

## XXVI. THE IMPOSSIBILITY OF ECONOMIC CALCULATION UNDER SOCIALISM

### 1. The Problem

**T**HE director wants to build a house. Now, there are many methods that can be resorted to. Each of them offers, from the point of view of the director, certain advantages and disadvantages with regard to the utilization of the future building, and results in a different duration of the building's serviceableness; each of them requires other expenditures of building materials and labor and absorbs other periods of production. Which method should the director choose? He cannot reduce to a common denominator the items of various materials and various kinds of labor to be expended. Therefore he cannot compare them. He cannot attach either to the waiting time (period of production) or to the duration of serviceableness a definite numerical expression. In short, he cannot, in comparing costs to be expended and gains to be earned, resort to any arithmetical operation. The plans of his architects enumerate a vast multiplicity of various items in kind; they refer to the physical and chemical qualities of various materials and to the physical productivity of various machines, tools, and procedures. But all their statements remain unrelated to each other. There is no means of establishing any connection between them.

Imagine the plight of the director when faced with a project. What he needs to know is whether or not the execution of the project will increase well-being, that is, add something to the wealth available without impairing the satisfaction of wants which he considers more urgent. But none of the reports he receives give him any clue to the solution of this problem.

We may for the sake of argument at first disregard the dilemmas involved in the choice of consumers' goods to be produced. We may assume that this problem is settled. But there is the embarrassing multitude of producers' goods and the infinite variety of procedures that can be resorted to for manufacturing definite consumers' goods. The most advantageous location of each industry and the optimum size of each plant and of each piece of equipment must be

determined. One must determine what kind of mechanical power should be employed in each of them, and which of the various formulas for the production of this energy should be applied. All these problems are raised daily in thousands and thousands of cases. Each case offers special conditions and requires an individual solution appropriate to these data. The number of elements with which the director's decision has to deal is much greater than would be indicated by a merely technological description of the available producers' goods in terms of physics and chemistry. The location of each of them must be taken into consideration as well as the serviceableness of the capital investments made in the past for their utilization. The director does not simply have to deal with coal as such, but with thousands and thousands of pits already in operation in various places, and with the possibilities for digging new pits, with the various methods of mining in each of them, with the various methods for utilizing the coal for the production of heat, power, and a great number of derivatives. It is permissible to say that the present state of technological knowledge makes it possible to produce almost anything out of almost everything. Our ancestors, for instance, knew only a limited number of employments for wood. Modern technology has added a multitude of possible new employments. Wood can be used for the production of paper, of various textile fibers, of foodstuffs, drugs, and many other synthetic products.

Today two methods are resorted to for providing a city with clean water. Either one brings the water over long distances in aqueducts, an ancient method long practiced, or one chemically purifies the water available in the city's neighborhood. Why does one not produce water synthetically in factories? Modern technology could easily solve the technological problems involved. The average man in his mental inertia is ready to ridicule such projects as sheer lunacy. However, the only reason why the synthetic production of drinking water today—perhaps not at a later day—is out of the question is that economic calculation in terms of money shows that it is a more expensive procedure than other methods. Eliminate economic calculation and you have no means of making a rational choice between the various alternatives.

The socialists, it is true, object that economic calculation is not infallible. They say that the capitalists sometimes make mistakes in their calculation. Of course, this happens and will always happen. For all human action points to the future and the future is always uncertain. The most carefully elaborated plans are frustrated if expectations concern-

ing the future are dashed to the ground. However, this is quite a different problem. Today we calculate from the point of view of our present knowledge and of our present anticipation of future conditions. We do not deal with the problem of whether or not the director will be able to anticipate future conditions. What we have in mind is that the director cannot calculate from the point of view of his own present value judgments and his own present anticipations of future conditions, whatever they may be. If he invests today in the canning industry, it may happen that a change in consumers' tastes or in the hygienic opinions concerning the wholesomeness of canned food will one day turn his investment into a malinvestment. But how can he find out *today* how to build and equip a cannery most economically?

Some railroad lines constructed at the turn of the century would not have been built if people had at that time anticipated the impending advance of motoring and aviation. But those who at that time built railroads knew which of the various possible alternatives for the realization of their plans they had to choose from the point of view of their appraisements and anticipations and of the market prices of their day in which the valuations of the consumers were reflected. It is precisely this insight that the director will lack. He will be like a sailor on the high seas unfamiliar with the methods of navigation, or like a medieval scholar entrusted with the technical operation of a railroad engine.

