



**Econometry,  
the Market  
and  
Planning**



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ECONOMETRY,  
THE MARKET  
AND PLANNING



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## INTRODUCTION

The economy is one of the most important fields of social activities and it affects the life of each man. It provides men with food and clothing, footwear and shelter and with material wealth in all its variety. "Every child knows that a nation which ceased to work, I will not say for a year, but even for a few weeks, would perish."<sup>1</sup>

In our times the unprecedented complexity of production, and of the entire economic life of the advanced countries in general, has rendered economic problems all the more acute for modern mankind. As industrial progress reaches higher and yet higher levels, the social division of labour becomes more profound and there is not a single commodity that is entirely the product of a single enterprise, or of a single sector of the economy, for that matter. Two hundred branches of the economy cooperate to manufacture a conventional radio-set. But there are far more sophisticated industrial products than this—supersonic planes, spaceships, etc.—and it takes a far more complicated industrial machinery to produce them.

Since a commodity is the result of extensive industrial cooperation involving many branches of the economy, it is clear that its batch production calls for the concerted effort of a multitude

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<sup>1</sup> K. Marx and F. Engels. *Sel. Correspondence*, 1965, p. 209.

of enterprises belonging to various sectors of the economy. The scope and complexity of industrial management becomes evident when one recalls that modern industry puts out millions of diverse production items and that, each year, thousands of new items go into serial production, while others are discarded. Economic interdependencies between hundreds and thousands of industrial, agricultural, transportation, construction and other enterprises, complicated as they are, become even more involved through their cooperation with various services in the non-productive sector of the economy. The economy of a country is a rapidly developing system that undergoes constant qualitative changes, while all its divisions form close interrelated patterns of economic ties and dependencies.

The picture would not be complete if we leave out international economic ties, the importance of which is constantly growing. Subregional, regional and inter-regional economic complexes, with their varying degrees of interdependency and their complementary nature, add significantly to the complexity of each country's economy.

Most domestic and foreign exchange is based on commodity-money relations, i.e., buying and selling goods through and in the course of various financial and credit transactions.

Commodity-money relations form the foundation of both the home market in any given country and the international market. A market is usually defined by economists as the aggregate of the various forms of trade either in individual commodities or in the totality of commodities available for sale.

As capitalism developed, the narrow limits of

local markets were broken up and a national market was formed in each country. At the same time, the development of productive forces led to the promotion of world trade and the formation of the world market.

The market was gradually developing into a formidable economic force. But in capitalist society this force is spontaneous in nature, and that very often renders it destructive. Now why is that so? What are the reasons for it? As a rule, a commodity on its way to the consumer from the producer passes through numerous intermediaries. So no producer has any idea of what the real social need is for the product that he is manufacturing. Also he does not know what amount of similar goods his competitors will offer for sale.

Producers are market-oriented in making their decisions what to produce, how to produce and how much to invest in this or that line of production. The market, being sensitive to all the changes and trends in the material sphere of production and consumption, is in a state of constant change. If the supply of a certain commodity exceeds the demand, its market price will immediately fall and some of the surplus stocks might not be sold at all. As a result of over-production some of the manufacturers of the commodity in question will suffer a loss, while others will go bankrupt. This sort of situation usually results in a cut-back in the production of the commodity, or, possibly, the complete stoppage of its production.

Production having been reduced, the market will immediately register a lesser demand for the raw materials, and semi-manufactures that go to produce that item. Thus, in a capitalist economy,

marketing difficulties affecting a single commodity spell economic trouble for numerous enterprises in various branches of the economy. But the range of goods produced by modern industry and agriculture runs into millions; so it is clear how extremely complex, and sometimes even ominously menacing, are the spontaneous processes that determine the state of the market in a capitalist economy.

Now the market reflects the extent to which the scope and structure of production meets the material and cultural needs of society. The economic health of industrial enterprises and of country's economy as a whole is dependent upon the situation prevailing on the market. As long as the vagaries that harass the market are of local nature and affect only individual manufactures, the economic life of a country is hardly affected. But as disproportions gradually pile up, a situation arises in which any serious trouble in one particular sector of the capitalist market causes a "chain reaction" of dislocations and bankruptcies involving, by and large, almost the entire economy of the country. During economic crises the destructive effect of such disproportions becomes most evident—they freeze the economies not only of individual states, but spread throughout the entire capitalist system dislocating industry, trade and agriculture.

The appearance of monopoly capitalism and its ever growing power in the economic set-up of advanced capitalist countries did not make the problem of the market any less acute or harassing. Though big monopolies may control the production and marketing of a considerable share of the total volume of goods manufactured in a

country, the market, as in the past, remains a spontaneous entity. This is so because monopoly domination does not eliminate cut-throat competition among the producers within each branch of the economy, or between the various branches of the country's economy as a whole, or, for that matter, on the world market either. So there are good reasons why bourgeois economists and political leaders have for a long time now been trying to find means of "bridling" the market and bringing it under control.

The market plays an important part in a socialist economy, too, though in this case planning and not spontaneity is the dominant factor. Under a planned economy the possibility of the bankruptcy of any socialist enterprise and therefore of another socialist business waxing rich by its ruin is absolutely ruled out. Planned and well-balanced development of all sectors of a socialist economy makes economic crises impossible, though certain temporary imbalances might present themselves in a planned socialist economy, too. They can be caused by a variety of factors, such as inaccuracies and even errors in planning, the fact that some branches of the economy cope quite well with their target figures, while others do not do so well, natural disasters, unforeseen changes in the international political climate, etc. Some of these factors cannot be foreseen directly in advance planning. However, most of them are now taken into consideration in the plan-making process. This development is of paramount importance for the smooth functioning of the socialist economy.

The scope of production in the Soviet Union is now so large that the slightest miscalculation in

planning could involve multi-million losses. There are instances when some products are produced in excess of demand while there is a shortage of others. But this in no way belittles the role of socialist planning. Socialism provides all objective prerequisites for cutting down the number of inaccuracies in planning projections to a minimum. To secure this minimum, further improvements in socialist planning are needed. In the Report of the CPSU Central Committee to the 24th Party Congress, General Secretary of the CC CPSU Comrade Leonid Brezhnev said: "Under socialism, planning is the central element, the core of national-economic guidance. Our country has major achievements in this sphere and justifiably takes pride in them. But we cannot afford to mark time, we must continue to work hard to improve both the theory and practice of national-economic planning.

"The further raising of its scientific level becomes a task of primary importance." Improvement of planned management of the economy is an objective of the current economic reform in the USSR, it is also an important condition of its implementation. Henceforth commodity-money relations will have a greater role to play in all the elements of our national economy. They serve as a basis for a whole complex of various economic measures that are now being introduced on an increasing scale as the economic reform gets under way. Soviet economists are engaged in working out recommendations aimed at improving the operation and operative efficiency of the market machinery so as to raise the efficiency of the socialist economy as a whole.

The operation of the market is a key factor

both in a capitalist and a socialist economy. But each socio-economic system has its own ways of solving market problems and they differ radically from each other. One of these differences, among others, lies in the use of mathematics and electronic computers for economic analysis and for the management of the economy.

This is the subject-matter of the present booklet.

# WILL ECONOMETRY SAVE CAPITALISM?

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## Reliance on Mathematics

"Econometry," "econometrics," "mathematical economics" have been dominant concepts in bourgeois economic thought since World War II. These three trends of modern bourgeois economics share in common an extensive application of mathematics for the investigation of the economic processes that go to make up the economy. However, there are certain distinguishing features that mark the three trends, though it is rather difficult to draw a clear demarcation line between them.

Econometry is the most important of the trends mentioned. A distinction between econometry and econometrics became apparent only recently, though the emergence of econometrics goes back to the early thirties of our century. Econometry covers a wider range of subjects in economic theory and uses a greater variety of mathematical methods, which makes it necessary to distinguish between the two trends. Econometry is an attempt to synthesize political economy, economic statistics and mathematics. However, there is no unanimity among Western specialists working in this field as to what econometry essentially means. Some of them attribute to it very wide "terms of

reference" regarding it as the "science of measuring economic phenomena." Others are more modest in their definitions and narrow the range of subjects econometry busies itself with.

Without going into the finer points of the controversy we shall note that the most important feature of econometry is the extensive use it makes of all the mathematical methods that have invaded economics with the advent of cybernetics, the theory of information, etc. This explains the intimate relations that link econometry with electronic computation techniques. Using a cybernetic approach for the analysis of economic phenomena econometry experts advance new concepts in political economy. True, some econometrists assert that statistical and mathematical methods can be applied to economic analyses without regard for any of the concepts advanced by political economy. They believe that in economics it suffices to present a purely quantitative analysis of the real economic processes defining the state of the market and to determine the functional dependences of the various economic variables.

Econometrics is a very close relation of econometry and mainly concerns itself with statistics. Inasmuch as it makes more extensive use of statistical method, some Western economists see no substantial difference between econometrics and economic statistics and often use the two terms interchangeably.

When one tries to formulate the methodology of applying mathematics to economic studies it is soon apparent how difficult it is to draw a distinction between the two trends. As distinct from conventional economic statistics, econometrics applies mathematical methods that are far more

varied and sophisticated. Usually econometrics is considered to be a division of econometry. Many Western experts, however, do not share that view. Some feel that econometry can do very well without using statistical methods. For example, Paul A. Samuelson, John R. Hicks, Roy F. Harrod and many others as a rule limit their efforts to the construction of formal mathematical models without attempting to link them via statistics with real economic processes.

Another controversial issue is the relationship of econometry with mathematical economics, the latter comprising economic studies to which mathematical method is applied, too, but without the determination of specific values of individual parameters. Sometimes mathematical economics is also regarded as being a component part of econometry. However, there are experts who believe that "mathematical economics" (by analogy with mathematical physics) belongs to mathematical and not economic science.

Thus econometry is far from being an integral, strictly defined division of economic theory. In its diversity of theoretical concepts is accompanied by lack of unanimity as to which mathematical and statistical methods should be applied to the analysis of economic phenomena. Because of this lack of unanimity as to the subject-matter of econometry an immense range of problems is taken up by its various branches. Thus macroeconomic problems of world scale such as the problem of the economic cycle, the economic aspects of social development, the distribution of national income, price formation, etc., are tackled alongside research into a great variety of highly specialized practical problems such as optimal

sheet-metal cutting methods, best feed-mixes for cattle forage, etc. The variety adds to the controversy as to what econometry should encompass. Some feel that econometry's characteristic feature should be a "refusal to treat the economy as a whole," that it should be concerned with the "local nature of its investigations". Others believe that the reverse is true and that econometrists by virtue of their dealing with aggregate values are best equipped for concentrating their efforts primarily on universal economic problems. These discussions have so far failed to narrow the range of problems taken up by econometrists in their studies.

The problems econometry busies itself with can be divided into three basic groups. The first deals with the econometric analysis of the national economy as a whole. Mathematical models elaborated by the followers of this trend involve such parameters as national income, savings, investments, capital, employment rate, etc. The development of such models began in the early thirties and very much under the impact of Keynesism.

The second group subjects to economic scrutiny individual sectors of the economy, sometimes it even studies the manufacturing of specific products. All research into the inter-sectoral balances as well as the greater part of the supply and demand and price-formation problems belong to that group.

Individual enterprises and businesses—the elements making up the lowest echelon of a national economy—are the object of econometric studies that fall into the third group. Economic problems within that division are considered in two



aspects. The activities of firms and enterprises proper—planning, marketing policies and techniques, etc.—constitute the first direction of research, while the second line of investigation aims at serving the needs of medium and even small businesses, farming included. Analysis of market practices and reactions (market behaviour patterns) is most important in the case of state programmes that set out to control and regulate the country's economy.

The wide spectrum of uses econometry is put to in the capitalist world is indicative of the great expectations attached to the application of mathematics for the solution of outstanding economic issues.

In the econometric materials in the West one finds ample evidence of a high esteem for that trend in modern economics. The views of I. Dalmulder, a French economist, are characteristic of such attitudes. "Physics became a science during the Renaissance," he writes, "chemistry—in the 18th century, biology—in the 19th; now, in the 20th century, due to econometrics, political economy is turning into a science."<sup>1</sup>

True enough, the mathematical school in political economy is now over 130 years old. For a long time, however, it did not play any significant role in the theory and practice of managing capitalist enterprises. Only the last four decades have seen the mathematical school of economics making vigorous progress. What turned that humble

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<sup>1</sup> I. Dalmulder, *Initiation à l'économetrie*, Alger, 1956, p. 2.

Cinderella of economics of the past into the Princess that it is today? At least two basic factors are responsible for the transformation. The first belongs to the realm of ideology. In the view of Western ideologists the infusion of mathematics into economics—the "mathematization" of economics—adds credibility to the arguments presented by the champions of capitalism in their attempts to present it as a viable economic system. The other is that governments of capitalist countries, and the large corporations, expect mathematics and electronic computation techniques to act as a panacea that will save the capitalist world from its growing economic difficulties, relieve it of the social disasters that threaten it and ensure still higher profits for the monopolies.

### Bourgeois Political Economy—the Apologists

Bourgeois political economy is now in a state of profound crisis. The crisis began between World War I and World War II and is rooted in the tremendous social and economic changes brought about by the victory of the Great October Socialist Revolution in Russia—changes that affected the entire world.

The dogma purporting that capitalism is the only viable social system "corresponding to the nature of man" has collapsed. History has already convincingly disproved such "assertions" made with a view to denouncing the Marxist-Leni-

nist principle of the inevitability and objective historical necessity of the revolutionary change-over from capitalism to socialism. The emergence of the socialist system has proved that capitalism is not the only possible system of economic management open to man, and also that it is far from being the best economic system.

Another bourgeois dogma disproved by the facts of life is the myth that capitalism ensures the full use of all the production potentialities possessed by a country and particularly of its labour force. Problems hitherto unknown in the economic evolution of capitalism became apparent between the two world wars. In addition to the crises of over-production it knew before, capitalism is now permanently beset by mass unemployment, and underemployment of plant and equipment. Technical advances, known as the scientific and technological revolution of our day, as well as large scale automation have confronted capitalism with new acute socio-economic problems.

