractual wage was *not* an accounting cost and was set by the firm, while the calculated wage *was* an accounting cost and was set by the state.

Secondly, there was the problem of charging the firm for its use of the state-owned land, plant and equipment. Ground rent was to be charged industrial firms at the same rate as that charged on the "largest class of arable land in the district" [17, No. 53, 1953, item 456]. The latter was set on a cadastral basis in accord with the yield of the land. Capital, that is to say plant and equipment, including the more expensive tools, was revalued during 1953 on a basis which does not seem to have been described explicitly in the press.⁴ The social (i.e., federal) plan was then to set each year the rate to be paid to the state as interest on fixed capital. A standard rate of depreciation on the various types of equipment was prescribed by the state and payments sufficient to maintain the value of the equipment were also charged as costs against the firm [16, pp. 128-32, 165-67].

Under this system then, costs would be the sum of material costs, "regular contributions" to the state (i.e., the interest charge on fixed capital, ground rent and the excise tax on sales, where levied—a relatively insignificant item in 1954), the calculated wage fund and interest on short-term credit outstanding. Profits, i.e., revenue less costs so-defined, became the measure of success of the firm.

To lend point to this change in perspective, a bankruptcy law was promulgated.⁵ Several types of receivership were defined, but in general it was provided that a firm became bankrupt if it was no longer able to

⁴ D. Misić [14] says that capital was to be valued at its "real present value, taking account both of its economic obsolescence and the extent to which it is worn out."

⁵ [17, No. 51, 1953, item 425]. An earlier law [17, No. 57, 1951, item 545] is much less specific and does not define the conditions under which a decree of bankruptcy against a firm will be passed.

make its regular payments to the state and to pay wages out of its revenues at the rate guaranteed by the state.⁶ Included was a provision permitting reorganization of the firm after writing down existing debts, provided the creditors were agreeable.

The new organization was designed to increase the efficiency of the economic system via competition among firms. As Vice-President Kar-delj put it, “. . . stimulative elements . . . appear above all through the interest of the enterprise in achieving, through free competition with other enterprises on the market, the best results as regards quality and quantity of goods, lower costs of production and good marketing” [10, p. 135]. The firm’s incentive to participate in this competition with its fellows stemmed from two sources: workers’ management and a profits-sharing scheme. The former had been established in 1950 [17, No. 43, 1950] and provided for an elected council of workers in the firm which was to serve a general policy-making function. The council approved the independent plan of the firm and the wage schedule and was empowered to issue directives regarding execution of the plan and the management of the firm. These were binding upon the firm’s director, providing they did not conflict with existing laws and decrees. Day-to-day supervision of operations was entrusted to the management board (*upravni odbor*),⁷ a subcommittee of the workers’ council which also prepared drafts of the plan and the wage schedule for the approval of the workers’ council. Differential wages within the firm were thus set by the workers themselves under this law and the later planning law, the chief constraint being that no wage rate could be set below that in the state minimum wage law.⁸

The calculated wage rates were supposed to be set at levels which would add up to 90 per cent of the total contractual wages at the planned production rate and sales price. If the workers were to receive the contract wage then it was necessary for the firm to make a profit on its operation [1, p. 44]. Furthermore, any profits achieved by the firm were placed at the disposal of the workers’ council to be used either for investment or rationalization or to be paid out as a wage supplement in proportion to the contract wage received by each worker,⁹ though a

⁶ In 1954 the state guaranteed up to 80 per cent of the calculated wage fund of the firm. A firm could apply to the state bank for a loan to cover up to 90 per cent of this fund, but the bank could refuse the loan if it thought the chances of repayment were not good. Guarantee of the loan by the local government (*narodni odbor* or “people’s committee”) was often required [17, No. 5, 1954, item 57].

⁷ The director was a member ex officio of the management board.

⁸ [17, No. 7, 1952, item 108] [17, No. 56, 1953, item 484]. Worker skills were classified in [17, No. 57, 1950, item 508], and minimum compensation fixed for each grade.

⁹ There are several qualifications to this statement. Some portion of the profits was to be used for the building up of a reserve fund and the local government received a share as well [1, p. 44].

steeply progressive profits tax was levied on this supplementary wage fund.

While the Yugoslav economic system thus involves a considerable measure of autonomy for the firm, it should not be thought that independence of the sort possessed within the legal framework of capitalism has been acquired by the Yugoslav firm. The state reserves the right to intervene directly to alter any decisions of which it disapproves.¹⁰ Such intervention could occur legally as a result of new decrees of the government or by means of the exertion of influence via the trade unions, the League of Communists, or the local governments, rights whose legal sanction was often based on the right of approval of the firm's decisions.¹¹ But intervention was now to be viewed as the exception rather than the rule.¹²

II. *The Competitive Firm: The One Output-One Variable Input Case*

The Illyrian firm operates in an environment rather similar to the legal environment within which the Yugoslav firm operates. In Illyria however there will be no intervention by the state in the firm's decision-making process, nor does minimum wage legislation exist. The worker-managers are free to set firm policy under the influence of the profit incentive.

The firm to be considered in this section operates in a purely competitive market. Decision-making is concerned with the short run and is viewed as static in nature; that is, the worker-managers are interested in maximizing their individual incomes over a given period of time. The services available to the firm are labor, which is a homogeneous input, and a fixed plant, which is owned by the state and operated by the workers. The firm must pay a tax in the form of interest on the replacement cost of the plant. Ground rent, depreciation, working capital and other taxes will be ignored. The state sets the calculated wage rate w , but this is done merely to provide an accounting definition of labor cost and does not determine in fact the level of wages.¹³ The workers never plough their profits back into the firm, but in each period

¹⁰ An official statement in vindication of the use of this right by Vice-President Kardelj can be found in [10, p. 133].

¹¹ The people's committee had the right of approval of the firm's independent plan (see planning law cited above, footnote 1) and the trade unions had some special rights of intervention in the hire-fire decision [17, No. 26, 1952, item 306].