We have assumed that the director has already made up his mind with regard to the construction of a definite plant or building. However, in order to make such a decision he already needs economic calculation. If a hydroelectric power station is to be built, one must know whether or not this is the most economical way to produce the energy needed. How can he know this if he cannot calculate costs and output?

We may admit that in its initial period a socialist regime could to some extent rely upon of the preceding age of capitalism. But what is to be done later, as conditions change more and more? Of what use could the prices of 1900 be for the director in 1949? And what use can the director in 19890 derive from the knowledge of the prices of 1949?

The paradox of "planning" is that it cannot plan, because of the absence of economic calculation. What is called a planned economy is no economy at all. It is just a system of groping about in the dark. There is no question of a rational choice of means for the best possible attain-

ment of the ultimate ends sought. What is called conscious planning is precisely the elimination of conscious purposive action.

## 2. Past Failures to Conceive the Problem

For more than a hundred years the substitution of socialist planning for private enterprise has been the main political issue. Thousands and thousands of books have been published for and against the communist plans. No other subject has been more eagerly discussed in private circles, in the press, in public gatherings, in the meetings of learned societies, in election campaigns, and in parliaments. Wars have been fought and rivers of blood have been shed for the cause of socialism. Yet in all these years the essential question has not been raised.

It is true that some eminent economists—Hermann Heinrich Gossen, Albert Schaffle, Vilfredo Pareto, Nikolaas G. Pierson, Enrico Barone—touched upon the problem. But, with the exception of Pierson, they did not penetrate to the core of the problem, and they all failed to recognize its primordial importance. Neither did they venture to integrate it into the system of their theory of human action. It was these failures which prevented people from paying attention to their observations. They were disregarded and soon fell into oblivion.

It would be a serious mistake to blame the Historical School and Institutionalism for this neglect of mankind's most vital problem. These two lines of thought fanatically disparage economics, the "dismal science," in the interests of their interventionist or socialist propaganda. However, they have not succeeded in suppressing the study of economics entirely. The puzzling thing is not why the detractors of economics failed to recognize the problem, but why the economists were guilty of the same fault.

It is the two fundamental errors of mathematical economics that must be indicted.

The mathematical economists are almost exclusively intent upon the study of what they call economic equilibrium and the static state. Recourse to the imaginary construction of an evenly rotating economy is, as has been pointed out,<sup>1</sup> an indispensable mental tool of economic reasoning. But it is a grave mistake to consider this auxiliary tool as anything else than an imaginary construction, and to overlook the fact

1. Cf. above, pp. 246-250.

that it has not only no counterpart in reality, but cannot even be thought through consistently to its ultimate logical consequences. The mathematical economist, blinded by the prepossession that economics must be constructed according to the pattern of Newtonian mechanics and is open to treatment by mathematical methods, misconstrues entirely the subject matter of his investigations. He no longer deals with human action but with a soulless mechanism mysteriously actuated by forces not open to further analysis. In the imaginary construction of the evenly rotating economy there is, of course, no room for the entrepreneurial function. Thus the mathematical economist eliminates the entrepreneur from his thought. He has no need for this mover and shaker whose never ceasing intervention prevents the imaginary system from reaching the state of perfect equilibrium and static conditions. He hates the entrepreneur as a disturbing element. The prices of the factors of production, as the mathematical economist sees it, are determined by the intersection of two curves, not by human action.

Moreover, in drawing his cherished curves of cost and price, the mathematical economist fails to see that the reduction of costs and prices to homogeneous magnitudes implies the use of a common medium of exchange. Thus he creates the illusion that calculation of costs and prices could be resorted to even in the absence of a common denominator of the exchange ratios of the factors of production.

The result is that from the writings of the mathematical economists the imaginary construction of a socialist commonwealth emerges as a realizable system of cooperation under the division of labor, as a full-fledged alternative to the economic system based on private control of the means of production. The director of the socialist community will be in a position to allocate the various factors of production in a rational way, i.e., on the ground of calculation. Men can have both socialist cooperation under the division of labor and rational employment of the factors of production. They are free to adopt socialism without abandoning economy in the choice of means. Socialism does not enjoin the renunciation of rationality in the employment of the factors of production. It is a variety of *rational* social action.