No matter how hard bourgeois economists try to gloss over the deepening of the socio-economic contradictions under capitalism their attempts prove abortive and only serve to undermine what little credence there might still be in their theoretical concepts and doctrines. Prof. John M. Keynes did not mince words when he pointed to the gap between the theoretical concepts of bourgeois economists and reality. "...A discrepancy which the ordinary man has not failed to observe," he wrote, "with the result of his growing unwillingness to accord to economists that measure of respect which he gives to other groups of scientists whose theoretical results are confirmed by

observation when they are applied to the facts."<sup>1</sup>

Such attitudes made it imperative for bourgeois economists to make their theoretical concepts seem more credible and worthy of greater respect. This, it was thought, could be achieved, among other things, by the extensive application of mathematics to economic analysis. But such "mathematization" of economics has not always been dictated by the quest for scientific objectivity alone. David Novick, an American economist, pointed out that much of the econometric literature is addressed to those economists and sociologists of average ability in the West who have a blind belief in mathematical formulae and assume that each mathematical equation expresses nothing but incontestable truth—the result of their studies of mathematics at school where each statement and theorem is neatly substantiated.

But there is more to it than that. Many Western economists believe that the extensive introduction of mathematics into the field of political economy and applied economic sciences will make it possible to overcome the socio-economic antagonisms that are tearing the capitalist economy apart. M. Robert Gibrat, a French economist, wrote in 1930 that political economy in the form it had taken in France in those years had blundered into a blind alley. Not willing, or incapable of applying mathematical methods, he added, it had come up against a wall it could not climb over. This view is shared by many bourgeois economists in other capitalist countries. This explains why in the West almost each book on political economy makes wide use of mathematics.

<sup>1</sup> John Maynard Keynes. *The General Theory of Employment, Interest and Money*, N. Y., 1935, p. 33.

Mathematics is used in such publications not only as a tool for quantitative analysis of economic phenomena but also as a foundation, a methodological basis, upon which theoretical concepts can be built and elaborated. True enough, most of these concepts, when compared with the long-known theories of vulgar bourgeois political economy, are found to be essentially void of any new ideas. The favourite trend here is modernization of the theory of marginal utility; that theory made its appearance a long time ago—after the late seventies of the last century—and owed its origin to attempts to “refute” the labour theory of value presented by Marx. The theory of marginal utility lay for many years, its position going from bad to worse, when suddenly it became all the rage in bourgeois economics—some approaches used in systems analysis in cybernetics bear a certain outward semblance to the theory of marginal utility. Seizing upon this outward semblance many Western econometrists wasted no time in declaring that it was now “possible to prove” in mathematical terms that the labour theory of value, upon which the entire Marxist-Leninist economic doctrine rested, was erroneous. As might well be expected, in that case, too, those who tried to refute Marx found themselves in a ridiculous position.

However, there is yet another trend in econometry that opposes both the labour theory of value and the theory of marginal utility. Its followers believe that it is senseless to look for the substance of economic phenomena, be it labour or utility, as these categories themselves are functionally interdependent. Characteristic in this respect are the views held on the subject by

V. Pareto, one of the first economists to suggest the application of modern mathematics to economics. The Swiss economist in his *Manuel d'économie politique* (Paris, 1927, p. 247) asserted that conventional logic was reasonably fit for studying ordinary causative phenomena, but that it became powerless as soon as we touched upon interdependent relationships. Such ideas are shared by many scientists who consider econometry to be a purely applied tool for studying economics.

It should, however, be stressed that the refusal to investigate the cause-effect relationships in economics on these grounds is a cleverly camouflaged way of justifying and defending the capitalist system, an attempt to distract the attention of those interested in economics from such acute problems as the essence and origin of surplus value, the forms its appropriation assumes through profit, interest rates, rent, etc. A close scrutiny of the views shared by the followers of this trend in econometry reveals that their ideas are objectively rooted in and stem from the concepts of vulgar bourgeois political economy. Abstract logical-mathematical and symbolic forms are quite handy for concealing the system of capitalist exploitation and for giving an appearance of objectivity in criticizing socialist planning.

Thus, econometry, either in an overt and straight forward, or in a concealed and camouflaged way, is ideologically oriented against communism. The idea that economists are responsible for the fate of the capitalist system is being propagated more and more widely in bourgeois works on economics. Some proponents of this view go so

far as to assert that the theorists of economics will be responsible for the victory of socialism in the West. The necessity of marrying economic policy to political economy is also stressed in the light of such views. The theorists of economics are called upon to devote more efforts to the study of the practical problems related to the implementation of the policies of the state economic agencies functioning in the capitalist countries. Political economy is thus likened to medicine and is expected to provide cures for social ills. S. Schaeffler, a British economist, wrote in *The Failures of Economics. A Diagnostic Study* published in Cambridge in 1955, that an economist who has specialized in the field of economic policy formulation should be literally a "doctor of economics"—he is to discharge the various functions a doctor of medicine performs for his patients. Such views show clearly why great hopes are being pinned on the application of mathematics for the solution of social problems. The great interest in econometry displayed in the West stems from such hopes and motives. The "defend-the-clan" motive is, naturally enough, not the main reason behind the attempts to defend the honour of bourgeois political economy. At the present stage of the development of capitalism, econometry cannot be considered to be an exclusively theoretical tool designed by state-monopoly capital to defend the economic policy of capitalism. It has turned into an important means of applying the economic policy of state-monopoly capitalism, and a lever for correcting and adjusting the activities of large private concerns. The necessary economic prerequisites are already ripe for it.

## Repudiation of Non-Interference

The principle of non-interference of the state in the economic life of the country was predominant during the pre-monopoly stage of capitalism. This, to be sure, in no way implied that the capitalist state was neutral in relation to the economy. Taxation policy, subsidies, protectionism in foreign trade, legislation safeguarding the interests of private capital—these and many other methods were constantly used by capitalist governments to promote economic development. However, the measure of state interference in economic matters was relatively small and played but an insignificant role in directing the economic development of the country. Politico-economic theories advancing the idea of the self-adjustment of a capitalist economy without interference from the state duly reflected the state-economy relationship prevailing in that epoch.

With capitalism entering upon the imperialist stage of its development the situation, little by little, began to change. Having scientifically defined the essence of imperialism as the highest monopolistic stage in the development of capitalism, Lenin discovered that the appearance of the industrial-financial oligarchy is one of the economic indications of imperialism, the oligarchy ruling supreme over the state machinery. The process is involved and contradictory. To enable it to aid the biggest monopolies in running their businesses effectively, the state must have ample opportunities for interfering in the economic life of the country and exercising real control over it. But as state control extends to a certain degree over the activities of the monopolies they are not

at all happy about it. This explains why the development of state-monopoly trends was in its initial stage relatively slow and was limited in scope.

To enable the state to exercise control over war production the process was accelerated during World War I. It was at that time that Lenin discovered the coming into being of an extensive machinery for stock-taking, statistical data gathering and adjusting the economy of a country—a development that appeared as the highest form of capitalist socialization of production. World War I over, state-economic control and adjustment policies were everywhere curtailed. The large business concerns believed that the economic function of the state was basically limited to serving them as a “night-watchman” guarding their wealth and peace.

These illusions were shattered by the capitalist world's economic crisis of 1929. It became clear that in spite of the tremendous increase in the role played by the monopolies in all branches of the economy the capitalist market machinery could not ensure an automatic harmony between social demand and supply, between consumption and production. The crisis brought forth sharp changes in the views held by bourgeois economists. Extensive state control over the economy was offered by bourgeois economists as a cure for the capitalist system's chronic diseases and became a universally accepted prescription. The British economist, Keynes, became the most prominent spokesman for the new trend. In a number of papers produced by him in those years, he suggested a complex of measures which could, he thought, soften, if not forestall, economic cri-

ses of over-production and mass unemployment. State control of investments, measures affecting consumer demand, the growth of government expenditure, lowering the interest rate—all these formed the foundation of the Keynes plan. Simultaneously theories of an analogous nature began to appear in other capitalist countries. They implied that monopoly capital could no longer get along without active state intervention in the economy of the country. State intervention was made easier by the fact that the cures offered for treating the sick economy were actually invitations to the state to step in and ensure the pecuniary interests of the big corporations.

To apply the recommendations of bourgeois scientists, the capitalist state had to extend its economic power so that it could intervene actively in the economy of the country. New developments in the life of many capitalist states which manifested themselves during World War II and in the postwar period created a favourable climate for such intervention.

The substantial growth of state-owned property was the most important of these developments. The increase in state-owned property was, on the one hand, a result of nationalization of a number of industries in Great Britain, France and Italy in the first post-war years. State-financed construction of a number of large industrial enterprises and even of entire branches of industry, on the other hand, also contributed to the growth of state-owned property. The United States was the first country to begin such construction programmes during World War II when the federal administration financed the building of many munitions plants. Now the practice has spread to ma-

ny countries. To be produced on an industrial scale, some of the new products require financial outlays beyond the investment fund resources of individual monopolies. Large investments of this nature often present obscure prospects of financial returns, and, to avoid the risks involved, the big corporations are only too happy to let the state finance the development of the new technologically advanced branches of the economy. As a result of these developments, the share of the state-run enterprises in the entire volume of industrial production in a number of capitalist countries has grown to 20-30 per cent. The state poses now as a "collective capitalist"—it manufactures many important commodities at enterprises it owns and consumes a considerable amount of the goods produced by the monopolies of the country.

The growth of state ownership is linked with the state's increasing participation in the development of the economy's infrastructure, i. e. those of its elements that are jointly used by all the producers—power plants, transportation facilities and communications, various research establishments, pilot plants and installations, etc. Neither can the monopolies finance without the aid of the state the great research and development programmes involved in advancing modern production. In addition, the capitalist state now has under its control more financial resources for credit purposes than it had in the past. In some capitalist countries the state budget is equal to a quarter and even a third of the national income. By concentrating colossal funds of loan capital the state acts as a leading banker holding sway over many firms and companies. As distinct from the thir-

ties, the capitalist state is now an institution capable of active intervention in the country's national economy.

The growing part the state plays in the national economy in capitalist countries calls for various statistical and economic projections and forecasts to determine the guiding principles the state would go by in its taxation, credit adjustment and control policies and programmes, and the wages and social insurance practices, etc. At the same time, Western econometrists believe that mathematics and statistics can be used for directing anti-crisis measures and helping to level off the economy when it is "overheated," a condition usually followed by recession, or to "pump-prime" it when a depression is imminent.

Attempts to apply econometry to the needs of the economy were made along three lines. They are listed below in the order they appeared chronologically; these trends are still apparent today, overlapping and complementing each other.

The first trend occupies itself with forecasting the economic cycles of the capitalist system, the second concentrates on market research with special emphasis on revealing the elasticity of demand and supply fluctuations, while the third—the youngest of the three—is known by the name that has become quite popular in recent years—economic programming.

### Attempt to Bridle the Market

It is not surprising that the forecasting of economic cycles was the first line of research econo-

metry concentrated its efforts on. Periodic crises in the economy cause great damage to the capitalist class. At the same time the crises result in lower living standards of the wage and salary earners, which brings forth the aggravation of class struggle. The need for economic forecasting grew more and more acute—general orientation data were badly needed for making various decisions affecting the economy. The monopolies needed estimates and projections that would help their management to establish prices and production volumes ensuring maximum profits. The greater role played by the state in the economy made it, too, attach the highest priority to economic forecasting. The economists belonging to that trend believed that the forecasting of "slumps" and "booms" would make it possible to adjust and adapt in time to changes in the economic situation. Curtailing production in the periods preceding a "slump" that had been forecast, and, conversely, making full use of a favourable business climate—many econometrists were naive enough to believe—would make it possible, first, to ease and alleviate economic crises, and, at a subsequent stage, to do away with them completely. The methods elaborated by the Harvard school of economics for studying economic situations became best known in this field. The main attention of the Harvard economists was concentrated on the statistical definition of cyclic and seasonal changes as well as upon ascertaining economic development trends by sifting statistical data and selecting those which indicated changes in the economic situation. Attempts were made to establish the influence of economic cycles upon certain economic variables. The data thus

obtained were used to construe a number of indicators of the phase of the economic cycle the national economy found itself in at any given moment which would allow the making of a forecast of economic development for the near future. The system of such indicators came to be known as "economic barometers." The fallacy of the Harvard method became especially evident in 1929. While such "economic barometers" pointed at a further growth of business activity, an economic crisis, unprecedented in its intensity, quite unexpectedly broke out in the autumn of 1929.

Along with the forecasts of the economic cycle, theorists, at the end of the twenties and at the beginning of the thirties there appeared a school of economics that devoted itself to market studies. The economists of that school in their economic forecasting proceeded from their interpretation of the national economy's balance sheet, in general, and of the balance of the population's income and expenditure, in particular. The principles used for the elaboration of such balance sheets were by and large borrowed from Professor Keynes' theory. In accordance with these principles, consumer expenditure and investment are identified from the total amount of expenditures in the country. If investments drop, an economic recession is believed to be setting in, which, if further aggravated, might reach crisis proportions. Conversely, growing investments are interpreted as a fore-runner of conditions favourable for the country's economy.

After World War II economists began keeping balances of that type in most of the advanced capitalist countries. In the USA a law was even enacted making such balances imperative. The

state endeavours to regulate the economy and implement its adjustment policies proceeding from evaluations and forecasts based on such balances of the national economy. However, experience has shown that forecasts thus arrived at are none too accurate, which makes the state's regulatory and adjustment measures much less effective. That being so, many bourgeois econometrists have advanced the concept of so-called "built-in stabilizers." The state is expected to operate these stabilizers following certain empirical rules. Three groups of the so-called "instrumental variables" are distinguished in the "built-in stabilizers" concept: stabilizers, stimulators and regulators. The followers of this concept believe that by acting upon various parameters of the capitalist economy, a capitalist state can influence the economy meaningfully and effectively.

The stabilizers are expected to limit market fluctuations and reduce the influence of outer disturbing factors. The function of the stimulators is to preserve and even accelerate the rate of the country's economic growth while the regulators are to keep certain economic inter-relations properly balanced and ensure the proper balancing and adjustment of different elements of the economy, especially the balance of trade and the balance of payments.