¹² Such action is termed "administrative intervention" by Yugoslav economists and is asserted to have been ubiquitous under the previous Stalinist form of economic organization. A principal reason for establishing the new system was to make such actions unnecessary. See for example [13, pp. 95-100, 113 ff., 131-32, 224 ff.] [18, pp. 238 ff.].

¹³ In Yugoslavia the setting of the calculated wage performs an important function in determining the portion of the firm's wage bill that comes under the progressive surplus profits tax, but we are ignoring this tax in the Illyrian case.

distribute the whole amount of profits as a wage bonus. In our firm, which employs a single skill-type of worker, the distribution is made equally to each employee.

A production function will describe the technical conditions under which the firm may transform the homogeneous factor labor, x , into a salable product, y :

$$(1) \quad y = f(x).$$

Over the range of the variables under consideration the marginal product of labor will be assumed to be positive but declining as output increases. Labor input will be measured in terms of the number of workers employed. By assuming that labor input can be changed only by varying the number of laborers the possibility of overtime work by the existing staff is eliminated. This is done so as to avoid introducing the marginal disutility of labor as an important constraint.¹⁴ It is also assumed that there is no discrimination among workers, and that a decision to lay off workers on profit-maximizing grounds would not be affected by the fact that the result would be to create unemployment.¹⁵

The sole source of income to the firm is from the sale of its product at the parametric price p . Two costs are incurred in production: labor cost which is valued at the calculated wage w per worker,¹⁶ and the fixed charge for the use of capital R . Profit of course is the difference between revenue and cost. The worker-managers, acting in their own material self-interest, are not necessarily interested in maximizing profits as their capitalist counterparts, the stockholders or entrepreneurs, would be. Each worker is interested in maximizing his own wage income. The workers as a group, corresponding to the group of stockholders in capitalism, are interested in adopting policies which will maximize

$$(2) \quad S = w + \frac{\pi}{x}$$

where π represents profits.

The last term of equation (2) can be divided into two parts since

¹⁴ The Yugoslav wage law cited above provides that time-and-a-half be paid for overtime work, but that such work cannot be paid for unless prior authorization has been obtained from the local government. Apparently there was a tendency to hog the work which, reasonably enough, was frowned upon by the authorities in a labor surplus economy.

¹⁵ The management board has the final decision in the matter of hiring and firing in the Yugoslav firm (with the exception noted above, fn. 11). If it is assumed that the board is composed of workers of relatively long tenure in their employment in the firm, so that they would not be personally affected by a decision to reduce output, aside from the favorable effect on their own income, this assumption may seem reasonable.

¹⁶ All workers and employees, including those whose wage cost to the firm would ordinarily be considered as overhead, are included in the wage cost wx , as a matter of convenience.

average profits per worker consists of the difference between average revenue per worker, U , and average cost per worker, K . The firm will then choose that output which will make the positive difference between U and K a maximum. This would be the output at which

$$(3) \quad dU/dy = dK/dy.$$

This is the Illyrian equivalent of the capitalist condition that price will equal marginal cost under rational management, or of the market socialist rule that managers act so as to set marginal cost equal to price. The Illyrian condition states that wages per worker (or, what amounts to the same thing, profits per worker) are maximized if the competitive firm chooses the output at which marginal revenue-per-worker equals marginal cost-per-worker.¹⁷ This condition has more in common with the capitalist "rule" than with the Lange-Lerner rule. For the Illyrian rule represents the *result* of behavior of a specified kind (wage-maximizing behavior), as does the neoclassical rule (profit-maximizing behavior). In the market socialist economy of the Lange-Lerner type however, the managers are *directed* by the state to act in a certain way, the rule not being connected explicitly with the motivations of the managers.

Equilibrium for the Illyrian competitive firm is described graphically in Figure 1, where the values of U and K are plotted against x . The solution is not altered by making x rather than y the formal choice variable. U has its maximum value at the point at which marginal and average product are equal¹⁸ and declines as the number of workers is either increased or decreased from this value. K , representing average costs per worker, is equal to

$$w + \frac{R}{x}.$$

This curve is a rectangular hyperbola asymptotic to $x = 0$, $K = w$. Profits per worker reach a maximum when the difference between U

¹⁷ Marginal revenue-per-worker, it will be noticed, is not the same thing as marginal revenue per worker. The former measures the change in average revenue per worker brought about by a small change in output, while the latter measures the average marginal revenue per worker. In symbols, marginal revenue-per-worker is:

$$\frac{d(py/x)}{dy} = p \cdot \frac{x - yx'}{x^2}$$

while marginal revenue per worker is:

$$\frac{d(py)/dy}{x} = \frac{p}{x}.$$

¹⁸ From the preceding footnote it can be seen that marginal revenue-per-worker will be zero when x/y equals x' . The shape of the production function ensures that this will be a maximum value for U .

and K is greatest, which is the value of x for which the slopes of U and K are equal. This is point b of Figure 1.

What is the meaning of this equilibrium? How does it compare with the equilibrium position of the traditional firm? We may consider first the effects of changes in the parameters on the Illyrian firm's behavior, and then contrast the equilibrium positions of Illyrian and capitalist firms under similar technological and market conditions.