An apparent verification of these errors was seen in the experience of the socialist governments of Soviet Russia and Nazi Germany. People do not realize that these were not isolated socialist systems. They were operation in an environment in which the price system still worked. They could resort to economic calculation on the ground of the prices established abroad. Without the aid of these prices their actions would have been aimless and

planless. Only because they were able to refer to these foreign prices were they able to calculate, to keep books, and to prepare their much talked about plans.

### 3. Recent Suggestions for Socialist Economic Calculation

The socialist tracts deal with everything except the essential and unique problem of socialism, viz., economic calculation. It is only in the last years that socialist writers have no longer been able to avoid paying attention to this primordial matter. They have begun to suspect that the Marxian technique of smearing "bourgeois" economics is not a sufficient method for the realization of the socialist utopia. They have tried to substitute a theory of socialism for the scurrilous Hegelian metaphysics of the Marxian doctrine. They have embarked upon designing schemes for socialist economic calculation. Of course, they have lamentably failed in this task. It would hardly be necessary to deal with their spurious suggestions were it not for the fact that such examination offers a good opportunity to bring into relief fundamental features both of the market society and of the imaginary construction of a nonmarket society.

The various schemes proposed can be classified in the following way:

1. Calculation in kind is to be substituted for calculation in terms of money. This method is worthless. One cannot add or subtract numbers of different kinds (heterogeneous quantities).<sup>2</sup>

2. Starting from the ideas of the labor theory of value, the labor-hour is recommended as the unit of calculation. This suggestion does not take into account the original material factors of production and ignores the different qualities of work accomplished in the various labor-hours worked by the same and by different people.

3. The unit is to be a "quantity" of utility. However, acting man does not measure utility. He arranges it in scales of gradation. Market prices are not expressive of equivalence, but of a divergence in the valuation of the two exchanging parties. It is impermissible to neglect the fundamental theorem of modern economics, namely, that the value attached to one unit of a supply of  $n-1$  units is greater than that attached to one unit of a supply of  $n$  units.

2. It would hardly be worth while even to mention this suggestion if it were not the solution that emanated from the very busy and obtrusive circle of the "logical positivists" who flagrantly advertise their program of the "unified science." Cf. the writings of the late chief organizer of this group, Otto Neurath, who in 1919 acted as the head of the socialization bureau of the short-lived Soviet republic of Munich, especially his *Durch die Kriegswirtschaft zur Naturalwirtschaft* (Munich, 1919), pp. 216 ff. Cf. also C. Landauer, *Planwirtschaft und Verkehrswirtschaft* (Munich and Leipzig, 1931), p. 122.

4. Calculation is to be made possible by the establishment of an artificial quasi-market. This scheme is dealt with in section 5 of this chapter.

5. Calculation is to be made with the aid of the differential equations of mathematical catallactics. This scheme is dealt with in section 6 of this chapter.

6. Calculation is to be made superfluous by resorting to the method of trial and error. This idea is dealt with in section 4 of this chapter.

#### 4. Trial and Error

The entrepreneurs and capitalists do not have advance assurance about whether their plans are the most appropriate solution for the allocation of factors of production to the various branches of industry. It is only later experience that shows them after the event whether they were right or wrong in their enterprises and investments. The method they apply is the method of trial and error. Why, say some socialists, should not the socialist director resort to the same method?

The method of trial and error is applicable in all cases in which the correct solution is recognizable as such by unmistakable marks not dependent on the method of trial and error itself. If a man mislays his wallet, he may hunt for it in various places. If he finds it, he recognizes it as his property; there is no doubt about the success of the method of trial and error applied; he has solved his problem. When Ehrlich was looking for a remedy for syphilis, he tested hundreds of drugs until he found what he was searching for, a drug that killed the spirochetes without damaging the human body. The mark of the correct solution, the drug number 606, was that it combined these two qualities, as could be learned from laboratory experiment and from clinical experience.

Things are quite different if the only mark of the correct solution is that it has been reached by the application of a method considered appropriate for the solution of the problem. The correct result of a multiplication of two factors is recognizable only as the result of a correct application of the process indicated by arithmetic. One may try to guess the correct result by trial and error. But here the method of trial and error is no substitute for the arithmetical process. It would be quite futile if the arithmetical process did not provide a yardstick for discriminating what is incorrect from what is correct.