State expenditure and a properly oriented financial policy are considered by econometrists to be the most effective anti-crisis controls the state has. Efforts are being made to use these controls to cut down the growth of investments during "booms" with the aim of preventing over-production, and, conversely, to encourage capital

investments during crises, recessions and depressions to help the economy to overcome the crisis. Certain rules for operating financial and credit policies have been formulated along these lines—increases in state expenditure and lower taxation and interest rates during "slumps," and lower budget expenditures and higher taxes and interest rates for when the economy is on the upgrade. It would be wrong to assume that such measures are quite ineffective. But neither should their effectiveness be overestimated, for it is not great. Hopes to increase the efficacy of the automatic "stabilizers" diminished as state-monopolistic economy adjustment methods were applied on a wider scale and became more elaborate. A number of advanced capitalist countries have now chosen, instead, to step up the state's regulation of economic activities.

The wide range of programmes and policies undertaken by a capitalist state in the field of the economy requires numerous calculations to measure a wide array of economic indicators. The economy of a country is a most intricate complex of diverse economic processes that involve all the facets of the life of society. The development of an economy is characterized by a multitude of interrelated and interdependent parameters which are constantly changing.

The vast amount of goods produced, the variety of technological ways used to manufacture them, extremely involved patterns of relations within each branch of the economy, as well as branch-to-branch relationships, regional and international economic ties and exchanges—all these make the task of surveying the production of material wealth most difficult.



Any effort to regulate the economy, no matter how minor, is inconceivable without a formidable number of computations necessary to analyze even a fraction of the economic indices involved. As the economy develops, the amount of such information is constantly snowballing. Taking this fact into account, it is clear that computation techniques and equipment available to capitalist economists before World War II made it possible to subject to analytical scrutiny only a limited number of economic indicators. To add to the difficulties, the relevant information was always very late in coming, and then it was not very accurate. State agencies thus had a very poor feel of the pulse of the country's economic life, and the measures taken by governments in the financial and credit fields were, as a rule, belated and ineffective.

After World War II, and when electronic computers appeared, statistical and mathematical methods were employed to a much greater extent by the state in controlling the economy. Electronic computation techniques made it possible to collect and process economic information on a scale quite unattainable in the past. Now it became possible to keep track on a nation-wide scale of the dynamics of the basic commodities. That explains why more and more computers are being used by the state machinery in the capitalist countries. In the United States, alone, more than sixty thousand computers were used for such purposes in 1968.

But the use of electronic computers does not solve the whole problem by itself. The employment of computer techniques was supported by a recasting of the entire statistics-gathering

machinery; this was done both by extending the coverage of economic characteristics measured and accounted for by state statistics and by introducing automatic processing of the data thus gathered. Industrial censuses were organized in the United States along new lines; they now cover a multitude of detailed data, the analysis of which enables US economists to make a profound study of the structure of the national economy. As a result, the production of branch-to-branch balance sheets became feasible on a scale that had been impracticable before.

The progress of balance statistics in many capitalist countries owes much to the infusion of mathematics into economics. Efforts to stimulate the economy with the aid of econometry caused economists to pay more attention to national income, the employment of labour and of capital in the economy, income distribution patterns, etc. As a result, national systems of accounts appeared in all advanced capitalist countries providing aggregates of individual production indicators for the various branches of the economy.

Simulation of the national economy in its integrated form, as well as simulation of its individual subdivisions, is a basically new development for analyzing the capitalist economy; it was made possible with the advent of electronic computers. Quantitative evaluation of diverse economic inter-relations incorporated in the economic model, with due consideration for the influence exerted by various economic policies, and undertakings makes it possible to predict with a greater or lesser degree of accuracy the course that economic processes will take. Computers bridged the gap between everyday economic

practices and many econometric concepts that hitherto had appeared as abstractions, divorced from reality.

At the present time the application of computer technique is considered in the main capitalist countries to be one of the most important means of building up the economic potential of a country. Whereas in the past electrical power available per worker and the extent of mechanization of a country's industry were considered basic indicators of its industrial development, nowadays, a new indicator is steadily gaining weight—the total number of computers installed and operated by big corporations and by the country as a whole. The drive for higher labour productivity and higher returns on investment in production is facilitated by computing techniques which speedily process diverse information for economic programming.

### Economic Programming

With the appearance of new powerful means of processing economic information in the late fifties, and especially so in the early sixties, state-monopoly control over the economy entered upon a new phase. The governments of a number of West European countries and the government of Japan initiated the transition from a complex of sporadic measures to economic programming that covered all sectors of the national economy. The transition was brought about by the appearance of the most influential school of modern econometry with its theory known as the theory

of programming interdependent actions, or, in brief, the programming theory.

The programming theory rests upon a new class of mathematical problems that can be solved only by means of electronic computers in accordance with computation programmes followed by these machines. The theory is comprised of two parts. One of the parts studies the problems related to the inner coordination of the programme itself, i.e., the coordination of individual inter-related solutions. No programme can be completed without such coordination. The second part of the programming theory deals with optimization of the programmes. Theoretically it is possible to work out an infinitely large number of such inner-coordinated programmes. But not all of them are equally effective. That means that the best variant is to be chosen out of a vast multitude of possible solutions.

The necessary means for solving the so-called extremal problems were known a long time ago in mathematics. The maximum or the minimum value of a given parameter chosen among an aggregate of mutually dependent variables is defined and its value is designated as the criterion function. The rest of the variables are considered to be constraints not to be trespassed while the problem is being solved. Guided by the criterion thus chosen we proceed to select out of a multitude of conceivable variants the one and only variant of the solution, such that the value sought reaches either its maximum or its minimum expression depending upon what we are after. That will be the optimal variant for the criterion we have singled out.

The mathematical procedure described above

has one significant flaw. To determine the optimal solution a tremendous number of possible variants have to be sifted and analyzed. To do this and compare all of them with each other was a practical impossibility until electronic computers appeared. Even with the work performed by electronic computers, the comparison of all possible variants required so much time that solving economic problems in that way proved absolutely ineffective.

Methods had to be elaborated that would allow the variants known in advance not to be optimal, to be discarded speedily and on a lump basis, thus considerably reducing the field in which the value sought was to be found. Such methods were found and their appearance ushered in a new branch of mathematics—computational mathematics.

The 1948-58 decade saw the beginning of a series of works on linear programming in the USA. The term "linear programming," now a familiar one, came into being exactly at that time.<sup>1</sup> Prominent American mathematicians and economists T. Ch. Koopmans, G. B. Dantzig, R. S. Tucker, A. Charnes, B. D. Dorfman and many others launched a series of theoretical studies to determine the scope of practical applications of linear programming methods in a capitalist economy. They linked linear programming

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<sup>1</sup> L. Kantorovitch, a Soviet scientist, was the founder of linear programming methods. His works, however, were not known for a long time in the West with the result that much of what he had discovered as early as 1939 was "rediscovered" by US experts working in the field. L. Kantorovitch's priority, however, has been universally acknowledged now.

with the matrix games theory and elaborated computation procedures for solving economic problems.

Dantzig, in particular, has advanced the simplex-method that is most widely used now in the West and is sufficiently broad in its applications. Using it and a number of other methods economists are compiling programmes for the computers to work out short-cuts to the optimal solution of a given problem.

Almost simultaneously with linear programming there appeared another trend in the application of mathematics in economics—an analysis of input-output tables. The main tools of such an analysis are the input-output matrixes for various sectors of the US economy elaborated by an American scientist, W. Leontief<sup>1</sup>. The model offered by Leontief is a very special case of linear programming. It might be classified under the first part of the theory of linear programming since it provides only for the balancing of all the characteristics of the branch-to-branch input-output relations without determining the optimal economic development variant.

The scope of practical applications of linear programming proved rather wide. This method is used both for solving applied problems such as determining the most rational use of materials in shops and in efforts to coordinate the activities of enterprises and branches of the economy as a whole. Linear programming provided new opportunities for the regulation of the economy on

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<sup>1</sup> Leontief makes use of Soviet experience which he observed while studying at Leningrad University in the 20s.

the part of the state. Modern capitalist programming is an attempt to lay, with the aid of mathematics and economic theory, a foundation for the economic practices and policies of the capitalist state. The objective of such programming is to coordinate the formulation of the state's economic policy with quantitative forecasts of the general trends in the development of the economy. However, all these attempts have failed in their purpose and they are doomed to fail in the future. They are not able to save capitalism from an economic collapse.

### Social Factors Ignored

The progress of economic programming in capitalist countries is closely linked with the use of the technique of large-scale economic process simulation. The development of intricate models of national economies used to simulate various economic situations became one of the most significant lines of research in such studies in the fifties and sixties. Econometry uses various types of models for forecasting and programming purposes. Among them we find aggregate macro-economic models determining the dynamic dependencies of such basic economic variables as the gross national product, national income, accumulation and consumption funds, manpower resources, foreign trade turnover and others. Models advanced by R. F. Harrod and E. D. Domar belong to that class. There are also two- and

three-sector models for large-scope forecasts of structural shifts—such as the inter-relations between the manufacturing of means of production and consumer goods, between industry and agriculture, home production and foreign trade. Models elaborated by Boss and Jan Tinbergen, Ragnar Frisch, Ishimura and others belong to that category. In addition to these, there are also multisector models based on the use of aggregate macro-economic models in conjunction with branch-to-branch input-output tables that indicate interrelations between various sectors, as well as the interdependence of final demand and social product through direct and full cost quotients; then, there are inter-regional trade relation models with balance equations of commodity production and consumption in the economically interrelated regions (J. Tinbergen's model). The newest models that merit mention here are multifactor Brooklyn econometric models, developed by J. S. Duesenberry, G. Fromm, L. Klein, Edwin Kuh, and a system of models for Great Britain elaborated at Cambridge under the guidance of R. Stone. Of great interest are the efforts made along the same lines in Japan where a system of econometric models has been used in the most comprehensive and consistent way to provide a national economic forecast.

The ignoring of social factors is a characteristic feature all econometric models share in common in capitalist countries. The naturalistic trend in the development of bourgeois political economy, a phenomenon of long standing in its history, is once again expressed in such neglect. As is known, the followers of the naturalistic trend believe that basic economic categories can

be determined proceeding from production and technological factors only, and that social factors might be taken into account only in the concluding stages of the economic analysis. The naturalistic trend became especially pronounced in bourgeois political economy with the advent of econometry. Western economists began developing their economico-mathematical models in complete abstraction from social relations. This abstraction to a very great extent is explained by the immense complexity of social factors, and their dependence upon a multitude of other facets of social life. Besides, many social factors are most difficult to measure and describe in mathematical terms. So, at the present time, social factors, as Leontief put it, are sacrificed to the "mathematical elegance of the model."

Along with such attitudes, some bourgeois economists feel that social relations in general should be regarded as lying beyond the interests of the science of economics, which should concern itself exclusively with investigations of subject-object relationships. As to the relations between the subjects, these are to be left entirely within the competence of sociology. By trying to present the capitalist system as a perpetual and stable entity, the representatives of that trend proceed from an erroneous assumption that the social environment in which an economic system is functioning is perpetual, stable and should not be taken into account as such.

A convincing refutation of such "theories" is, among others, the most contradictory nature of the development of economic programming in capitalist countries. State intervention in the eco-

nomy is not always dictated by the direct interests of the monopolies. Sometimes it originates from the pressure exerted by labour and democratic movements forcing the capitalist state to yield and give ground to their demands. This is true, in particular, of such fields as new housing programmes, public health services, education, social security services, etc. In a number of instances the strategic interests of state-monopoly capitalism do not coincide with the selfish avaricious interests of individual monopolies, and contradictions that follow such clashes of interests are frequently resolved in a way least of all liked by the big business concerns. Cases in point are, for instance, the long-range projects aimed at changing the national economy's branch structure by stepping up the development rate of its most advanced sectors. In this case the objective of improving the competitive stand of the entire national economy on the world market gains supremacy over the interests of specific groups of monopoly capital.

Patriotic elements still wield some influence in the state-owned sector of the national economy in the European countries that partially nationalized some of their industries; these elements uphold a policy that meets the national interest. The Left forces are gaining strength in opposing the reactionary tendencies of state-monopoly capitalism. The capitalists, as a class, are incapable of taking cover behind the mathematical "elegance" of econometric models and run away from the social problems confronting them. And these problems are so acute and pressing that no econometry is capable of solving them—they will be resolved only through class struggle.

# Problems of the Capitalist Economy

## "Indicative Planning"

The attitude towards programming economic development is different in various capitalist countries. In the USA and the Federal Republic of Germany, where monopoly capital was strong enough to do whatever suited it best, efforts to stage programming on a national scale were rather feeble. Financial barons did not need state support badly enough to invite its aid.

The situation was different, however, in those capitalist countries where the economic position of the capitalist class was weakened as a result of World War II. In this case state support was needed by monopoly capital to improve its competitive ability on the world market. In France, Italy and Japan economic programming was used in an effort to coordinate and regulate the national economy. Especially in Italy and France, an acute need was felt for such intervention on the part of the state to keep the nationalized branches of the economy operating normally. Though differing in the level and characteristics of their economic development, France, Italy and Japan all required, as a matter of vital necessity, to speed up the rate of their economic development in the post-war period. So, with full support of monopoly capital, the governments of these countries were impelled to launch long-

range economic programming. The intention behind those initiatives was to do away with the cyclic swings in the economy and to ensure high and steady rates of economic progress. Using programming as a tool the capitalist states are striving to "rationalize" their national economies along capitalist lines in a way that accords with the interests of the biggest monopolies of the country. High priority is given to new promising branches of the economy, to overcoming the bottlenecks in the economy and to reconstructing backward elements. Of paramount importance is the fact that the state organizes and finances fundamental research programmes that go beyond the interests of individual monopolies, but which are absolutely essential for stimulating the country's scientific and technological progress.