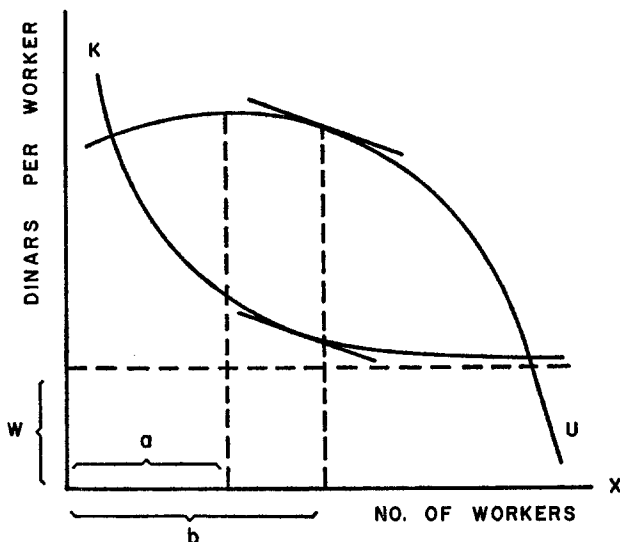


FIGURE 1

Referring to Figure 2, suppose that the firm is in equilibrium producing, under revenue and cost conditions represented by U_1 and K_1 , an output corresponding to the level of employment a . The state now raises the interest rate, so that R is increased. This shifts the cost curve up to K_2 . But at the output corresponding to a , curve K_2 is steeper than is U_1 .¹⁹ That is to say, at employment level a the rate of decrease of average cost per worker is greater than the rate of decrease of average revenue per worker. Consequently it will be to the workers' advantage to raise output until average cost and average revenue per worker are decreasing at the same rate. In Figure 2 this is represented by employment level b where the slopes of U_1 and K_2 are equal. This result can be generalized into the theorem: *A change in the fixed costs of the competitive Illyrian firm leads to a change in output in the same direction.*

¹⁹ Since $K = w + (R/x)$, $dK/dx = -R/x^2$. Therefore, if $R_2 > R_1$, $|dK_2/dx| > |dK_1/dx|$ at $x = a$.

Further increases in R would lead to further increases in output. If K_3 were the relevant cost curve the firm would be earning zero profits. Even if R were increased beyond this point output would continue to increase, as the worker-managers strove to minimize losses. Under these circumstances the workers would be receiving less than the calculated wage w . So long as no better alternatives were available elsewhere the workers would continue to work in the given firm despite this fact, under our assumptions.²⁰ Decreases in R of course have the opposite effect. At $R = 0$, the cost function becomes $K_4 = w$, and output would

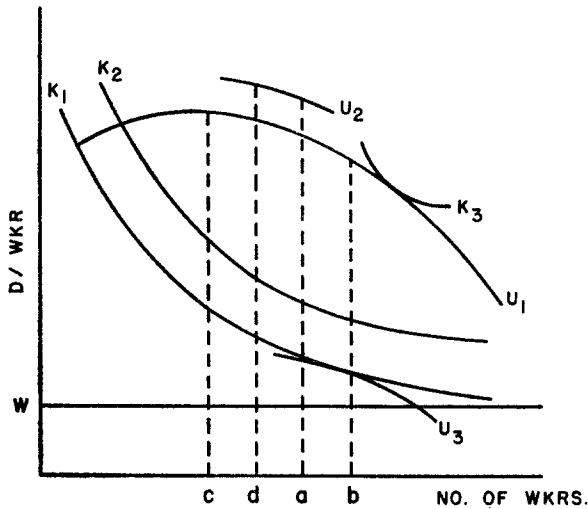


FIGURE 2

be at the level corresponding to the maximum value of U_1 . A negative interest rate would convert K into a hyperbola asymptotic to the same lines as before but located below w on Figure 2. Employment would be less than c and the competitive Illyrian firm would be in equilibrium with average costs falling.²¹

Price changes may be considered in a similar way. Suppose that an increase in demand for the industry's product leads to an increase in the market price p of our firm, which is currently in equilibrium at

²⁰ In Yugoslavia wages up to 80 per cent of the calculated wage are guaranteed by the government. If this were true of Illyria, then at outputs beyond that which yielded 0.8 w to the workers the maximization criterion would cease to apply. Continued operation at such a level would eventually lead to bankruptcy.

²¹ As in capitalism this would only be true over the range in which marginal product was declining. Beyond that range the second-order condition for equilibrium would not be satisfied, so that if a solution existed it would not be a maximum. It may also be noted that over this range of values the supply curve would be positively sloped.

employment level a of Figure 2. This will shift U_1 upwards to position U_2 . But at the current employment level U_2 will be steeper than K_1 .²² That is, at a the rate of decrease of average revenue per worker is greater than the rate of decrease of average cost per worker. Output and employment will contract until these rates are again equal as at employment level d . Our theorem is: *A change in price to the competitive Illyrian firm leads to a change in output in the opposite direction.*

The lower limit to a price-induced output contraction is, roughly speaking, at employment level c where average and marginal product are equal. If falling price were to shift the revenue curve down to U_3 a zero profits position would have been reached. The remarks above regarding operations at a loss would of course apply equally if falling price rather than rising fixed costs were the cause of the losses.²³

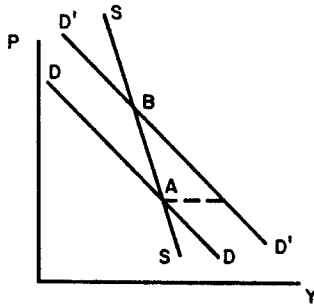


FIGURE 3

Under the usually hypothesized market and technological conditions the Illyrian competitive firm possesses a negatively sloped supply curve. This does not mean however that Illyrian competitive markets are inherently unstable. For example, Figure 3 depicts the industry supply

²² $dU/dx = (p/x)[y' - (y/x)]$. Hence if $p_2 > p_1$ then $|dU_2/dx| > |dU_1/dx|$ at $x = a$.

²³ The effects of changes in p and R can perhaps be seen more clearly by considering the equilibrium condition:

$$(4) \quad \frac{dS}{dx} = \frac{p(xy' - y) + R}{x^2} = 0$$

OR

$$(5) \quad \frac{y}{x} - y' = \frac{R}{px}$$

Thus the right-hand term of (5) measures the difference between average and marginal product in equilibrium, which will be positive (decreasing average product) if R is positive. But the difference between average and marginal product is a monotonic increasing function of output beyond the point of maximum average product (at which point the difference is nil). So, from equation (5), if R is increased, the difference between average and marginal product, and hence equilibrium output, will be increased. On the other hand an increase in p means a decrease in the difference between average and marginal product, and hence a decrease in equilibrium output.

and demand curves in such a market. If demand were to shift from DD to $D'D'$ point A would no longer be an equilibrium position. If this is a "price-adjusting" market in the usual sense, the adjusting mechanism is such that the direction of movement of price over time has the same sign as the amount of excess demand. In the diagram excess demand is now positive, so price increases and eventually equilibrium is restored.