If one wants to call entrepreneurial action an application of the method of trial and error, one must not forget that the correct solution is easily recognizable as such; it is the emergence of a surplus of proceeds over costs.

Profit tells the entrepreneur that the consumers approve of his ventures; loss, that they disapprove.

The problem of socialist economic calculation is precisely this: that in the absence of market prices for the factors of production, a computation of profit or loss is not feasible.

We may assume that in the socialist commonwealth there is a market for consumers' goods and that money prices for consumers' goods are determined on this market. We may assume that the director assigns periodically to every member a certain amount of money and sells the consumers' goods to those bidding the highest prices. Or we may as well assume that a certain portion of the various consumers' goods in kind is allotted to each member and that the members are free to exchange these goods against other goods on a market in which the transactions are effected through a common medium of exchange, a sort of money. But the characteristic mark of the socialist system is that the producers' goods are controlled by one agency only in whose name the director acts, that they are neither bought nor sold, and that there are no prices for them. Thus there cannot be any question of comparing input and output by the methods of arithmetic.

We do not assert that the capitalist mode of economic calculation guarantees the absolutely best solution of the allocation of factors of production. Such absolutely perfect solutions of any problem are out of reach of mortal men. What the operation of a market not sabotaged by the interference of compulsion and coercion can bring about is merely the best solution accessible to the human mind under the given state of technological knowledge and the intellectual abilities of the age's shrewdest men. As soon as any man discovers a discrepancy between the real state of production and a realizable better<sup>3</sup> state, the profit motive pushes him toward the utmost effort to realize his plans. The sale of his products will show whether he was right or wrong in his anticipations. The market daily tries the entrepreneurs anew and eliminates those who cannot stand the test. It tends to entrust the conduct of business affairs to those men who have succeeded in filling the most urgent wants of the consumers. This is the only important respect in which one can call the market economy a system of trial and error.

## 5. The Quasi-market

The distinctive mark of socialism is the oneness and indivisibility of the will directing all production activities within the whole social system. When

3. "Better" means, of course, more satisfactory from the point of view of the consumers buying on the market.

the socialists declare that “order” and “organization” are to be substituted for the “anarchy” of production, conscious action for the alleged planlessness of capitalism, true cooperation for competition, production for use for production for profit, what they have in mind is always the substitution of the exclusive and monopolistic power of only *one* agency for the infinite multitude of the plans of the individual consumers and those attending to the wishes of the consumers, the entrepreneurs and capitalists. The essence of socialism is the entire elimination of the market and of catallactic competition. The socialist system is a system without a market and market prices for the factors of production and without competition; it means the unrestricted centralization and unification of the conduct of all affairs in the hands of one authority. In the drafting of the unique plan that directs all economic activities the citizens cooperate, if at all, only by electing the director or the board of directors. For the rest they are only subordinates, bound to obey unconditionally the orders issued by the director, and wards of whose well-being the director takes care. All the excellences the socialists ascribe to socialism and all the blessings they expect from its realization are described as the necessary outcome of this absolute unification and centralization.

It is therefore nothing short of a full acknowledgment of the correctness and irrefutability of the economists’ analysis and devastating critique of the socialists’ plans that the intellectual leaders of socialism are now busy designing schemes for a socialist system in which the market, market prices for the factors of production, and catallactic competition are to be preserved. The overwhelmingly rapid triumph of the demonstration that no economic calculation is possible under a socialist system is without precedent indeed in the history of human thought. The socialists cannot help admitting their crushing final defeat. They no longer claim that socialism is matchlessly superior to capitalism because it brushes away markets, market prices, and competition. On the contrary. They are now eager to justify socialism by pointing out that it is possible to preserve these institutions even under socialism. They are drafting outlines for a socialism in which there are prices and competition.<sup>4</sup>

What these neosocialists suggest is really paradoxical. They want to abolish private control of the means of production, market exchange, market prices, and competition. But at the same time they want to organize the socialist utopia in such a way that people could act *as if* these things were

4. This refers, of course, only to those socialists or communists who, like professors H. D. Dickinson and Oskar Lange, are conversant with economic thought. The dull hosts of the “intellectuals” will not abandon their superstitious belief in the superiority of socialism. Superstitions die hard.

still present. They want people to play market as children play war, railroad, or school. They do not comprehend how such childish play differs from the real thing it tries to imitate.