France and Japan have gained more experience in economic programming than any other capitalist country. The General Planning Commissariat has been functioning in France since 1947. Four medium-range plans have been developed in these years and a plan for 1966-70 was adopted in 1965. In Japan the drafting of the plans started in 1948. In 1958, the Economic Planning Board submitted an economic development plan for 1958-62 and in 1960 it presented its plan for doubling the national income in the period 1961-70. An interim economic plan for 1964-68 was elaborated in 1963-64. Long-range economic programming has been used for quite some time in Italy. "The Vanoni Programme" was a feature in Italy for the period 1955-64. It was followed by a new national development programme for 1965-69.

But what are the basic aspects characterizing

the economic policy of capitalist states that rely on economic programming? Both the state and the monopolies are interested, first and foremost, in lifting the veil over the future to determine the prospects for economic progress. The greater the economic difficulties, the more urgent the need of state-monopoly capitalism for economic forecasting. As distinct from the past, economic forecasting today is not confined to being merely informative. For instance, the official concept of programming in France is expressed by the following formula: "Being different in principle from forecasting, planning presupposes energetic and purposeful influencing of the course of economic events. Proceeding from the data provided by the forecasts it poses objectives and ensures their accomplishment *affecting to this or that extent the progress the economy makes.*" (Author's italics.)<sup>1</sup>

Programming in capitalist countries involves the setting up of a whole structure of agencies that study economic trends, gather relevant information, and organize the collection and processing of statistical data on various economic relations. Forecasts are worked out on the basis of the data collected through such channels, and long-range programmes of interdependent policies are advanced proceeding from such predictions. Such

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<sup>1</sup> *Notes et études documentaires*, No. 2846, 30.12.1961, p. 4. The quotation shows quite clearly that what is meant here is anything but planning. The combination of economic forecasts with indirect-control-over-the-economy policies can in no way be identified with socialist planning because of the limited scope of the state regulation envisaged by the authors of the document quoted.

economic policy rests upon the volume of investments allocated by the state for the purpose, and the financial outlays that are coordinated with the plans of the largest private corporations. A guaranteed state market is created for the leading business concerns, and private capital thus becomes more and more entrenched in the country's economy. That means that a market deal is the backbone of capitalist programming, a deal between the state and monopoly capital, though of a very peculiar nature. Such deals are purely indicative, i.e., they are no more than simple recommendations, and the terms are not strictly binding on firms which are parties to them. To encourage firms taking part in the deal and to influence the development of production in accordance with the recommendations proposed by the state, indirect pressure is brought to bear through the marketing, crediting and financial machinery. Such a system is more effective than the forms of state economic regulation described above. Economic policies under indicative planning proceed from a long-range programme that lays down the guiding principles for regulating the country's economy by means of credit and financial levers.

In addition to national programmes, work has been going on for a long time now on branch optimal programmes. As a rule, these have been applied in the nationalized branches of the economy. An example is the power industry of France where optimal programming has now been applied for over seventeen years. At first the French power engineers used the simplest linear optimization models, passing at a later stage to more complex non-linear models with hundreds

of unknown quantities and with constraints into which stochastic elements had been introduced. The demand for minimum overall calculated costs including a seven per cent discount rate on the capital is taken as the optimality criterion. The French power industry managed to attain levels of profitability at individual power stations almost fully equal to the industry's optimal indicator.

The combination of national development programmes with those established for individual branches of the economy enables state-monopoly capitalism to exercise a greater margin of control over the country's economy. Certain achievements in the development of the national economies of the countries that operate programmes of this nature demonstrate the advantages offered by this system. For instance, some economically backward branches of the economy were reconstructed and brought up to modern standards in this way in France. The practice brought into being and promoted the development of new branches of the economy, which secured for French capitalists higher competitive ability on the world market. Economic programming has, in this way, to a certain extent been responsible for the higher rates of economic development registered by France, Italy and Japan.

Various forms of economic programming are now spreading on an increasing scale in all advanced capitalist countries. Short-, medium-, and long-range programmes are being compiled by combining various methods; this is done with the dual aim of meeting market situation problems and of effecting the desired structural changes in the economy. Programming to deal with

market situations and short-range programming with certain elements of medium-range programming is typical of Holland, Sweden and Norway. For example, in Holland annual economic programmes compiled by the country's Central Planning Bureau are coordinated with the annual budgets, and in recent years they have been dovetailed with experimental medium-range five-year forecasts also. Annual national economic budgets serve as the foundation for economic programming in Sweden, the budgets combining forecasting with investments-of-reserves policy. Economic programming in Norway has assumed the form of investment adjustment through budget, credit and financial regulation policies, as well as price control practices.

In Great Britain, where economic programming came to be adopted later, a National Economic Development Council was specially set up for the purpose. This state body, acting under a Conservative government, produced a medium-range programme for 1961-66. And though the initiative proved to be ineffective, a new five-year economic development programme for the 1965-70 period was worked out, this time under a Labour government, on the basis of the observance of a balance in branch-to-branch relations.

Greater competition from the states that reconstructed their economies after they had adopted long-range economic development programmes of state-monopoly regulation of their national economies is compelling the ruling circles of the USA and the Federal Republic of Germany to reconsider their attitude towards the "dirigisme" of the French type.



## The Problems Stay

"The era of crisis-free development of capitalism" was what many bourgeois economists thought would result from the greater range of economy regulation controls introduced by the capitalist states. John K. Galbraith is known to be the most ardent exponent of this idea; he stated that advanced capitalist countries in their evolution were entering upon a new epoch during which "a new industrial society" was coming into being. Professor Galbraith even alleged that a revolution was now in progress in economic theory that was no less important than the Keynesian revolution.

What is the meaning of this "industrial society," anyhow? Professor Galbraith uses the term "industrial society" to designate the world of the largest business corporations. These "mature" concerns, as distinct from the immature cousins of the past, have enough economic power to free themselves from the decisive influence of the market. But to do it, they need the aid and the guarantees of the state. The main conclusion Professor Galbraith arrives at is that capitalism can and should set up a comprehensive and effective planning system that would comprise planning carried on by the "industrial system" in conjunction with state adjustment of total demand.

But what is planning as the Professor sees it? It appears that it is nothing more than the total combination of methods used by monopoly capital to establish and maintain control over the market. These methods include the setting up of "polyglot corporations" (as the professor calls

them) for merging and diversifying production, acquiring controlling interests in companies carrying on business in various branches of the economy, for forcing small and medium companies to follow in the wake of the big corporation's pricing policies, for establishing control over sources of raw materials and distribution, wholesale and retail systems, for stimulating demand and controlling the consumer.

Such methods, naturally enough, have nothing in common with socialist planning. Professor Galbraith, undoubtedly, realizes it. Nevertheless, he asserts that a big modern corporation and the modern machinery of socialist planning are different means of meeting the same needs. It is impossible to agree with such views.

At the present time big monopolies through profitable state orders have a market secure enough to meet their interests. That explains why in the main capitalist countries production, as opposed to the past, is now to a considerable extent oriented on a known market. But the change does not guarantee capitalism from the recurrence of slumps, depressions and full-fledged economic crises.

That application of economico-mathematical methods supported by electronic computer techniques has considerably increased the economic potentialities of state-monopoly capital is a fact that cannot be denied. In the USA, for instance, these methods made it possible to effect sharp cuts in the swelling ranks of managerial personnel, to speed up and streamline production schedules, to reduce production backlogs, to secure savings in allocating financial outlays, to slash transportation costs. American experts believe

that the application of mathematics and use of electronic computers will lower production costs by 15-20 per cent in industry, bringing higher profits. At the same time automation is greatly increasing industrial production capacity. But great as the production potential now is, it is inhibited and held back by great marketing difficulties. That is why many corporations do whatever they can to secure a flexible adjustment of production increments to marketing possibilities.

With such aims in view they encourage research into mathematical simulation of the market, and make ever-increasing use of computers in their sales and marketing divisions, wholesale distribution firms, department stores, etc. The speedy processing of consumer demand data makes it possible to respond to the market without delay and to stock up commodities currently in high demand. Another advantage of the new methods was that firms were able to cut down at least by one-fourth the volume of stocks in wholesale and retail outlets.

Technological progress ensures a rapid change-over of production to new items. Big corporations make sure that the new lines in the goods the company offers are superior or, at least, equal in cost and quality standards to those goods produced by their competitors that find a ready market. But increased outputs made possible by automation flood the market and this, in turn, intensifies and aggravates competition. The use of computer techniques allows each individual producer, in principle, a better chance of adjusting his production to the changes in the marketing situation than he could have in the past. But

when the pressure of the goods unsold in a flooded market becomes higher, a larger market can be secured only by pushing competitors out, but the latter, too, are armed with modern computers and the know-how of using them to secure their own goals. Competition becomes sharp and dramatic as never before.

Under these circumstances, powerful US monopoly capital groups are forced to put up with wider economic functions exercised by the state, though such interference undermines in certain fields of the economy the free enterprise principle. Mr. Alfred Clarence Neal, President of the Committee of Economic Development—an influential body representing US business interests—feels that under present conditions continuous growth of the economy can be ensured by using state economic regulation more energetically and resolutely. "Times," he told a *Pravda* correspondent, "have changed. The state is now the corporations' greatest and most reliable partner. It is the immense federal orders that secure the stability of the economy's growth, and these orders keep growing. That is why we not only put up with the higher income taxes we pay, but even suggest that the taxes, if necessary, should be increased—the money would automatically come back to the corporations as new federal orders."<sup>1</sup>

In the last few years energetic efforts have been made in the United States to launch new extensive programmes ensuring state-cum-monopoly regulation of the country's economy. Attempts are being made to produce consolidated and branch long-range economic forecasts, branch-to-

<sup>1</sup> Quotation from *Pravda*, March 23, 1969, p. 4.

branch "input-output" tables, and to set up complex programmes for the development of the country's water resources, road construction, etc. Great expectations are pinned upon the "planning, programming and budgeting system" advanced by the Rand Corporation. The system was applied for the first time in 1961 to direct and manage the military-industrial complex comprising the Defence Department and a number of private industrial companies linked to it through a complex of procurement contracts. The system was unquestionably a success in managing the intricate military-industrial complex and former US President Johnson directed that it be used for managing all the civil federal agencies, the State Department included. The system was subsequently applied in Great Britain, Canada and the Federal Republic of Germany.

All these advances notwithstanding, the contradictions that rend the economy in capitalist countries are still there to behold.

### Results Fall Short of Expectations

Is economic programming capable of curing capitalism of all its ills? The answer, of course, is negative. The objective conditions prevailing in the capitalist system make it impossible to use fully the great economic advantages inherent in the application of mathematics to economics and the use of computers for solving economic problems. B. Seligman, a Western economist, believes that "only when the whole economy is viewed as a firm, as in a socialist system, does linear programming offer important possibilities for achie-

ving a social balance between production, technology and prices."<sup>1</sup> But that is precisely the condition that is absent and must necessarily always be absent under capitalism, whose economy, a very high degree of concentration notwithstanding, is parcelled up between a multitude of private corporations, medium and small capitalist businesses, each being governed in its activities primarily by profit-seeking motives and objectives.

State-cum-monopoly control over the economy does anything but eliminate cut-throat competition among the biggest corporations for profitable state contracts and home and foreign markets. And this is exactly what accounts for the unsurmountable difficulties in the way of any attempts to regulate the economy through economic programming.

Let us take the case of economic forecasts that, as has been pointed out, constitute an integral part of economic programming. Three basic methods are used in working out such forecasts: the circulation of questionnaires among firms and the obtaining of expert evaluations; extrapolation, i.e., the forward projection of dynamic series calculated on the basis of statistical generalization of economic development data; and the elaboration of mathematical models. These methods are often used in various combinations, each of which has its own considerable deficiencies.

The circulation of questionnaires—the polling method—cannot provide correct data because each

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<sup>1</sup> B. Seligman. *Main Currents in Modern Economics*, 1963, p. 784.

firm, to secure its commercial secrets, and because of other considerations, is always reluctant to reveal fully its own plans and policies. Determination of economic development trends by extrapolation runs up against considerable difficulties because of the unevenness in industrial development rates and in other economic indicators in various periods. A very serious problem in econometric simulation is the instability of the relation coefficients of various economic parameters comprising the model. The deficiency is especially telling when efforts are being made to work out long-range forecasts. A capitalist state is unable to provide for and secure a greater stability of such indicators lacking, as it does, a sufficient economic basis for the purpose.

So it is only natural that, under the circumstances, economic projections, estimates and forecasts are bound to lack accuracy and dependability. The deflation of their value is especially sharp when estimates are made, not of the technological development prospects in some specific narrow field, but when forecasts are worked out for the entire national economy; this is particularly true of efforts to determine overall economic development trends for several years to come.

Thus, Great Britain's National Economic Development Council compiled a plan-forecast for 1964-70 on the basis of firm-polling techniques. But from the very beginning of the period, the forecast proved completely inadequate and unsound. Industrial production in Great Britain increased only by 3 and 1.5 per cent in 1965 and 1966 respectively instead of by 4.5 per cent which was the average annual growth envisaged by the forecast.

Some of the forecasts had better luck. For instance, the Swedish forecast indicated that the gross national product would grow throughout 1960-63 to 113.2 per cent, while the index actually reached 113.4 per cent. At the same time, however, the structure of the gross product was far from what had been predicted, which greatly detracted from the value of the forecast, although a tremendous amount of work had gone into the making of it.

No matter what country we take, as a rule, there is a significant discrepancy between state plans for the development of individual branches of the economy and the progress they actually make. A case in point is France. Extensive long-range economic development programmes began to be implemented there somewhat earlier than in other Western states. In all French programmes, target figures almost never coincided with actual economic indicators. And though France has a record of considerable economic achievements, the credit certainly does not belong to econometry. Neither was the Italian national programme crowned with success—the advances predicted by the forecast for 1965-69 never materialized. Contrary to forecasts economic development rates slowed down in Japan, too.

Problems posed by the selection of optimality criterion clearly show that the arsenal of mathematical programming (and of linear programming, in particular) cannot be used efficiently enough for state-monopoly regulation of the economy. It has already been pointed out that the choice of the optimal variant for the development of the economy out of the multitude of possible alternatives is the most important facet of econo-

mic programming. To make the selection, planners need a definite criterion to go by in establishing preference among the variants available in a given case.