On the other hand, if the demand curve has a steeper slope than the supply curve the adjusting mechanism described above will lead away from equilibrium and the market will be unstable. To be assured of stability this possibility must be avoided, which means that some further constraint must be imposed on the structure of the firm specified above.²⁴ The problem of instability is most likely to arise when product demand is relatively inelastic, or when marginal product is relatively large and declining slowly as output increases.

If the state changes the calculated wage w there is no change in any of the variables relevant to the firm. The K function (*cf.* Figure 1) shifts vertically up or down as a result. The income of the workers is unchanged, though relatively more income is in the form of profits (if w is reduced) and relatively less in the form of wages.²⁵

The Illyrian equilibrium can now be contrasted with its capitalist counterpart. Consider two firms, one in Illyria, the other in a capitalist country. They have identical production functions and are operating in purely competitive markets. In addition, market prices are equal in both cases, as are fixed costs, and the Illyrian calculated wage w_l equals the going capitalist wage w_c . In Figure 4 the U and K functions describe the revenue and cost positions of the Illyrian firm under alternative levels of employment. The rates of change are also drawn in. At the intersection of the latter the Illyrian firm is in equilibrium, producing the output corresponding to employment x_l .

In describing the equilibrium of the capitalist firm it will first be noted that U also expresses the value of the average product of the capitalist firm under our assumptions, since $U = py/x$. The capitalist value-of-the-marginal-product function bears the usual relation to U , and the capitalist output is found at the point x_c where VMP equals the wage, since output y_c is a single-valued function of labor input.²⁶

In the diagram the capitalist output exceeds that of the Illyrian firm. But this need not be the case. For example, by increasing w_c it would be possible to reduce the equilibrium output level of this firm to the Illyrian level or even below. Under our assumptions a necessary and

²⁴ See the Mathematical Appendix.

²⁵ See note 13 above.

²⁶ We are assuming that the capitalist firm too can vary only the number of workers employed and not the hours of work.

sufficient condition that the outputs of the two firms be equal is that the equilibrium marginal products be equal. The capitalist value of the marginal product is equal to w_c . In Illyria the value of the marginal product is equal to the "full" wage, *i.e.*, the calculated wage plus the profits share to each worker.²⁷ Therefore the Illyrian full wage equals the capitalist wage and equality of outputs implies zero profits.²⁸

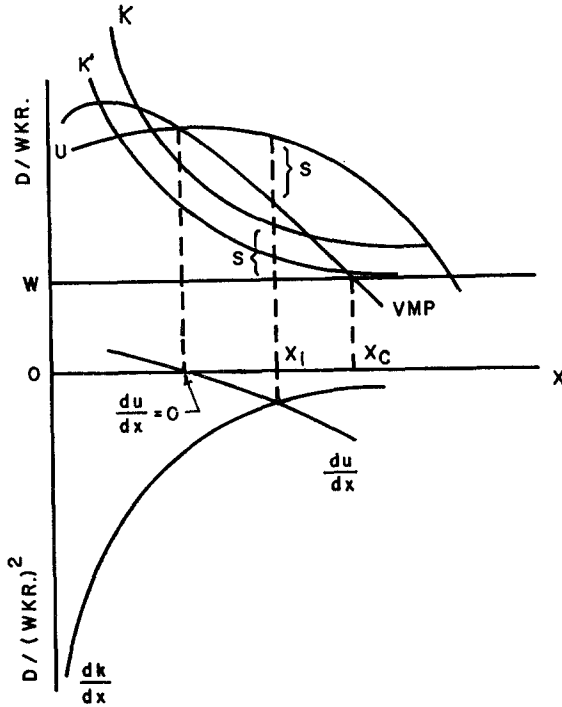


FIGURE 4

Thus the Illyrian firm is capable of producing in the short run at a level equal to or even greater than that of its capitalist counterpart. And the state can affect output decisions of the firm via its ability to alter the parameter R . If it is willing to use the fixed tax for capital use as an instrument of policy in attaining desired levels of output, and consequently is willing to make discriminatory charges on this basis, it may create an environment in which it is in the material interests of the worker-managers to produce at the competitive capitalist output, or at some other preferred rate. Alternatively, if the industry were in long-

²⁷ From equations (2) and (5), $S = (py - R)/x = py'$ in equilibrium.

²⁸ We assumed at the start that $w_l = w_c$. Since the value of w_l really does not make any difference, a more significant statement would be: equality of outputs implies equal wages.

run equilibrium in both countries and demand, labor force, etc., conditions were identical, both firms would produce the same output.

Finally, the case of constant average product y/x may be noted. In capitalism this means one of three things: (1) if $VMP > w$ the firm produces at capacity; (2) if $VMP < w$ the firm produces nothing; and (3) if $VMP = w$ output is indeterminate. In the Illyrian case this means that U is a horizontal line. The maximum positive, or minimum negative, difference between U and K consequently is at infinity whatever the position of U on the diagram. The Illyrian firm produces at capacity when marginal and average product are equal.

III. *The Case of Two Variable Inputs*

In Illyria a single class of inputs, labor, is singled out for special treatment. The distinctive features of Illyrian behavior stem entirely from this fact. By extending our previous model to include the use by the firm of a variable nonlabor input, the special position of labor in the firm can be brought out more clearly. The production function will now have the two arguments,

$$(6) \quad y = f(x, z).$$

If the usual assumptions of positive marginal products and diminishing returns to the factors are made, the equilibrium condition for labor use will correspond to that in Section II, i.e., the value of the marginal product of labor will be equal to the full wage. For the nonlabor input however the value of the marginal product will be equal to the price v of the input.²⁹ The workers react to changes in nonlabor inputs in the same manner as do capitalists: they will increase their use of the factor as long as it contributes more to revenue than to cost. On the other hand they seem to use a different criterion in evaluating labor use. An additional laborer must contribute more to revenue per worker than to cost per worker in order for him to be employed. In fact, *only* the latter criterion is being employed in the model. It simply happens that the capitalist and Illyrian criteria lead to the same behavior with regard to nonlabor inputs. Whenever one of these factors contributes more to revenue than to cost it also contributes more to revenue per worker than to cost per worker. As a result the equilibrium conditions are the same. However the two criteria do not lead to the same behavior when it comes to labor use. Because each laborer gets a share of the profits it does not follow that an additional worker who contributes more to revenue than to cost will necessarily also contribute more to revenue per worker than to cost per worker. As a result the equilibrium conditions for labor use are not the same in the two regimes.