It was, say these neosocialists, a serious mistake on the part of the older socialists (i.e., of all socialists before 1920) to believe that socialism necessarily requires the abolition of the market and of market exchange and even that this fact is both the essential element and the preeminent feature of a socialist economy. This idea is, as they reluctantly admit, preposterous and its realization would result in a chaotic muddle. But fortunately, they say, there is a better pattern for socialism available. It is possible to instruct the managers of the various production units to conduct the affairs of their unit in the same way they did under capitalism. The manager of a corporation operates in the market society not on his account and at his own peril, but for the benefit of the corporation, i.e., the shareholders. He will go on under socialism in the same way with the same care and attention. The only difference will consist in the fact that the fruits of his endeavors will enrich the whole society, not the shareholders. For the rest he will buy and sell, recruit and pay workers, and try to make profits in the same way he did before. The transition from the managerial system of mature capitalism to the managerial system of the planned socialist commonwealth will be smoothly effected. Nothing will change except the ownership of the capital invested. Society will be substituted for the shareholders, the people will henceforth pocket the dividends. That is all.

The cardinal fallacy implied in this and all kindred proposals is that they look at the economic problem from the perspective of the subaltern clerk whose intellectual horizon does not extend beyond subordinate tasks. They consider the structure of industrial production and the allocation of capital to the various branches and production aggregates as rigid, and do not take into account the necessity of altering this structure in order to adjust it to changes in conditions. What they have in mind is a world in which no further changes occur and economic history has reached its final stage. They fail to realize that the operations of the corporate officers consist merely in the loyal execution of the tasks entrusted to them by their bosses, the shareholders, and that in performing the orders received they are forced to adjust themselves to the structure of the market prices, ultimately determined by factors other than the various managerial operations. The operations of the managers, their buying and selling, are only a small segment of the totality of market operations. The market of the capitalist society also performs all

those operations which allocate the capital goods to the various branches of industry. The entrepreneurs and capitalists establish corporations and other firms, enlarge or reduce their size, dissolve them or merge them with other enterprises; they buy and sell the shares and bonds of already existing and of new corporations; they grant, withdraw, and recover credits; in short they perform all those acts the totality of which is called the capital and money market. It is these financial transactions of promoters and speculators that direct production into those channels in which it satisfies the most urgent wants of the consumers in the best possible way. These transactions constitute the market as such. If one eliminates them, one does not preserve any part of the market. What remains is a fragment that cannot exist alone and cannot function as a market.

The role that the loyal corporation manager plays in the conduct of business is much more modest than the authors of these plans assume. His is only a managerial function, a subsidiary assistance granted to the entrepreneurs and capitalists, which refers only to subordinate tasks. It can never become a substitute for the entrepreneurial function.<sup>5</sup> The speculators, promoters, investors and moneylenders, in determining the structure of the stock and commodity exchanges and of the money market, circumscribe the orbit within which definite minor tasks can be entrusted to the manager's discretion. In attending to these tasks the manager must adjust his procedures to the structure of the market created by factors which go far beyond the managerial functions.

Our problem does not refer to the managerial activities; it concerns the allocation of capital to the various branches of industry. The question is: In which branches should production be increased or restricted, in which branches should the objective of production be altered, what new branches should be inaugurated? With regard to these issues it is vain to cite the honest corporation manager and his well-tried efficiency. Those who confuse entrepreneurship and management close their eyes to the economic problem. In labor disputes the parties are not management and labor, but entrepreneurship (or capital) and the salaried and wage-receiving employees. The capitalist system is not a managerial system; it is an entrepreneurial system. One does not detract from the merits of corporation managers if one establishes the fact that it is not their conduct that determines the allocation of the factors of production to the various lines of industry.

Nobody has ever suggested that the socialist commonwealth could invite

5. Cf. above, pp. 305-308.

the promoters and speculators to continue their speculations and then deliver their profits to the common chest. Those suggesting a quasi-market for the socialist system have never wanted to preserve the stock and commodity exchanges, the trading in futures, and the bankers and moneylenders as quasi-institutions. One cannot *play* speculation and investment. The speculators and investors expose their own wealth, their own destiny. This fact makes them responsible to the consumers, the ultimate bosses of the capitalist economy. If one relieves them of this responsibility, one deprives them of their very character. They are no longer businessmen, but just a group of men to whom the director has handed over his main task, the supreme direction of the conduct of affairs. Then they—and not the nominal director—become the true directors and have to face the same problem the nominal director could not solve: the problem of calculation.