The problem is comparatively easy to solve when it is limited to an individual corporation or a specific branch of the economy. If a programme is elaborated by a certain corporation, everything is clear—in that case a programme promising the highest profits would be considered optimal. However, things become far more complicated when a programme has to be chosen proceeding from a wider scope of economic considerations. For example, a programme providing for the highest rates of national income growth might be considered the best choice, or, alternatively, the one that ensures maximum employment, etc. But the choice of an overall criterion holding good for the entire national economy inevitably brings about a clash between the interests of the nation at large and those of the powerful monopolistic corporations—a situation that results in the outbreak of severe economic wars.

So it is not accidental that at the present time many bourgeois economists are tending to give up the optimization principle in favour of "the stability and control by critical parameters" approach as a guide in economic programming. The new formula stands for the use of permissible substantial (critical) variables in a mathematical model. The essence of the idea is to use the state-cum-monopoly leverage designed to control the economy only to an extent that will not jeopardize the existence of the capitalist system. The unemployment level, real wages and salaries, the budget deficit, the purchasing power of money,

etc., might serve as such critical variables. Consequently, to prolong the life of the capitalist system, these economists suggest that manoeuvring between "critical parameters" take the place of a purposeful development of the economy in accordance with a definite well-defined criterion. But the term "planning," wide as its meaning is, cannot be extended to economic development control of the "manoeuvring-between-critical-variables" type.

### Crises Have Not Been Eliminated

Bourgeois econometrists have failed to eliminate the cyclic character of the development of the capitalist economy, no matter how sophisticated they have been in their efforts to do so. This shows how limited the possibilities of capitalist programming and control are. Though the intensity of economic crises has somewhat slackened in Western Europe, their complete elimination within the framework of capitalist society has proved to be an utter impossibility. The wide use of economic forecasting and of computers notwithstanding, bourgeois economists are still helpless in predicting economic crises, which, as in the past, come without warning. State anti-crisis programmes are launched, as a rule, after a crisis has already set.

One might assume that, under modern conditions of state-cum-monopoly regulation of the economy, no world economic crisis, comparable in scope with the one that struck the capitalist world in 1929-33, can be expected. Nevertheless,

the development of capitalist production remains essentially cyclic. And though crisis slumps are often not concurrent in various capitalist countries, the crisis cycle is still global in scope and nature. This is proved by the periodic recurrence at approximately 8-12-year intervals of series of industrial, currency, stock exchange or trade slumps that come about more or less simultaneously. All this proves convincingly that the theory, scientifically elaborated and advanced by Karl Marx, of the inevitability of economic crises under capitalism is valid and just as applicable today as in the past.

Economic crises are referred to as crises of over-production. But the over-production is a relative term—the volume of goods produced is compared not with what society can consume, but with what it can afford to buy. And at the present time the conditions that bring about this disparity are not disappearing but, on the contrary, are becoming more favourable.

The failure of the capitalist system of economy manifests itself quite clearly when such benefits as automation of production and modern management systems applied at all levels of the economic hierarchy, are not only failing to eliminate the contradictions that beset the economy, but even are aggravating them. Indeed, a sharp increase in production volumes as a result of automation invokes, as never before, a constant menace of over-production. At the same time over-production renders ever growing numbers of workers and employees jobless. Under capitalism growing unemployment is automation's inevitable concomitant. But mass unemployment, as is known, brings in its wake a drop in the purchas-

ing power of the population, which severely strains the economy as the volume of production grows while purchasing power shrinks.

Provisions are even made for lowering the living standards of wage and salary earners in the economic development programmes followed by capitalist states. For instance, the French plan for 1966-70 envisaged the lowering of the annual average increases in wages and salaries from 5.3 to 3.3 per cent, and that in spite of sky-rocketing prices. Similarly the share of personal consumption in the national income was "programmed" to drop from 69.7 per cent in 1965 to 68 per cent in 1970<sup>1</sup>. At the same time the plan provided for a greater growth of capitalist profits in relation to the national income growth rate. An "incomes policy" along the same lines has been included in economic development programmes adopted by Great Britain, the Netherlands, Italy and other countries. To encourage investments, national income is being redistributed everywhere in favour of monopoly capital; this is being done at the expense of wages and salaries and other sources of income earned by working people. This results in a situation in which the market is flooded by newly-produced goods while the purchasing power of the population is, by and large, diminishing. This cannot but lead to unwelcome economic repercussions.

The after-effects of militarization of the economy in the capitalist countries must be added to the conditions described above. Under an arma-

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<sup>1</sup> *Cinquième plan de développement économique et social (1966-70)*, Tome I, Paris, 1965, p. 165.

ments race, state-cum-monopoly regulation of the economy can be manipulated so that it creates unlimited possibilities for the embezzlement of public funds. A state armaments market allows a small exclusive "club" of the biggest corporations to carry on an extremely profitable business. "Club" membership safeguards them from any competition, as under cover of "military secrecy" they can sell their products at sky-high prices.

Heavy military spending by the state has become a constant feature of life in capitalist countries. By causing the armed forces to renew and modernize their weaponry and equipment periodically, military expenditure exercises a stimulating effect on the economy. Thus, 75,500 million dollars out of a total of 135,000 million dollars, or 56 per cent of the entire expenditures of the US federal budget for the 1967/68 fiscal year, was spent for direct military purposes. Financial outlays for military purposes are very large in other capitalist countries, too. According to preliminary estimates by the NATO Defence Planning Committee \$ 104,000 million were spent in 1968 alone. This is five times the sum spent by NATO on its military programme twenty years ago when this aggressive bloc of Western powers was founded. It is noteworthy that the national incomes of the NATO member-countries grew during the same period by not more than 2-2,5 times. That means that military expenditure now devours a much greater share of their national incomes than immediately after the war. According to an estimate of the magazine *France Nouvelle*, the sum spent each month by NATO countries on armaments would be sufficient to pay for the irrigation of the entire area of the Sahara.

But where does all this money come from? Where do capitalist governments get it? They get it mainly from the pockets of the tax-payers, the working classes bearing the brunt of the taxation burden. For example, 51.4 per cent of the \$ 100,000 million constituting the revenue of the US federal budget for the 1965/1966 fiscal year came from personal income taxes, 9.2 per cent from excises, and only 29.7 per cent from corporation income tax. Out of the \$ 10,300 million total state revenue in Great Britain's annual budget for 1966-67, £ 9,400 million came from taxation, the lion's share of it having been drained from the pockets of the working people.

The volume of military expenditure today, however, is so great that state revenues cannot meet the expenses incurred by it. Deficits in state budgets have become chronic since the Second World War in capitalist countries. The deficit of the US federal budget, for example, reached an all time high of \$ 25,400 million. To close the gigantic financial gap, the administration under former US President Johnson had to rush through Congress an Act by which income tax was raised by ten per cent. By way of consolation the man-in-the-street was led up to believe that the measure was only temporary. But Mr. Nixon, the new US President, shortly after his inauguration requested and obtained Congress approval for the continuation of the additional tax.

The Nixon administration ignoring the opposition of the progressively-minded section of the US public, decided to embark upon an "anti-missile defence" programme that was estimated to cost not less than \$ 100,000 million. Trying to allay the tax-payer's concern, those who back the



arms race say that "so far" only a "thinly-spread anti-missile defence system" is being contemplated and planned at the cost of a "mere" \$ 5,500 million. Poor consolation, indeed! Bearing in mind that the appetites of gigantic corporations manufacturing military equipment are insatiable, it can safely be assumed that they will never be satisfied with the profits the programme would fetch them. As Senator Eugene McCarthy wrote in *Saturday Review*, the military-industrial complex in the USA was rapidly turning into a kind of a republic within the Republic and that its influence was being felt in each town, in each state assembly, in each federal agency. To meet its claims, the US administration would seek new financial means and impose more and more burdensome taxation.

Growing taxes and inflation generated by militarization of the economy result in a drop in effective demand. This inevitably creates the necessary conditions for the next-in-the-series economic recession, hitting the industries producing non-military goods the hardest. And no economic programming can forestall such recessions. This is why some sections of the capitalist class who have no vested interest in the arms race are opposing militarization more and more actively. The arms race is also meeting with mounting opposition from the democratic elements of capitalist states, and, primarily, from the working class, because it is they who pay most heavily for missile-nuclear lunacy. It is clear that stepped up militarization of the economy does not remove the causes underlying the cyclic development of capitalism, but tends to intensify them.

It should be added that the inevitability of the

crisis recessions of production is likewise rooted in greater competition strife waged by capitalist countries on world markets. Mathematics has been applied to economics, it will be remembered, with the aim, among other things, of improving the ability of a country's goods to compete on the export market. But the vested interests of state-cum-monopoly groupings in other countries also try to make their exports more competitive. So the clash of monopoly groups competing for international trade produces results that are quite the opposite of what has been programmed. It follows that long-range economic programming, while being instrumental in effecting capitalist rationalization in the home economy, aggravates inter-imperialistic contradictions and causes still greater anarchy in the world capitalist economy. The record of the European Common Market clearly shows that these contradictions cannot be surmounted and done away with by means of capitalist economic integration. The founders of the Common Market hoped for a blissfully peaceful idyll. Instead, acute economic struggle persists between the "Six," the conflict of interests being especially sharp between the big corporations of France and their opposite numbers in the Federal Republic of Germany. Many economic processes, in general, cannot be controlled by the combined might of capitalist states and monopoly capital. The increasing tremors of the monetary crisis are proof of this. The French franc shared the fate of the devalued British pound. The US dollar is losing its value and is becoming less and less reliable as a currency unit.

Leonid Brezhnev, General Secretary of the Central Committee of the Communist Party of the



Soviet Union, speaking at the International Meeting of the Communist and Workers' Parties in 1969, stated: "The further imperialism goes in its attempts to adapt itself to the situation, the deeper become its inner social and economic antagonisms. The development of capitalist economy is marked by periodic recessions. The unevenness and one-sidedness of the development of individual countries is becoming more pronounced. All this cannot fail to engender serious difficulties within these countries and boost the growth of contradictions between them. This is shown by the constant budget deficits, the extremely acute outbursts of currency and financial crises, and the rising cost of living and inflation which in the 1960s have become a chronic disease in many capitalist countries. This disease is now frequently called a 'creeping crisis'." There is no doubt that the capitalist system has failed, and, because of its inherent contradictions, will always fail, to free itself from the grip of anarchy.

### Opposing Socialism Under a Socialist Banner

The deepening of the inner antagonisms of the capitalist system is not the only reason why econometry has been so extensively applied by state-monopoly capitalism to regulate its economy. Efforts along these lines have also been encouraged and sponsored by capitalism in its attempt to hold its own in its economic competition with socialism. For example, a matter of great con-

cern in the United States is the levelling of the economic growth rates of the USA and the USSR. What are the business circles of the United States concerned about? It is quite plain—in 1950 the volume of industrial production of the USSR was less than one-third of that of the US, whereas it has now grown to 70 per cent. At the same time, during the past three years, Soviet agriculture has produced on an average about 85 per cent of the total volume of US agricultural produce.

The ideologists of the bourgeoisie cannot shut their eyes to the fact that the ideas of socialism are winning the hearts of millions all over the world and are becoming more and more popular. So some of those ideologists have taken to preaching the "convergence" theory, i.e., the idea that socialism and capitalism will gradually come closer to each other and become similar. The "convergence" is being brought about, they say, as a result, on the one hand, of state intervention in economic affairs and the transformation of the uncontrolled, spontaneously developing capitalist economy into a planned, controlled system. On the other hand, the proponents of the theory hold that the elimination of rigid centralization in the socialist economy spells a return to capitalist principles of private enterprise.

Walter Buckingham, an American economist, and one of the founders of the convergence theory, in 1958 published a book entitled *Theoretical Economic System. A Comparative Analysis*. The closing chapter of the book has quite a significant heading— "Toward One Economic System." The author of the book writes: "...a major conclusion of this study is that practical, working economic systems are becoming more alike than

different".<sup>1</sup> His views found many followers and exponents. Among them a Dutch economist, Jan Tinbergen, is the most consistent and ardent supporter of the theory. What is important, he asserts, is that both systems are in a state of development and that many changes involved in the process show a trend towards converging. There is even proof that both systems are moving towards a certain optimal synthesization—he goes on to assert—towards a system that is better than either pure capitalism or pure socialism as these systems have been interpreted in the past.<sup>2</sup>

Some bourgeois economists and sociologists actually identify increased state intervention in the economy of capitalist countries with . . . socialism! For instance, M. R. Aron considers that the state nowadays actually realizes its responsibility for the functioning of the economy and is not inclined to put up with serious depressions.<sup>3</sup>

No matter how much a capitalist state gains in importance as an economic factor, it will never be able to grow into a decisive force capable of determining and guiding the economic development of a country in its entirety. To make that possible, respective state agencies must be in a position to determine the rate at which the entire economy will grow, as well as that of its basic segments; besides, they must ensure a proportionally adequate distribution of labour, material and financial

<sup>1</sup> Walter S. Buckingham. *Theoretical Economic System. A Comparative Analysis*, N. Y., 1958, p. 26.

<sup>2</sup> Jan Tinbergen. *Do Communist and Free Economies Show a Converging Pattern?* (Soviet Studies, April, 1961, p. 333.)

<sup>3</sup> R. Aron. *Dix-huit leçons sur la société industrielle*, p. 308.

resources among the branches of the country's economy and its economic regions, a steady extension of production in conjunction with the growth of national consumption, and guarantee full employment and rational use of the entire labour force, etc. To perform these functions the capitalist state has no adequate economic foundation, and, as in the past, remains the servant of the monopolies.

It is noteworthy that Professor Norbert Wiener, "the father of cybernetics," in answering a question put to him in one of the panel discussions in which he took part during his stay in the USSR in 1960 on the applicability of the general principles of cybernetics to the control of the national economy as a whole, answered quite frankly that in his view in capitalist society it was next to impossible to do so; at the same time a planned socialist economy opened wide prospects for such applications.

Capitalist ownership of the means of production and the drive for profits curb the activities of the capitalist state in the field of the economy; and although the efforts of the capitalist state have of late been somewhat stepped up along these lines they have not become a dominant factor. And no mathematics combined with cybernetics will be of any help in this.