An analysis of the effects of changes in the parameters R and p leads

²⁹ See the Mathematical Appendix for derivations in the two-variable-input case.

to less clear results in the two-input case than it did in Section II: In the case of a change in fixed costs the analysis may be illustrated by means of the factor allocation diagrams of Figure 5. The curves in 5A are drawn on the assumption of a fixed input of factor z and those in 5B on the assumption of a fixed level of employment. From an initial position of equilibrium in which x_1 of x and z_1 of z are being used, fixed cost is increased. This shifts K_1 upward to K_2 , increasing labor input from x_1 to x_2 , and consequently tending to increase output. However, there is now an additional effect which must be taken into account: namely the effect of the increase in labor use on the marginal product of the nonlabor input. If the latter is unaffected or increases, shifting VMP_1 upwards to VMP_2 , the increase in output is either unaffected or

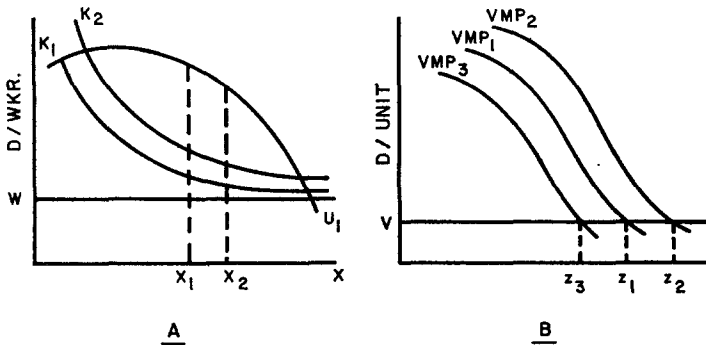


FIGURE 5

magnified. However, if VMP is reduced by the increased labor use the amount of z used decreases, and the output effect of the increase in fixed cost is indeterminate by means of qualitative analysis alone. The latter, however, is a rather unlikely eventuality, since in the short run more labor will generally not decrease the usefulness of the other variable factors, and conversely. Consequently a change in fixed cost in the multifactor case will also tend to lead to a change in output in the same direction.

A more serious indeterminacy appears in the analysis of price changes. Without a good deal more information it is not possible to state the effect on output of a change in price. The possibility of a positively inclined supply curve emerges clearly however, and some presumption that the danger of instability, resulting from a negatively inclined and relatively elastic supply curve, has diminished. Whether or not a negatively sloped supply curve will result in the multifactor case depends on the relative importance of labor in the bill of inputs.³⁰

Similarly, changes in the parameter v , the supply price of the non-

³⁰ Cf. equation (20) in the Appendix.

labor input z , have indeterminate effects on output. This is also true in the case of analysis of the capitalist firm with the same amount of information, though information sufficient to remove the indeterminacy in one case may not be sufficient in the other.

The statements made in Section I comparing competitive capitalism with competition in Illyria generally apply in the somewhat more complicated two-variable-input case. We will consider here the problem of comparative factor allocation. As before our two firms have identical production functions and are operating under identical market conditions so that:

$$p^I = p^C$$

$$w^I = w^C$$

$$v^I = v^C$$

$$R^I = R^C$$

the superscripts standing for "Illyria" and "Capitalism" respectively.

The situation is described in Figure 6 in which isoquants Q_i which are identical for both firms are drawn. Let us assume first that the capitalist firm is producing output Q_1 . BB is the factor-cost line based on the values of w and v , so that the capitalist firm is in equilibrium at a factor mix represented by point N . Let us assume further that the capitalist firm is earning a profit at this level of operation. At the same output the Illyrian firm would be earning a profit too. But it would not be in equilibrium at point N . This is because BB is not the relevant factor cost line for the Illyrian firm. Since in Illyria the value of the marginal product of labor is equated to the full wage, i.e., including the profits share, BA , representing a larger wage "cost," is the relevant one for the Illyrian allocation decision. The Illyrian firm is in equilibrium then at point M , producing less output and using less labor than its capitalist counterpart.

Suppose now that market price falls to the zero profits point. Capitalist output and factor mix contract along Y^C , say to point L . Illyrian output and factor mix contract along Y^I , but also to point L , since the zero-profits full wage is equal to w . If price should fall further so that both firms are incurring losses the full wage will then be less than w . For example, under conditions which would lead the capitalist firm to produce at H , the Illyrian firm would produce at J . The Illyrian firm would produce more than the capitalist firm and would use more labor, so as to spread the losses around among as many of the worker-managers as possible.