In recognition of the fact that such an idea would be simply nonsensical, the advocates of the quasi-market plan sometimes vaguely recommend another way out. The director should act as a bank lending the available funds to the highest bidder. This again is an abortive idea. All those who can bid for these funds have, as is self-evident in a socialist order of society, no property of their own. In bidding they are not restrained by any financial dangers they themselves run in promising too high a rate of interest for the funds borrowed. They do not in the least alleviate the burden of responsibility incumbent upon the director. The insecurity of the funds lent to them is in no way restricted by the partial guarantee which the borrower's own means provide in credit transactions under capitalism. All the hazards of this insecurity fall only upon society, the exclusive owner of all resources available. If the director were without hesitation to allocate the funds available to those who bid most, he would simply put a premium upon audacity, carelessness, and unreasonable optimism. He would abdicate in favor of the least scrupulous visionaries or scoundrels. He must reserve to himself the decision on how society's funds should be utilized. But then we are back again where we started: the director, in his endeavors to direct production activities, is not aided by the division of intellectual labor which under capitalism provides a practicable method for economic calculation.<sup>6</sup>

The employment of the means of production can be controlled either by private owners or by the social apparatus of coercion and compulsion. In the

6. Cf. Mises, *Socialism*, pp. 137-142; Hayek, *Individualism and Economic Order* (Chicago, 1948), pp. 119-208; T. J. B. Hoff, *Economic Calculation in the Socialist Society* (London, 1949), pp. 129 ff.

first case there is a market, there are market prices for all factors of production, and economic calculation is possible. In the second case all these things are absent. It is vain to comfort oneself with the hope that the organs of the collective economy will be “omnipresent”<sup>7</sup> and “omniscient.” We do not deal in praxeology with the acts of the omnipresent and omniscient Deity, but with the actions of men endowed with a human mind only. Such a mind cannot plan without economic calculation.

A socialist system with a market and market prices is as self-contradictory as is the notion of a triangular square. Production is directed either by profit-seeking businessmen or by the decisions of a director to whom supreme and exclusive power is entrusted. There are produced either those things from the sale of which the entrepreneurs expect the highest profits or those things which the director wants to be produced. The question is: Who should be master, the consumers or the director? With whom should the ultimate decision rest whether a concrete supply of factors of production should be employed for the production of the consumers’ good *a* or the consumers’ good *b*? Such a question does not allow of any evasive answer. It must be answered in a straightforward and unambiguous way.<sup>8</sup>

## 6. The Differential Equations of Mathematical Economics

In order to appraise adequately the idea that the differential equations of mathematical economics could be utilized for socialist economic calculation, we must remember what these equations really mean.

In devising the imaginary construction of an evenly rotating economy we assume that all the factors of production are employed in such a way that each of them renders the most highly valued services it can possibly render. No further change in the employment of any of these factors could improve the state of want-satisfaction under prevailing conditions. This situation, in which no further changes in the disposition of the factors of production are resorted to, is described by systems of differential equations. However, these equations do not provide any information about the human actions by means of which the hypothetical state of equilibrium has been reached. All they say is this: If, in this state of static equilibrium, *m* units of *a* are employed for the production of *p*, and *n* units of *a* for the production of *q*, no further change in the employment of the available units of *a* could result in an increment in want-satisfaction. (Even if we assume that *a* is perfectly

7. Cf. H. D. Dickinson, *Economics of Socialism* (Oxford, 1939), p. 191.

8. For an analysis of the scheme of a corporative state see below, pp. 816-820.

divisible and take the unit of  $a$  as infinitesimal, it would be a serious blunder to assert that the marginal utility of  $a$  is the same in both employments.)

This state of equilibrium is a purely imaginary construction. In a changing world it can never be realized. It differs from today's state as well as from any other realizable state of affairs.