"Imperialism's inability to deliver mankind from poverty and need, abolish unemployment and ensure the working people and small proprietors a life free of fear of the morrow is particularly striking against the background of the unparalleled potentialities being opened by the present development of science and technology. To a steadily growing number of people it is becoming clear

that capitalism neither can nor will ever admit the working people to real participation in the running of production and public affairs. It is growing more and more obvious that imperialism is leading towards an unprecedented decline of society's cultural and moral values.

"The monopolies use the increased possibilities of production, science and technology for their own selfish ends—to intensify the exploitation of the people, strengthen the apparatus of violence over them and reinforce the machinery of military aggression and adventures. The social gulf between the handful of top monopolies and the huge masses of the working class and all the other working people continues to grow wider. In other words, the imperialist system is a permanent and ineradicable threat to the conditions of life and the very existence of the broadest masses in the capitalist countries, where acute class conflicts break out with increasing frequency." <sup>1</sup>

The prerequisites of socialism that have been objectively engendered by the entire course of capitalism's development can be used by progressive democratic forces in their struggle against state-monopoly capitalism. The long-range economic programmes elaborated in capitalist countries by state planning agencies are oriented to serve the interests of the big corporations of the country. Therefore, the bloc of Left forces in all advanced capitalist countries demands and works for democratic programming. Democratic programming is a comprehensive platform that calls for the gradual nationalization of all key sectors of the

national economy. It implies such economic programming that will ensure higher standards of life for the working people. Luigi Longo, Secretary General of the Italian Communist Party, in his address to the Eleventh Congress of that Party stated that the struggle for democratic programming constituted one of the most important aspects in the implementation of profound social reforms. He pointed out that the alternative offered by the Party and around which a wide grouping of social and political forces could be built was not a socialist one. He went on to say that the aim of the Party was to work for democratic programming with the defeat of the monopolies as its primary objective. Such programming would affect the political essence of investments, industrial development orientation, as well as the general orientation of the economy.

The use of economic programming for the good of the whole population, for undermining the power of the monopolies, is one of the basic planks of the platform advanced by the Communist Party of France for a consolidation of Left-wing forces. Left-wing forces are also in the lead in the struggle for democratic programming waged by the labour movement in Great Britain, Japan and many other countries.

<sup>1</sup> *International Meeting of Communist and Workers' Parties*, M., 1969, pp. 142-43.

## MARKET AND PLAN UNDER SOCIALISM

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"Crisis of the socialist economy," "scuttling the planning system"—these were the ready reactions of bourgeois ideologists to the economic reform in the USSR. "Giving up Marxism!" other theorists echoed and, as if to prove their point, referred to the growing application of mathematics and computer techniques in the management of the Soviet socialist economy. But those who jumped to such conclusions were merely indulging in wishful thinking, as Western "experts" have done, it might be noted in passing, many times before in the history of the Soviet Union. And, as so many times in the past, they were once again wide of the mark. The allegation of bourgeois economists that planning was "scuttled" or "dismantled" in the socialist countries was born of confusion on their part, deliberate or inadvertent, of the essence of planning and of the specific forms the organization of planning might assume.

In reporting to the 23rd Congress of the Communist Party of the Soviet Union on the activities of the Party's Central Committee General Secretary L. I. Brezhnev gave a forthright rebuttal of such views. "The reactionary bourgeois press has said quite a lot recently about a 'crisis' in Soviet economy. Some people even had the illu-

sion that our latest economic measures represented a retreat from socialism.

What can one say about this?

These assertions are ridiculous from beginning to end. It is obvious to anybody that our unshakable foundation has always been and remains public ownership of the means of production. We are not only retaining, but improving the principle of planning in our economy."

Planned development is an essential feature of the socialist economy. There can be no socialism without planning. What sense would there be in giving up a planned economy which in the Soviet Union and other socialist countries has scored such remarkable successes, a proud record of economic achievement, at a time when the capitalist countries are trying to introduce a margin of planning into their national economies? No, the hopes of the bourgeois ideologists that the Soviet economy is beginning to slip into the ways of capitalism are futile. The authors of such conjectures refer to continuing discussions on important economic issues among Soviet economic theorists and economists working in industry and agriculture. The role of the interest rate, the function of rent in a socialist economy and kindred problems are raised and investigated in the course of these discussions. Theoretical concepts based on "social utility" have been evolved in these exchanges. Many economists deem it imperative to consider demand in the pricing of goods; some think it expedient to extend the rights of individual enterprises in their dealings with each other. Bourgeois economists are apt to believe that when such problems come under discussion and are not only debated, but are followed up by action, the economic

reform now under way in the socialist countries must surely mean nothing else but the end of the planned economy and its substitution by some "market socialism" of special invention.

However, nothing of this kind has happened, nor can it happen. The implementation of the economic reform in reality is designed to further streamline socialist planning by the fullest possible use, in the first place, of such an economic lever as commodity-money relations. Under socialism the market-plan combination should be viewed in this light.

It should be stressed that the question of the market is not a new one. It has been debated by Soviet economists more than once in the past. The Communist Party and the Soviet Government gave their attention to the market problem as soon as the Civil War was over in Soviet Russia and the country was confronted with the stupendous task of rehabilitating the devastated and war-ravaged economy. One of the ways of overcoming the economic difficulties facing the country at the end of 1921 was to proceed from the fact that the market was an economic reality in the country and to master it in accordance with its laws by systematic, well-considered economic measures that take into account in an accurate way processes under way in it so as to assume control of the market and the money circulation.

During the first years of Soviet power the acuteness of the problem was aggravated by the necessity to combine the search for a socialist method of controlling the market with measures aimed at overcoming diverse forms of resistance put up by private capital operators to the government's planning policies. At a subsequent stage, as so-

cialist planning became consolidated and the exploiting classes were forced out of the economy, the realization of a planned distribution eliminated many acute market problems. The functioning of the marketing machinery was placed under planned, rigid control in spite of the fact that enterprises passed on their products through selling and buying transactions, that financing and crediting was widely used and monetary circulation retained its key role in the economy of the country.

When socialist planning was still in its first stage, the country was living through a period of considerable economic difficulties. Qualified economists were at a premium, and the bulk of planning decisions bearing not only upon overall economic problems, but upon a multitude of specific local problems relating to the activities of large enterprises was made by the central policy-making bodies. At that time such forms of planning and management were still possible as the country's economy was not highly developed. There was an acute shortage of means of production and the supply of consumer goods was anything but adequate—the marketing of the goods produced presented no problem. What really mattered at the time was how to distribute in a most rational way the available resources, scarce as they were, so as to ensure the best possible and speediest development of the economy. That is why, for the most part, the means of production were allocated in a strictly centralized way through the state supply and distribution agencies. With the consumer goods being in short supply, the population was not much concerned about quality and bought up everything that industry had to offer.

This situation persisted for quite a lengthy period and Soviet economists gradually came to believe that planned management of the national economy necessarily entailed detailed centralized elaboration of planned target figures for all branches of the economy; such target figures and indicators were planned for each enterprise while a considerable proportion of the commodities produced was directly distributed in a centralized way, too.

The nature of commodity-money relations under socialism was not very clearly stated in economic theory, and the absence of clarity on the matter encouraged the views referred to above. Inasmuch as Marx and Engels believed that commodity production and money circulation would wither away in a socialist society, the majority of Soviet economists were somewhat biased against such categories of the commodity economy as money, price, trade, finances, credit. Not everybody understood the necessity of using them in a socialist economy, though everyday practice demanded that they be used. And although Lenin explained to the Party the necessity of making such economic categories as money, price, credit, finances and trade serve the needs of socialism they were looked down upon as survivals of capitalism to be done away with at the earliest opportunity.

These are the reasons why in the evolution of socialist planning the main attention was paid to the economic substantiation of the plan's performance indicators expressed in physical volume terms. As to the profit-making (cost accounting) performance measurements, they were relegated to a service or auxiliary position. The disre-

gard of socialist enterprises for costs, observed in the Soviet Union throughout a long period of time, is rooted in these attitudes. Serious shortcomings in pricing procedure and a number of other deficiencies in the use of the economic levers occurred at that time.

The negative effect of the situation that had thus arisen made itself felt even under rigorous centralization-of-planning conditions. To remove the shortcomings, many economic measures were taken and pricing, financing, crediting, wage-and-salary practices and policies were improved as a result of many systematic efforts. The measures lacked coordination, however, and that greatly detracted from their efficiency. That brought about a paradoxical situation—many suggestions for improving planning and management procedures taken by themselves were considered quite expedient and sound; but when, upon their implementation, they began to interact in real economic situations, serious maladjustments became evident. Again, the situation made it necessary to resort to various administrative decisions involving a wide range of economic matters, preference very often being given to solutions by administrative injunction, rather than to the application of economic levers to remove the trouble. This practice, in turn, led to arbitrariness in planning and managing the Soviet economy.

By and large, these deficiencies were local in nature and did not affect the main issue—the principal direction of development of the country's economy, the rate of growth of the economy as a whole, as well as that of its individual sectors and specific enterprises, the share of these in the total effort—all these projections were made in strict

accordance with planned goals and objectives. Had it not been for the shortcomings mentioned, the Soviet Union's economic progress would have been even more impressive. The objective of the new economic reform in the USSR is to eliminate these shortcomings with a view to stepping up the rate of the country's economic growth.

The modern Soviet economy is a most involved and intricate economic system. Its planning should not be thought of as something resembling the compilation of a very lengthy bookkeeper's sheet upon which all production and consumption data are inscribed and broken down in minute detail. The scope and volume of production in the national economy of the USSR is nowadays so great that any such attempt would be simply impossible. The total volume of industrial production in 1967 was almost 9.5 times that of 1940. It was the result of the commissioning of thousands of new industrial enterprises, the production of hundreds of thousands of new items, the still greater specialization of industrial production, etc. Such growth inevitably brings in its wake more diverse and complex economic ties and their interdependence.

The scope of modern production is so great that even with the extensive use of high-speed computers rigid centralized planning must be ruled out as absolutely impracticable. A centralized plan of that kind would have to provide for all nomenclature variations of each item to be produced—grades, types, models, colours, etc. Such a plan would have to assess an immense number of various production methods, making due allowance for various production factors, and take into account a great variety of other particulars and

specifics. Even with modern computation means such calculations are a practical impossibility. Somebody worked out that by the turn of the century it would take the entire able-bodied population of the country to elaborate a plan meeting rigid centralized planning standards.

So a more flexible and efficient system of planned management of the economy is now in the making in the Soviet Union. On the one hand, the new system is based on those valuable elements and methods of planning that came into being while Soviet planning was developing and improving; on the other hand, greater use is being made of the possibilities of commodity-money relations, and this calls for the solution of substantially new problems.

### Rigid Planning—Causes and Effects

Bourgeois economists have tried to interpret the expediency and essence of the economic reform in the USSR in terms of the theory of "phases of industrial development." They see the reform as a transition from the extensive to the intensive stage of economic development. The transition, they assert, is inevitable for any country that has developed industrially. According to this concept, centralized management of the economy together with the presence of a plan and special stress on the quantitative growth of production are characteristic features of the first stage of industrial development. With the transition to the second stage, however, the market machinery becomes predo-

minant in the economy as special priority is accorded to the economy's qualitative performance indicators. The concept is quite divorced from reality. Having registered the external aspects of economic growth, it tries to interpret economic development in an unscientific way; moreover, by arriving at wrong conclusions the concept offers an apology for capitalism.

There is nothing out of the ordinary in the new economic reform now under way in the Soviet Union as some have been eager to believe in the West. The development of the Soviet economy has seen more than one programme aimed at improving planning and management set-ups and material incentive practices. They were occasioned by the fact that the Soviet people were the first in history to create a planned economy—and in a vast country. Each move along the path was a step into the unknown. Not all forms of planned management organization proved to be a success. This was true, in particular, about the project to organize the management of the economy along production-regional lines and to set up Regional Economic Councils. The latter were expected to perform the functions of sectoral ministries.

One has to bear in mind that economic conditions in a country do not remain unchanged throughout the various periods it passes in its development. Thus, what is right and expedient at one stage becomes outmoded under new conditions. Lenin, who personally directed the first steps of socialist planning, pointed out more than once that the organizational structures and methods of managing the economy should not be decided arbitrarily—they should be determined by the specific economic conditions characteristic of each

given stage of socialist society's progress. As the Soviet economy developed extensively and intensively, its growth dictated the necessity to periodically reorganize specific forms of management and planning. Some measures along these lines were taken with a view to laying greater stress on the importance of the role of economic levers, without introducing any substantial changes in the administrative structure. The credit reform of 1930 was the most effective of such moves. Most of the managerial and planning reorganizations, however, dealt either with the creation or the abolition of this or that administrative echelon without affecting in any way the performance of existing economic factors.

The characteristic feature of the new economic reform is the combination in it of structural changes in the management organization with much greater stress on the role of economic levers in stimulating economic growth and performance. The reform makes it possible to apply to the best advantage the principle of democratic centralism throughout and at all levels of the national economy. The essence of the principle is the flexible combination of centralized state management with the greatest possible freedom of initiative on the part of local bodies and agencies, individual enterprises and of the working people themselves. This is a formidable task.

But are not plan and initiative notions that exclude each other? Can one speak of initiative and enterprise in an economy regulated by a plan? In point of fact, socialist planning of the economy presupposes the presence and interaction of centralized planning and local initiative. No planned development is conceivable in a socialist economy



without defining planned national economic priorities and objectives for, say, the current year or the next five years. Only by working out an overall plan can coordinated development of all sectors of the economy be ensured, the necessary proportions and balances observed, and systematic control over the plan's performance implemented, etc.

But no economic plan, no matter how perfect, can cover in detail and take account of all latent economic possibilities existing in the various regions of the country and, especially, those at individual enterprises. Yet all these potentialities can enhance economic development and help to meet planned target figures ahead of time, local initiative being of paramount importance in securing such advancement rates.