The Y^I line, like Y^C , is positively sloped in the diagram, indicating that supply responds positively to an increase in price. It is perfectly

possible for Y^I to have a negative slope under suitable cost and technological conditions, but it will still intersect Y^C at the zero-profits point.³¹

As a final aspect of the multiple-input case we may consider a firm which is highly automated so that labor does not enter significantly into the short-run production function as a variable input. In this case fac-

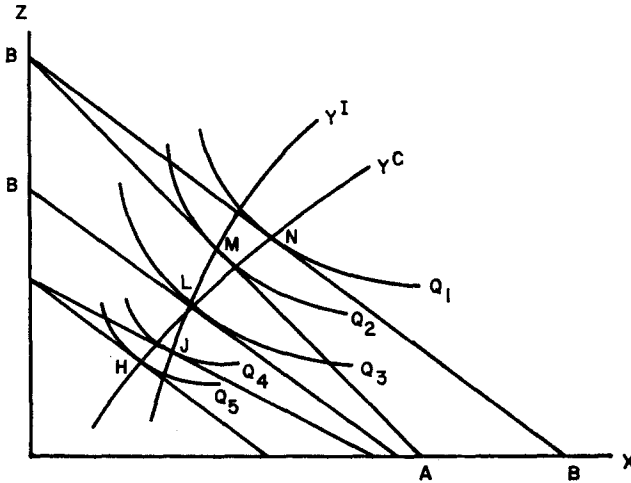


FIGURE 6

tor use and output are determined by the usual equilibrium conditions of capitalism. That is, with a fixed labor force any addition to profits is also an addition to profits per worker. Such a firm would behave in exactly the same way as its capitalist counterpart, equating marginal cost to price and the marginal value products to the fixed input prices.

IV. Market Imperfections

Illyria must pay a price for its decentralized pricing system in the form of imperfect markets. For the worker-managers no less than their capitalist counterparts have an incentive to profit from the negatively inclined demand schedule that must in many instances confront them. The whole congeries of market types from monopoly to monopolistic competition, including the usual forms of collusion, could emerge under Illyrian conditions. Alterations in the previous models required to take

³¹ Figure 6 may also be used to contrast other comparative static changes. For example, an increase in w will increase the slope of BB without affecting that of BA . This will tend to move the capitalist equilibrium position at N closer to the Illyrian at M . An increase in R on the other hand will tend to make BA less steep without affecting the slope of BB . This will tend to move the Illyrian equilibrium position at M closer to the capitalist at N . When the equilibria coincide in either case profits will be zero.

account of such market imperfections in most instances are not extensive. For example, the monopoly solution in the single-variable-input case can be discussed by means of Figure 2 (p. 574) if the U function is reinterpreted to take account of the fact that price is now a variable rather than a parameter of the system. That is, any point on U would now represent the average revenue that would accrue to the monopoly from selling the output the x workers are capable of producing at the price offered for that quantity by buyers. The result is that factors are used up to the point at which the marginal revenue product equals the (assumed perfectly elastic) supply price in the case of nonlabor inputs, and to the point at which marginal revenue product equals the "full" wage for labor inputs.³² Output will be less than in competition under the usual conditions.

There is one factor market which exhibits a special rigidity in Illyria; namely the labor market. The situation can be illustrated by assuming away all the customary forms of rigidity in the labor market such as trade unions, barriers to training, imperfect knowledge, etc. If labor is a homogeneous factor well informed and concerned to better its material position as far as possible, we may assume the supply to depend solely on the wage offered. If profits figures are published or otherwise available it is the full wage that will determine the offer of labor power. Suppose that from an initial position of equilibrium the supply schedule for labor shifts up, leading to excess demand. Ignoring the influence of varying employment levels on product demand, the marginal firms are now unable to obtain labor at the going wage rate. But they are also unable to offer higher wages, since the wage rate was already at a maximum. As a result of the rigidity of the wage offer there will be no forces set in motion in the short run to correct a disequilibrium, and the shortage of workers will in itself tend to depress the wage paid by the marginal firms, since profits can no longer be maximized.

If excess supply of labor should develop, a similar rigidity would occur. Workers are willing to offer themselves at lower wage rates, but these rates cannot legally be paid. Consequently the excess supply will persist. Only entry or departure by some firms would be capable of changing the situation; i.e., by changes in the quantities demanded in each case rather than by alterations in the market price of labor.

If profit rates were kept secret it might be possible to create a supply function in which the nominal wage w_1 was the independent variable. In this case, when excess demand appeared the state could raise the nominal rate sufficiently to attract the needed number of workers into the market. This change in the wage would not affect the full wage or

³² See Appendix, note 2.

the product market positions.³³ That is, it would affect only the supply of labor, not the demand. However it would be rather difficult to keep all information regarding profits from the labor market when all recipients of profits or losses were also workers.

V. *Concluding Remarks*

1. The zero-profit output of the competitive Illyrian and competitive capitalist firms will be identical, given the same market and technological conditions for the two firms. This suggests that in the long run the Illyrian conditions under competition could lead to an optimal allocation of resources wherever the capitalist competitive regime would. However we have not discussed conditions of entry in Illyria. Entry could occur either by creation of new firms by the state, or by expansion of existing firms, or by some provision for individual or decentralized group initiative in starting new enterprises. All three possibilities exist in Yugoslavia but it is not possible to discuss them here. It will merely be noted that there is likely to be strong resistance by the Illyrian worker-managers to ploughing back profits, since this would involve a reduction in the current profits share. This will be true if relatively low-income entrepreneurs are likely to be more myopic than relatively high-income ones. Something additional to worker self-interest might well be necessary in the Illyrian environment to ensure entry equivalent to that under capitalism.

2. Market imperfections stemming from the ability of the seller (or buyer) to influence the market price by varying his rate of output lead generally to a lower level of output and a higher price than the competitive rates, in Illyria as in capitalism. This has been a persistent problem in Yugoslavia from the beginning of the new system [7, p. 16] [4, 1953, 2, 443-44] [4, 1954, 3, 841-42] and has led to the promulgation of an "antitrust" law.³⁴ The state's broad rights of intervention might seem to offer more favorable opportunities for controlling such behavior, but persistent complaints in the Yugoslav press suggest that control of monopoly has not been notably successful.³⁵ Of course Yugoslavia, being a rather small country with an underdeveloped industrial sector and communications network, and with a balance-of-payments

³³ However, with a progressive profits tax, as exists in Yugoslavia, the full wage will be reduced, *ceteris paribus*, by a decrease in w , since a larger proportion of the wage bill would become taxable; and of course the full wage would increase with an increase in the calculated wage.

³⁴ [17, No. 56, 1953, item 483, esp. Article 74]. The language is fully as vague as that of the Sherman Act, among other things forbidding firms from doing anything which leads to a "monopoly position in the market."