In the market economy it is entrepreneurial action that again and again reshuffles exchange ratios and the allocation of the factors of production. An enterprising man discovers a discrepancy between the prices of the complementary factors of production and the future prices of the products as he anticipates them, and tries to take advantage of this discrepancy for his own profit. The future price which he has in mind is, to be sure, not the hypothetical equilibrium price. No actor has anything to do with equilibrium and equilibrium prices; these notions are foreign to real life and action; they are auxiliary tools of praxeological reasoning for which there is no mental means to conceive the ceaseless restlessness of action other than to contrast it with the notion of perfect quiet. For the theorists' reasoning every change is a step forward on a road which, provided no further new data appear, finally leads to a state of equilibrium. Neither the theorists, nor the capitalists and entrepreneurs, nor the consumers, are in a position to form, on the ground of their familiarity with present conditions, an opinion about the height of such an equilibrium price. There is no need for such an opinion. What impels a man toward change and innovation is not the vision of equilibrium prices, but the anticipation of the height of the prices of a limited number of articles as they will prevail on the market at the date at which he plans to sell. What the entrepreneur, in embarking upon a definite project, has in mind is only the first steps of a transformation which, provided no changes in the data occur other than those induced by his project, would result in establishing the state of equilibrium.

But for a utilization of the equations describing the state of equilibrium, a knowledge of the gradation of the values of consumers' goods in this state of equilibrium is required. This gradation is one of the elements of these equations assumed as known. Yet the director knows only his present valuations, not also his valuations under the hypothetical state of equilibrium. He believes that, with regard to his present valuations, the allocation of the factors of production is unsatisfactory and wants to change it. But he knows nothing about how he himself will value on the day the equilibrium will be reached. These valuations will reflect the conditions resulting from the successive changes in production he himself inaugurates.

We call the present day  $D_1$  and the day the equilibrium will be established

$D_n$ . Accordingly we name the following magnitudes corresponding to these two days: the scale of valuation of the goods of the first order  $V_I$  and  $V_n$ , the total supply<sup>9</sup> of all original factors of production  $O_I$  and  $O_n$ , the total supply of all produced factors of production  $P_I$  and  $P_n$ , and summarize  $O_I + P_I$  as  $M_I$  and  $O_n + P_n$  as  $M_n$ . Finally we call the state of technological knowledge,  $T_I$  and  $T_n$ . For the solution of the equations a knowledge of  $V_n$ ,  $O_n + P_n = M_n$ , and  $T_n$  is required. But what we know today is merely  $V_I$ ,  $O_I + P_I = M_I$ , and  $T_I$ .

It would be impermissible to assume that these magnitudes for  $D_I$  are equal to those for  $D_n$  because the state of equilibrium cannot be attained if further changes in the data occur. The absence of further changes in the data which is the condition required for the establishment of equilibrium refers only to such changes as could derange the adjustment of conditions to the operation of those elements which are already operating today. The system cannot attain the state of equilibrium if new elements, penetrating from without, divert it from those movements which tend toward the establishment of equilibrium.<sup>10</sup> But as long as the equilibrium is not yet attained, the system is in a continuous movement which changes the data. The tendency toward the establishment of equilibrium, not interrupted by the emergence of any changes in the data coming from without, is in itself a succession of changes in the data.

$P_I$  is a set of magnitudes that do not correspond to today's valuations. It is the outcome of actions which were guided by past valuations and faced a state of technological knowledge and of information about available resources of primary factors of production which was different from the present state. One of the reasons why the system is not in equilibrium is precisely the fact that  $P_I$  is not adjusted to present conditions. There are plants, tools, and supplies of other factors of production which would not exist under equilibrium, and other plants, tools, and supplies which must be produced in order to establish equilibrium. Equilibrium will emerge only when these disturbing parts of  $P_I$ , as far as they are still utilizable, will be worn out and replaced by items which correspond to the state of the other synchronous data, viz.,  $V$ ,  $O$ , and  $T$ . What acting man needs to know is not the state of affairs under equilibrium, but information about the most

9. Supply means a total inventory in which the whole supply available is specified in classes and quantities. Each class comprehends only such items as have in any regard (for instance, also in regard to their location) precisely the same importance for want-satisfaction.

10. Of course, we may assume that  $T_I$  is equal to  $T_n$  if we are prepared to imply that technological knowledge has reached its final stage.

appropriate method of transforming, by successive steps,  $P_1$  into  $P_n$ . With regard to this task the equations are useless.