Applied to the management of the national economy, democratic centralism is instrumental in introducing, in a most flexible and comprehensive way, adjustments for local peculiarities, presupposing the presence of a vast variety of ways, means and methods of attaining a common objective. "Stereotyped forms and uniformity imposed from above have nothing in common with democratic and socialist centralism. The unity of essentials, of fundamentals, of the substance, is not disturbed, but ensured by *variety* in details, in specific local features, in methods of *approach*, in *methods* of exercising control. . ."<sup>1</sup>

The principle of democratic centralism has been widely applied throughout all the stages of the economic development of the USSR. However, up

till now its application lacked the necessary consistency and fullness, which impaired complete utilization of the advantages inherent in a planned socialist economy. The essentially rigid planning and management system used in the Soviet economy for quite a long time was the major reason for these shortcomings. The preponderance of management by administrative order over economic methods and considerable limitations in the operational independence of enterprises were the basic characteristics of the system.

This system was used for such a long time that many Soviet economists came to think of it as the only form of planned management suitable and proper for running a socialist economy. But such views were shown to be mistaken. With the passage of time it became increasingly clear that rigidity in planning was a major hindrance barring the way to the full and consistent application of the Leninist principle of democratic centralism. At the same time, it should not be assumed that the system referred to and adherence to it were errors or miscalculations of some sort now being put right by the new economic reform.

There were times when rigid planning and management of the Soviet economy were a vital necessity for the country. Eighteen years in the relatively brief history of the Soviet state were taken up by repulsing imperialist aggression and by the rehabilitation of the war-devastated economy; rigid planning of both production and distribution was essential during those years. It must also be remembered that, in addition to those eighteen lean and hard years, thirteen years were taken up by the industrialization of the country that was accomplished at a very rapid pace—so thirty

<sup>1</sup> Lenin. *Coll. Works*, Vol. 26, p. 413.

years, all in all, out of the half-century-long history of the Soviet Union were marked by extreme economic strain. During those years only rigid centralization could ensure the concentration of relatively scarce material and financial resources so as to meet the most urgent national priorities.

In capitalist countries, also, strict and rigid state economic regulations were a feature of the war and post-war years and numerous limitations were imposed on private enterprise and business activities.

It is no exaggeration to state that, already by 1937, the Soviet Union had become the second largest industrial producer in the world only because of its concentration of all available resources upon the crucial national priorities. Neither would it have been possible to rehabilitate the national economy in so short a time after the war without rigid planning.

However, at a later stage, when the programme for building the material and technical basis of communism was launched in the Soviet Union, the negative effects of the rigidity of centralized management and planning made themselves felt more and more painfully in the economy. The most pronounced among these effects were the excessive bulkiness of the management structure and ineffectiveness and slow responses in the relationship between the central bodies directing economic sectors and local executive bodies and management agencies. Enterprises and local economic bodies had very limited freedom of independent activity and this inhibited their efforts and initiative in revealing and using latent possibilities for increasing production and for making the fullest possible use of the economic ad-

vantages inherent in the socialist system.

As the Soviet economy developed in depth and scope, economic relations between enterprises and various institutions functioning in industry, agriculture, construction, transport, trade and the services became more involved and complicated. And this demanded higher and more efficient management and planning standards.

Chairman of the Council of Ministers of the USSR A. N. Kosygin pointed out that flexibility, efficiency and promptness in management and planning are especially required in present-day production. It is most essential, Comrade Kosygin stressed, to take into account the changes in the economic situation, to deploy resources, to skilfully coordinate production and the growing demand of the population, to put new production techniques and scientific break-throughs into practice in industry without delay, and to find ways of solving economic problems, most suitable for each enterprise.

The main objective of the economic reform is to raise the efficiency of socialist production and thus ensure still higher living standards for the Soviet people.

## Plan, Incentives, Initiative

The new stage in the development of the Soviet economy called for further improvements in the socialist mode of operation on a self-supporting, profit-making basis. The mode was introduced at a very early stage on Lenin's initiative soon after

the Soviet state came into being. When socialist construction began in the country Lenin pointed to the necessity of converting state enterprises into concerns run on "...what is called a profit basis, i. e. into ones being reorganized on commercial lines."<sup>1</sup>

The words "commercial lines" imply, naturally, only the outward semblance of the business activities of state socialist enterprises with the ways capitalists operate their businesses. Socialist enterprises enjoy a certain margin of economic independence and freedom of business activity. Everything they produce they sell either to other enterprises or to the population. The money thus received covers not only production costs, but ensures a certain margin of profit. The profit goes to finance the needs of the enterprise itself, and part of it goes to the state budget.

When the economy was run in a strictly centralized way, freedom of business decision-making was, of course, limited in scope. Consequently the possibilities inherent in the self-supporting (profit) mode of operation were far from being exhausted as the economic potentialities of each individual enterprise were not fully tapped. Under the current economic reform all these hindrances are done away with. Henceforth, all Soviet enterprises will be run on a fully self-supporting profit-making basis, which will allow them greater business flexibility than in the past. The new mode of operation (also known as the cost-accounting method) requires that enterprises have a greater freedom of action. The number of plan performance indicators

imposed upon enterprises by a higher management body was sharply cut down—a move of great importance. Now there are only several plan performance indicators: production realization targets, the wages and salaries fund, and some others. The rest of the plan performance indicators that go to make up the state plan are set forth by the enterprise itself. They are not subject to approval by superior bodies.

At the same time, wider local discretion in the management of an enterprise in no way implies a lessening of the role of planned management. The aim of the reform is to remove the limitations inhibiting the initiative of a factory's or a plant's personnel aimed at improving the performance of their enterprise. It has to be emphasized that the few target indicators that are still assigned to an enterprise from above are strictly binding and are not mere indications of what is expected of it. It is likewise important to note that the plan performance indicators still originating at the centre are now more conducive to higher economic efficiency than in the past and ensure better judgement of the actual demand for various commodities. The total volume of production of an enterprise was in the past the basic plan performance indicator. Now it has been substituted by a new measurement unit based on sales. The total volume of production became plan performance indicator No. 1 at a time when the Soviet national economy suffered an acute shortage of machine-tools, equipment, metals and fuel—all of which were badly needed in order to secure a further increase in production volumes and to meet the growing demands of the population. The evaluation of the performance of an enterprise by the volume of

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<sup>1</sup> Lenin. *Coll. Works*, Vol. 33, pp. 184-85.

commodities it produced had at that time one objective—to ensure production of the greatest possible amount of various goods, with quality standards being a secondary consideration.

With the growth of the Soviet Union's economy and more intricate pattern of economic ties, a simple increase in the physical mass of goods produced, regardless of their quality and of the demand for each specific item, began to hold back economic progress. One result, for example, was that there was a piling up of low-quality or surplus goods for which there was no ready market. At the same time other commodities were in short supply.

To remedy the situation, the volume of production sold was made the main plan performance indicator for each enterprise. This indicator, as before, is a determinant of output in that the more goods an enterprise produces, the more it can sell. However, under the present conditions goods offered for sale must be in demand, be of high quality, and, consequently, find a ready market. So the new plan performance indicator obliges producers to take account of demand and pay attention to quality.

The profitability of an enterprise is another performance indicator that adds to the many-sided and stimulating effect of the main indicator mentioned above. When he was elaborating the guiding principles of socialist management, Lenin stressed the necessity of making each Soviet enterprise a going concern. But the profitability indicator became somewhat pushed into the background under centralized planning conditions. This, to a certain extent, hampered the economic efficiency of production.

To make the most efficient use of the new indicators a climate must be created at each enterprise such as to make its personnel interested in meeting the target figures set forth by these indicators. Higher material incentives for increased production have been designed to create such a climate, an objective that in no way runs counter to planned economy principles. Lenin was emphatic in stressing the wisdom of practices stimulating high labour productivity in socialist society. Various material incentives were practiced under rigid-planning-of-the-economy conditions, too. The difference was that the incentives then, as a rule, were rewards for particular achievements in work performed regardless of the final results of the personnel's common effort, and especially so in relation to the efficiency of performance measured in economic terms. That was a serious defect of the former system. The new system of material incentives, as distinct from former practices, lays greater stress on the production record of workers' teams, sections, groups, shops and individual workers as related to the fulfilment of the plan by the entire enterprise both in terms of physical production and economic performance measurements.

At the same time it is important to stress that the greater economic latitude now enjoyed by enterprises, and the greater weight attributed to profit-making and material incentives in no way imply that the principles of planning are being undermined and that the market is taking over. All ideas to this effect are merely wishful thinking on the part of bourgeois economists, bearing no relation to fact. Democratism in the management of the socialist economy presents itself not

as an antipode of centralization, but as a powerful stimulator in the search for the optimal combination of state interests with those of each individual enterprise, of each member of Soviet society.

### The Market and the Plan

The transition of socialist enterprises to a fully self-supporting (cost-accounting) mode of operation is accompanied by closer economic links among them. Under the new system of economic management and planning, each enterprise itself negotiates with its trading partners such matters as the size and terms of deliveries of the goods it manufactures and consumes. In future it will procure all the supplies it needs, the means of production included, through wholesale channels.

Higher priority is given to raising living standards in the USSR and increasing the volume of trade in consumer goods. Higher productivity in Soviet agriculture and greater variety of its products will ensure greater sales of agricultural produce and a better supply of foods for the population and of raw materials for industry. As a result, market transactions will grow in number and value, and commodities will be marketed and sold differently from the way in which this was done under the centralized distribution system. Under the new system it will be possible to choose from a line of similar products with due regard for their quality, price, etc.

Inasmuch as selling and buying through market transactions are gradually replacing direct distribution, bourgeois economists are interpreting the change as a departure from the principles of planned economic development. They try to represent the plan and the market as incompatible entities divided by a fundamentally implacable antagonism. "In its work to improve the guidance of the national economy," Comrade Leonid Brezhnev said in the Report of the CPSU Central Committee to the 24th CPSU Congress, "the Party has firmly followed the line of correctly combining directive assignments by central organs and the use of economic levers for exerting an influence on production. These levers—cost accounting, prices, profit, credit, forms of material incentives, and so on—are designed to create economic conditions promoting the successful activity of production collectives, millions of working people, and to ensure well-grounded evaluations of the results of their work. The need for precisely defining the measure of labour and the measure of consumption demands skilful use of all these levers, and improvement of commodity-money relations." In a capitalist economy the plan and the market are indeed opposites, and the economists in question carry over the antagonism to the socialist economic system. But here the market is an absolutely different economic category. In socialist society the sellers and the buyers are collective farms and state-owned enterprises—they are not isolated businesses as under the capitalist system, where each concern is guided by its selfish profit-seeking motives and tries to undercut and suppress its competitors. It will be remembered that in a socialist society the bulk of

the manufactured goods and of the agricultural produce is turned out by state-run enterprises. These are directly guided in their business activities by the state plan. As to the collective farms, a considerable part of their produce is bought up by the state under special arrangements for bulk purchasing of agricultural products in accordance with a "contract-plan." In addition, collective farms are encouraged to sell to the state their surplus produce—that over and above the contract-plan quota—by the payment of higher prices for such deliveries. Consequently, certain restrictions operate which exclude market spontaneity and competitive confrontations.

At the same time, it should be noted that planned use of market machinery is far from being a simple matter. Certain problems are still outstanding here both in the field of theory and in the choice of specific forms of organization. Nowadays, when so much emphasis is being laid on improving production efficiency, the pattern of economic links and transactions should not be imposed upon enterprises from higher management levels—such patterns might very often prove to be inadequate and ill-advised. At the present time the enterprises are themselves expected to establish advantageous long-term direct deals with the consumers of their products and with the suppliers of the raw materials, semi-finished products, ready-made fixtures, and services and equipment they need, etc. But the introduction of direct relations among the enterprises does not mean that centralized planning will lose in importance as a fundamental principle. After all, even in a planned socialist economy an enterprise or firm does not know the social demand for

any particular item on its production list; neither does the management of an enterprise or firm know what quantity of goods of the same type as theirs is being put out by other producers in the country. That means that direct commercial transactions between enterprises should be entered into only in strict conjunction with state plan targets. According to the new management philosophy, enterprises acting upon preliminary draft-plan target figures received from upper echelon executive bodies, make up their own order books. Proceeding from those preliminary target figures the manufacturing plants outline in good time the volume, range, quality standards and delivery terms and coordinate such draft-plans with their clients, distribution agencies and trading firms. The order book supported by the relevant contracts is a sound foundation for elaborating the first draft of the enterprise's production plan. Direct commercial links are established for many years and become strong and lasting with the passage of time, thus making it possible to improve and streamline planning procedures and practices.

But an enterprise or a firm forms only the lowest level in the planned economy management system. An enterprise in a given branch of industry is subordinated to the Ministry in charge of that branch. Each Ministry has within its framework groups of enterprises belonging to this or that sub-branch (or sub-structure) headed by a respective Chief Sub-Branch Department. The activities of the branch Ministries—and there are scores of them in the administrative structure of the USSR—are coordinated by supreme specialized economic bodies (State Committees) and primarily

by the State Planning Committee of the Council of Ministers of the USSR (Gosplan).

It is assumed that more extensive market relations within the framework of socialist planning will entail definite changes in economic relationships of branch Committees, the State Planning Committee and the branch Ministries, on the one hand, and the branch Ministries, Chief Departments, firms and enterprises, on the other. In view of the high efficiency of the new planning and material incentives system, plans are made to introduce the self-supporting (cost-accounting) principle in the administrative echelons of the economy. The Chief Directorates are expected to be the first to go over to the new practice to be followed by the Ministries in toto. Such initiatives are already being tested in several pilot projects. "Sigma," a manufacturing trust, run on a self-supporting basis, is operating in Latvia. The trust enjoys the status of a Chief Department and has been functioning since 1966 within the framework of the Ministry of Instrument-Making, Automation Means and Control Systems. Under the scheme the administrative bodies receive a definite share of the profits made by the enterprises subordinated to them and use the funds for incentives for their staff. The administrative bodies in this way become involved materially in the commercial successes of the enterprises under their jurisdiction, and therefore display more initiative and higher efficiency. The success in the functioning of an enterprise hinges upon the executive and administrative bodies whose function is to direct the enterprises in new ways of raising production efficiency and to promote and provide for further extension of production capabilities

through optimal specialization, cooperation, centralization, etc.