³⁵ See however [4, 1953, 2, 1034] for a description of the refusal of a Yugoslav court to uphold a contract which was in restraint of trade.

problem which has led to a large number of restrictions on competitive imports, has considerable initial disadvantages to overcome in developing a purely competitive market.

3. A special stability problem arises in Illyria, since firms may react to a price change by altering the rate of output in the opposite direction (negatively sloped supply schedule), a situation which is more likely to occur the more important labor is as an input. Since a good deal of new plant has been installed in Yugoslavia since 1952, this would be a difficult hypothesis to test. Indeed, our model does not tell us anything at all about what to expect if there is in fact instability in a market. In addition it is probable that in a large number of Yugoslav firms policy decisions are made by the director without much reference to the wage-maximizing desires of the workers. Though directors also share in the profits, it is likely that other motives also exist for them which might lead to different behavior as regards price and output and input policy.³⁶

4. The beginning student of economics would undoubtedly be delighted to learn that in Illyria an increase in fixed costs would really lead to an increase in output so as to spread out the increased burden over a larger number of units. I have seen no evidence to indicate that the Yugoslav authorities have varied the interest rate on existing capital for purposes of output control, though discrimination has been practiced which is consistent with such an aim.³⁷

5. The labor market possesses a rigidity which prevents adjustment of supply and demand to restore a displacement from equilibrium. It is true that in Yugoslavia there has been some excess supply of labor at least since the institution of the new economic system in 1952 [4, 1953, 2, 182-83] [9], though this can be explained as well by other factors operating generally in a labor market in an underdeveloped country (and by the successive droughts) as by means of this theorem. In this excess-supply situation some incentive probably exists for the firm to practice a form of illegal discrimination which is related to the specific rigidity described above. This could be done by means of an illegal contract to hire workers who would agree to work for the contractual wage rate for unskilled workers and renounce their right to profits.³⁸

³⁶ See [19] for a discussion of the relative influence of director, management board and workers' council within the firm. For example, directors are often in close contact with local government officials. One possible result of ties of this kind might be profit-maximizing behavior, as mentioned in note 38 below.

³⁷ [16, pp. 132-33]. In the 1954 plan, for example, the standard rate was 6 per cent, but in some types of construction no interest at all was charged, while elsewhere a rate of 2 per cent was charged. It is certainly true that the state was specially interested in increasing output in the favored areas. It does not necessarily follow however that the planners had the mechanism operative in our model in mind in granting the favors.

³⁸ A phenomenon known as the "dead brigades" (*mrtvi brigadi*) may have been an instance of this [4, 1953, 2, 1034] [9, p. 487]. For example the coal mining concern men-

Finally, outside pressure by various groups, but especially by the people's committees, the organs of local government, seems to have had considerable effect on decision-making by the firm in Yugoslavia. We will note only one example. The people's committees possess the right to a portion of the profits of every firm within their territory. This has led them to influence the firms' policies and to take other steps to siphon funds from the firms into the treasury of the local government.³⁹ The actions of local governments and other administrative bodies, plus fears of administrative intervention, undoubtedly result in significant differences in the behavior of firms in Yugoslavia and Illyria. These factors, plus the relatively large role the director seems to play in *de facto* decision-making within the Yugoslav firm, provide the chief limitations to the application of the above analysis to current operations in Yugoslavia. The model's relevance to Yugoslavia may be somewhat increased if it is assumed that the legal framework is descriptive of an ultimate purpose on the part of the Yugoslav leadership.

In summary, market syndicalism differs from market socialism in that in the former (1) both price and output decisions are decentralized to the level of the firm; (2) the workers employed in each firm control policy making; and (3) material interest is the governing incentive. Some of the arguments in favor of market syndicalism as a nonbureaucratic alternative to other forms of socialism would bear a striking resemblance to those of the economic liberal when attacking some tendencies of contemporary capitalism; and conversely for arguments against market syndicalism. However it would not be seemly to discuss these issues until some other properties of the Illyrian economy, such as the investment decision, multiple market stability and macroeconomics, have been investigated.

MATHEMATICAL APPENDIX

1. *The Condition for Stability in a Single Competitive Illyrian Market under the Assumptions of Section II.*

From equations (2) and (3) in the text

$$(7) \quad S = \frac{py}{x} - w - \frac{R}{x}$$

tioned on p. 568 above might hire an unskilled worker for 6000 dinars per month, which would add 8100 dinars to the calculated wage fund, i.e., to labor cost in the accounting sense. This would substantially reduce accounting profits and hence the amount of taxation under the steeply progressive profits tax law. If the firm expected to make a fairly high level of profits, this could be to the monetary advantage of the "in-group" workers even if the newly hired worker performed no work at all. From the above descriptions it seems that the dead brigades in fact had little to do. In some cases the dead brigades were in fact "dead souls," fictitious employees.

³⁹ [8, p. 159] [5]. The people's committee would be interested in the level of profits per se, rather than in profits per worker, so that within the framework of our model such disagreements over price-output policy could arise.

so that

$$(8) \quad \frac{dS}{dy} = \frac{p(x - yx') + Rx'}{x^2} = 0$$

where $x' \equiv dx/dy$. The equilibrium condition $S' = px - pyx' + Rx' = 0$ may be differentiated with respect to the parameter p :

$$\begin{aligned} \frac{\partial S'}{\partial p} \Big|_R &= \frac{dS'}{dy} \frac{\partial y}{\partial p} \Big|_R + \frac{\partial S'}{\partial p} \Big|_{u,R} \equiv 0 \\ &= (-pyx'' + Rx'')(\partial y/\partial p) + (x - yx') \equiv 0 \end{aligned}$$

or the slope of the firm's supply function:

$$(9) \quad \frac{\partial y}{\partial p} = \frac{yx' - x}{x''(R - py)}$$

But $(R - py) = -pxy'$, since the equilibrium is preserved along the supply function. So supply elasticity:

$$(10) \quad \eta_s \equiv \frac{p}{y} \frac{\partial y}{\partial p} = \frac{x'}{xx''} \left(\frac{x}{y} - x' \right) < 0,$$

except over the relatively unimportant range in which average product is equal to or less than marginal product. Note that

$$x'' \equiv \frac{d^2x}{dy^2} = \frac{y''}{(-y')^3} > 0, \quad \text{where} \quad y'' \equiv \frac{d^2y}{dx^2}.$$