One cannot master these problems by eliminating  $P$  and relying only upon  $O$ . It is true that the mode of utilizing the original factors of production uniquely determines the quality and quantity of the produced factors of production, the intermediary products. But the information that could be won in this way refers only to the conditions of equilibrium. It does not tell us anything about the methods and procedures to be resorted to for the realization of equilibrium. Today we are confronted with a supply of  $P_1$  which differs from the state of equilibrium. We must take into account real conditions, i.e.,  $P_1$ , and not the hypothetical conditions of  $P_n$ .

This hypothetical future state of equilibrium will appear when all methods of production have been adjusted to the valuations of the actors and to the state of technological knowledge. Then one will work in the most appropriate locations with the most adequate technological methods. Today's economy is different. It operates with other means which do not correspond to the equilibrium state and cannot be taken into account in a system of equations describing this state in mathematical symbols. The knowledge of conditions which will prevail under equilibrium is useless for the director whose task it is to act today under present conditions. What he must learn is how to proceed in the most economical way with the means available today which are the inheritance of an age with different valuations, a different technological knowledge, and different information about problems of location. He must know which step is the next he must make. In this dilemma the equations provide no help.

Let us assume that an isolated country whose economic conditions are those of Central Europe in the middle of the nineteenth century is ruled by a dictator who is perfectly familiar with the American technology of our day. This director knows by and large to what goal he should lead the economy of the country entrusted to his care. Yet even a full knowledge of today's American conditions could not be of use to him in regard to the problem of transforming by successive steps, in the most appropriate and expedient way, the given economic system into the system aimed at.

Even if, for the sake of argument, we assume that a miraculous inspiration has enabled the director without economic calculation to solve all problems concerning the most advantageous arrangement of all production activities and that the precise image of the final goal he must aim at is present to his mind, there remain essential problems which cannot be dealt with without economic calculation. For the director's task is not to begin from the very

bottom of civilization and to start economic history from scratch. The elements with the aid of which he must operate are not only natural resources untouched by previous utilization. There are also the capital goods produced in the past and not convertible or not perfectly convertible for new projects. It is in precisely these artifacts, produced under a constellation in which valuations, technological knowledge and many other things were different from what they are today, that our wealth is embodied. Their structure, quality, quantity, and location is of primary importance in the choice of all further economic operations. Some of them may be absolutely useless for any further employment; they must remain "unused capacity." But the greater part of them must be utilized if we do not want to start anew from the extreme poverty and destitution of primitive man and want to survive the period which separates us from the day on which the reconstruction of the apparatus of production according to the new plans will be accomplished. The director cannot merely erect a new construction without bothering about his wards' fate in the waiting period. He must try to take advantage of every piece of the already available capital goods in the best possible way.

Not only the technocrats, but socialists of all shades of opinion, repeat again and again that what makes the achievement of their ambitious plans realizable is the enormous wealth hitherto accumulated. But in the same breath they disregard the fact that this wealth consists to a great extent in capital goods produced in the past and more or less antiquated from the point of view of our present valuations and technological knowledge. As they see it, the only aim of production is to transform the industrial apparatus in such a way as to make life more abundant for later generations. In their eyes contemporaries are simply a lost generation, people whose only purpose it must be to toil and trouble for the benefit of the unborn. However, real men are different. They want not only to create a better world for their grandsons to live in; they themselves also want to enjoy life. They want to utilize in the most efficient way those capital goods which are now available. They aim at a better future, but they want to attain this goal in the most economical way. For the realization of this desire too they cannot do without economic calculation.

It was a serious mistake to believe that the state of equilibrium could be computed, by means of mathematical operations, on the basis of the knowledge of conditions in a nonequilibrium state. It was no less erroneous to believe that such a knowledge of the conditions under a hypothetical state

of equilibrium could be of any use for acting man in his search for the best possible solution of the problems with which he is faced in his daily choices and activities. There is therefore no need to stress the point that the fabulous number of equations which one would have to solve each day anew for a practical utilization of the method would make the whole idea absurd even if it were really a reasonable substitute for the market's economic calculation.<sup>11</sup>

11. With regard to this algebraic problem, cf. Pareto, *Manuel d'économie politique* (2d ed. Paris, 1927), pp. 233 f.; and Hayek, *Collectivist Economic Planning* (London, 1935), pp. 207-214. - Therefore the construction of electronic computers does not affect our problem.