We are assuming a price-adjusting market in which the existence of excess demand leads to price increases over time in the case of excess demand and of decreases in the case of excess supply. Such a market will be stable when the supply curve is negatively sloped provided $\eta_D > \eta_s$. If we assume that production functions of all firms are identical, elasticity is invariant under the summation from firm to industry supply function. Thinking then in terms of industry demand and firm supply conditions, we have:

$$(11) \quad \eta_D > \eta_s = \frac{x'}{xx''} \left(\frac{x}{y} - x' \right)$$

as a necessary and sufficient condition for stability.

2. Monopoly with One Variable Input.

Equation (7) applies in this case, except that p is now a variable. Assume

$$(12) \quad p = g(y, \alpha)$$

such that $\partial p/\partial y < 0$ and α , a shift parameter, is defined so that $\partial p/\partial \alpha > 0$ and further that $\partial p/\partial y$ remains invariant under the shift. Differentiating (7) with respect to y and solving for the first order condition for a maximum ($y' \equiv 1/x'$):

$$(13) \quad y'(p + p'y) = (py - R)/x, \quad \text{where} \quad p' = \frac{\partial p}{\partial y} \Big|_{\alpha}$$

Equation (13) may be differentiated with respect to R and α , respectively, and solved for:

$$\frac{\partial y}{\partial R} = - \frac{x'}{2p'x + p''xy - x''(py - R)}$$

and

$$\frac{\partial y}{\partial \alpha} = \frac{(\partial p/\partial \alpha)(x'y - x) - xy \left(\frac{\partial^2 p}{\partial y \partial \alpha} \right)}{2p'x + p''xy - x''(py - R)}.$$

Knowledge of signs tells us that, as long as the demand curve is linear or convex to the origin, a change in R leads to a change in y in the same direction. With a similar demand curve, an upward shift in demand of the hypothesized kind will lead to a decrease in output if the firm is operating beyond the point of maximum average product, but an increase in output if average product is still increasing.

3. The Two-Variable-Input Case.

$$(14) \quad S = \frac{1}{x} [py - (wx + vz + R)]$$

and

$$(15) \quad \begin{aligned} y &= f(x, z), & y_x &> 0, & y_z &> 0, \\ y_{xx} &< 0, & y_{zz} &< 0, & \text{and } y_{xz}y_{zz} - y_{zz}^2 &> 0. \end{aligned}$$

Applying the first-order conditions for a maximum,

$$(16) \quad \partial S/\partial x = (1/x^2)[p(xy_x - y) + vz + R] = 0$$

and

$$(17) \quad \partial S/\partial z = (1/x)(py_z - v) = 0$$

or

$$(18) \quad py_x = \frac{py - (vz + R)}{x}$$

and

$$(19) \quad py_z = v.$$

Further differentiation of (16) and (17) gives, at the equilibrium position at which (18) and (19) are satisfied,

$$\partial^2 S/\partial x^2 = py_{xx}/x < 0,$$

$$\partial^2 S/\partial z^2 = py_{zz}/x < 0,$$

$$\partial^2 S/\partial x \partial z = py_{xz}/x$$

and

$$\frac{\partial^2 S}{\partial x^2} \frac{\partial^2 S}{\partial z^2} - \left(\frac{\partial^2 S}{\partial x \partial z} \right)^2 = \frac{p^2}{x^2} (y_{xz}y_{zz} - y_{zz}^2) > 0.$$

Therefore equations (18) and (19) determine a maximum. Both the latter equations can be differentiated with respect to R and with respect to p and solved for:

$$\frac{\partial x}{\partial R} = \frac{\begin{vmatrix} -1 & (pxy_{zz}) \\ 0 & (py_{zz}) \end{vmatrix}}{p^2x \begin{vmatrix} y_{xx} & y_{zz} \\ y_{xz} & y_{zz} \end{vmatrix}} > 0,$$

$$\frac{\partial z}{\partial K} = \frac{\begin{vmatrix} (pxy_{zz}) & -1 \\ (py_{zz}) & 0 \end{vmatrix}}{p^2x \begin{vmatrix} y_{xx} & y_{zz} \\ y_{xz} & y_{zz} \end{vmatrix}} \stackrel{\text{IV}}{\leq} 0,$$

$$\frac{\partial x}{\partial p} = \frac{\begin{vmatrix} (y - xy_z) & (pxy_{zz}) \\ (-y_z) & (py_{zz}) \end{vmatrix}}{p^2x \begin{vmatrix} y_{xx} & y_{zz} \\ y_{xz} & y_{zz} \end{vmatrix}} \stackrel{\text{V}}{\geq} 0 \quad \frac{\partial z}{\partial p} = \frac{\begin{vmatrix} (pxy_{zz}) & (y - xy_z) \\ (py_{zz}) & (-y_z) \end{vmatrix}}{p^2x \begin{vmatrix} y_{xx} & y_{zz} \\ y_{xz} & y_{zz} \end{vmatrix}} \stackrel{\text{VI}}{\leq} 0.$$

The slope of the supply function at the equilibrium point,

$$\begin{aligned} \frac{\partial y}{\partial p} &= y_x \frac{\partial x}{\partial p} + y_z \frac{\partial z}{\partial p} \\ (20) \quad &= \frac{[y_{zz}y_x(y - xy_z) - xy_z^2y_{xx} + y_{zz}(xy_zy_z - yy_z + xy_z)]}{p^2x(y_{xx}y_{zz} - y_{xz}^2)} \stackrel{\text{VII}}{\geq} 0 \end{aligned}$$

The denominator is positive, but the numerator is undetermined in sign with the specified information.

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