No matter how good and adequate a plan is, while it is being put into practice new opportunities present themselves for producing goods needed by society. In this case, an enterprise has the right to raise the planned production quota, provided the commodities produced over and above the plan find a buyer. If an enterprise itself fails to do so, the planned production targets may be increased by the Ministry, or a planning body with due account, however, of the potentialities of the enterprise. Such changes are agreed with the enterprise concerned, but they must be backed up by the provision of the necessary supplies and other resources called for by the increase. The new system encourages enterprises to draw up higher production plans on their own initiative without being directed by superior bodies.

Greater latitude in commercial transactions and business policies of the enterprises does not imply, however, that the administrative elements of the management structure should relinquish control over the activities of the production units. Such control is in no way an encroachment upon the rights of an enterprise to run its own business. If a Ministry raises the plan's targets for a specific plant, mine or factory, and supports the new increased plan by the appropriate deliveries of new equipment, ensures the commissioning of new plant ahead of schedule and suggests progressive innovations in organization of work—such interference will be quite legitimate and reasonable. It will, undoubtedly, meet the interests both of the personnel of the enterprise and those of society as a whole.



## Community of Interests

The principle of mutual benefit in the enterprise-administrative body relationship stems essentially from one of the basic principles of the economic reform—the principle that what is good for the state is good for the enterprise, and vice versa. Under these conditions the administrative and the commercial practices and policies of managing an enterprise do not run at cross purposes. On the contrary, they are complementary to each other. Before the reform, the state plan's basic target figures were forwarded to the enterprises as binding administrative directives. This procedure is still followed after the reform and holds good as a firm fundamental principle. But now a plant, mine or factory tries to meet the plan's target figures, not because it is motivated by the necessity to carry out an administrative order coming from "above," but because this is profitable in economic terms. To make material incentives fully effective, a whole set of commodity-money tools had to be perfected and revamped—wages and salaries, bonuses, profits, credits, prices, rent payments, wholesale trade in capital goods, trade in consumer goods, etc. As has already been stressed, this in no way implies giving free play to market forces. Economic incentives are being applied on a growing scale in a planned way as the role of cost relationships is being accentuated in accordance with national economy development targets assigned by the state.

Acting in the interests of society at large, the socialist state chooses the best and the most effective ways of concentrating and distributing capital investments, and encourages and speeds up the

development of the most important and progressive branches of industry and the production of first-priority items. It also ensures the coordination of research and development programmes and the wide application of new techniques and production methods, is instrumental in spreading advanced know-how, looks after the training of skilled personnel, and organizes refresher courses to this end, etc. The enterprises, in their turn, relying on the use of scientifically approved economic levers tend to make fuller use of their material, manpower and financial resources. With this end in view, they elaborate production plans that meet the interests of the enterprise and of society as a whole. This opens up new possibilities for a considerable simplification of the management set-up. At the same time, an opportunity presents itself for a gradual reduction of the number of target indicators made binding upon an enterprise until it is left with only one indicator to meet. Although, under the new arrangement, only a single performance indicator will remain, since the rest are discarded, the national economic development plan is sure to be fulfilled and overfulfilled. The size of profit may become the only performance indicator capable of executing that function according to the evidence of Soviet economic-mathematical models simulating the operation of the national economy. But in order for it to perform its task, a whole complex of mutually coordinated economic constraints has to be present and become operational in the economy. These constraints include: prices of most important commodities, payment for productive assets, credit repayment rates, turnover tax, rent and fixed payments, wage rates, scales and stand-



ards for the establishment of incentive and bonus funds, etc. The steady and consistent implementation of the reform is aimed at the creation of such a system.

As we see, in socialist society, the market functions so that centralized planned management of the economy plays a key role in the country's economy. It is also quite evident that the market here is not a mere appendage to the plan. Commodity-money relations form an organic part of the planned-management-of-the-economy complex, a fact proved beyond doubt by the practical experience gained in this country. Rational and delicate coordination of the physical and the value aspects of annual and five-year target figures is one of the most important prerequisites for working out scientifically sound economic development plans. All this goes to show that the market under socialism is not only manageable but can be the object of deliberate planning and organization.

During recent years, measures to improve planning and management policies and practices have been introduced in the national economies of the German Democratic Republic, Bulgaria, Hungary, Poland, Romania and Czechoslovakia. As in the Soviet Union, the economic reforms in the European socialist countries are aimed at raising the efficiency of socialist production by combining, in a more rational way than in the past, planned centralized management with extensive local initiative. The communist and the workers' parties of the socialist countries vigorously oppose the revisionist ideas of those who want to undermine the basic role of the plan in the development of the socialist economies. Each of the fraternal countries is implementing the economic reform,

taking account of the historically evolved economic and other pertinent local conditions. One feature all these reforms have in common is that each country seeks ways and means of fitting commodity-money relations and material incentives into the system of planned economic management. Since the very inception of these reforms, the structure of the central planning bodies has been reorganized so that they are concerned with general overall economic problems while issues of secondary subsidiary importance, as well as those requiring immediate action, are dealt with by the middle and lower management echelons.

Vigorous and extensive application of economic-mathematical methods at all stages and levels of planning is a salient feature in the planning improvement programmes now in progress in the USSR and other socialist countries. Used in conjunction with electronic computers, these methods allow for much higher standards of scientific planning and projections. The use of electronic techniques holds promise for a most rational combination of state centralized planning with maximum utilization of local initiative.

# MOVING TOWARDS AN OPTIMAL PLAN

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## Accuracy and Coordination

The application of economico-mathematical methods and the use of electronic computers in the planned management of the socialist economy is not a tribute to a "Western vogue," but an imperative demand rooted in the immense complexity of the Soviet economy. The growing complexity of economic relations is especially felt in a socialist national economy that develops under a general overall plan. There can be no coordination of all the elements and components comprising the country's economic machinery without processing a mounting mass of scientific and technological information. The mass of economic information keeps multiplying so that the rate of its growth surpasses the pace of economic development. Prompt processing of this mass of data by conventional means is becoming more and more difficult, and sometimes it is a virtual impossibility. The only solution is recourse to electronic computers. This is what Comrade Leonid Brezhnev said in the Report of the CPSU Central Committee to the 24th Party Congress: "Science has greatly enriched the theoretical arsenal of planning, by producing methods of economico-mathematical modelling, systems analysis, and so on.

Wider use of these methods must be made, and sectoral automated management systems must be created more rapidly, considering that in the future we shall have to create a nationwide automated system for collecting and processing information. This makes it important not only to fabricate the necessary equipment but also to train considerable numbers of skilled personnel."

But important as it is by itself, the speeding up and facilitating of economic calculations is not the only result of the invasion of mathematics and cybernetics into the domain of economics. The use of electronic computers makes it possible to calculate an immense amount of data and assess various projections of economic development variations within a very short time and do it so that such variations would cover and refer to individual enterprises, whole branches of the economy, regional economic complexes and the economy as a whole. What purpose do these projections and assessments serve? They are needed to choose the best optimal plan out of a multitude of draft variations. Management policies and decisions corresponding to the optimal plan will be most instrumental in reaching the goals and objectives formulated by the plan. The use of mathematics in economics, as well as the employment of electronic computers in various fields of planning and management in the Soviet economy boost production efficiency by ten-fifteen per cent. This development indicates that socialist planning has entered upon a qualitatively new stage, the transition having been made possible by the appearance on the economic stage of mathematics and new computation techniques and facilities.

It would be wrong to assume that the choice of

the best way of economic development was not an objective which planners tried to achieve under the old techniques of plan elaboration. The planning agencies have always been instructed by the Soviet Government to seek optimal solutions in plan-making. However, the possibilities for coping with that most important task were at the time limited. Only four of five draft variants of the national economic development plan could be analyzed and evaluated under the former planning techniques and procedures, although those drafts were balanced not fully, but only in their main parts. Because of the staggering number of various economic indicators that had to be balanced and coordinated with each other, the development plans of specific branches of the national economy were drafted only in one and very seldom in two variants. But even in this situation, involved as it was, Soviet planning bodies proceeding from the Marxist-Leninist theory of reproduction presented highly efficient national economic development plans. The economic achievements of the Soviet Union are a convincing proof of the efficiency of Soviet planning.

The working out of national economic plans with the aid of old techniques and procedures became more and more difficult as the economy of the country grew more and more complex. Now, as never before, the planning of the Soviet national economy requires precise and reliable projections that allow planners to choose the most efficient way of putting to use the publicly owned resources of the nation. The latest advances in science and technology, cybernetics, mathematical simulation methods and optimization techniques, the application of the theory of information and

of the theory of modern social topology, etc.—all these are indispensable for improving economic analysis and planning procedures.

The Soviet Union plans to set up an optimal planning system on the basis of a state-operated national integrated network of computation centres. Economico-mathematical methods play more than an auxiliary role—they help to formulate economic problems in a language “understood” by electronic computers. The application of mathematics and cybernetics offers planners a most important tool in their quest for the optimal decision, providing a reliable and speedy procedure for the purpose. A multitude of diverse variations may be projected proceeding from one and the same complex of economic potentialities of society. The following case may be quoted by way of example. Twenty different items can be machined by one lathe in about  $2 \times 10^{18}$  sequences. But if each item is to be machined by two lathes, the number of possible sequence combinations will grow to the astronomical figure of  $2 \times 10^{36}$ .

If one tries to analyze all these sequences looking for the optimal combination, it will take even electronic computers many hundreds of years to arrive at an optimal solution. And, still, it would be not at all clear why one variant had been chosen in preference to another. That is how matters stand with a relatively simple, at least on the face of it, production problem.

But the problems involving the national economy are far more complex. Many products are interchangeable among the many millions of items industry and agriculture produce. One and the same type of product can be put out by various

kinds of technology. The relations and ties within each branch of industry and each economic region, the branch-to-branch, and region-to-region relations—all these form extremely complicated, well-developed and extensive patterns. In planning the economic development of a country, alternatives present themselves literally at each step. Resources, for example, can be apportioned in different ways between consumption and accumulation, between many individual wants of the members of society and the wants they share in common. Increases in agricultural production can be effected by cultivating larger areas or, alternatively, by intensifying production, or by a combination of the two ways. The list of various alternatives can be extended infinitely. The best, optimal decision has to be singled out from endless combinations of diverse economic factors.

But is the problem solvable in principle? The answer is in the affirmative. Mathematical, and especially linear programming, have made the solution of such problems a practical possibility. In a socialist economy the prospects which linear programming opens up in the search for optimal solutions are very great, indeed. This is especially true of problems affecting the national economy as a whole. Only under socialism, on the basis of the preponderance of public property, can a unified approach and proper coordination be ensured while solving optimal problems covering all the elements of the socialist national economy. This is being achieved by selecting such optimal criteria for each element and each level in the structure of the economy, that, by complementing each other, they secure results most beneficial for socialist society as a whole.

To effect optimization planning, a system of coordinated models is required that will cover all the elements and levels of the structure of the economy. Numerous obstacles have to be surmounted before such a system can be established. The elaboration of most complex models and entire sets of models is stimulated by practical needs of functional sectoral planning agencies; such models include dynamic aspects of capital investments, sectoral, territorial, demographic, labour relations and financial implications and aspects. The present level of economic development being what it is, a complete description of all economic processes with all their interrelations and interdependence is most difficult and sometimes even impossible to accomplish. However, in the absence of such a description, these processes do not lend themselves to mathematical interpretation.

Difficulties notwithstanding, economists in this country have already started elaborating models of the development of our national economy that, though simplified, are fundamentally correct and valid. In the near future such models will ensure much better balanced plans than those we have had in the past. During recent years a considerable amount of research has been conducted in the USSR aimed at optimizing various economic activities in the country: plans are being worked out how best to use various means of transportation to haul cargoes and carry passengers in specific regions; possible siting of new enterprises is studied in the territorial and sectoral aspects; models of enterprises, of economic sectors and of economic regions are elaborated as well as macro-models of the national economy as a whole. Pri-

cing, capital investment policies, etc. are studied with a view to optimizing them. This opens up new far-reaching possibilities for revealing latent hitherto untapped potentialities in the country's economy.

We shall fall short of our aim to secure the optimal development of the socialist economy if we go by only local economico-mathematical models. Even if such models are integrated to form a unified, coordinated system, the economic effect of using mathematics and electronic computers will fall short of the possibilities inherent in them. The point is that any economic decision or policy derived from a definite economico-mathematical model is optimal only in relation to the criterion that has been chosen. One and the same problem can be solved in several ways depending upon the criterion chosen for the purpose.

For example, if the maximum amount of cargo to be carried by a truck-hauling outfit is taken as its performance evaluation criterion, the result will be different from the one obtained if the profit to be made has been chosen as the optimal performance criterion. That means that in each case it is necessary to decide which criterion out of a whole set of applicable criteria is to be selected. The criterion must in the best possible way characterize the positive effect of the functioning of the organization in question. But even that is not enough in a planned economic system.

If each model of each part of the economy has its own local criterion, not coordinated with and not comparable to other local criteria, no harmonious development of the economy can be accomplished. Lack of coordination will inevitably breed discrepancies and imbalances dislocating

the economy. Moreover, no optimization of the economy's development is attainable even if the local criteria are coordinated with each other only in a simple ordinary way. The planning of the national economy is a purposeful process. So, the presence of a definite overall criterion is indispensable for laying down the main line in the economic development of the country. Only if a common overall criterion coordinates and unifies the entire complex of local criteria, can a truly optimal development of the socialist economy as a whole, and of each of its sectors, be secured.

#### Not a "Push-Button" Economy

It would be wrong to assume that the creation of an overall comprehensive system of planning and management of the national economy is merely an impressive technical challenge to be solved by means of electronic computers and mathematics. A definite theoretical concept, or philosophy, giving correct orientation to any practical moves towards that goal, is indispensable for the creation of such a system. The theory concerned with the optimal functioning of the socialist economy, advanced by the Central Economico-Mathematical Institute of the Academy of Sciences of the USSR, presents such a concept.

According to this theory there exists only one most rational and effective variant for the development of the Soviet economy. It is to be chosen out of a multitude of possible alternatives as the only possible variant conducive, as no other alternative, to the achievement of a definite optimiza-

tion criterion. The criterion should express in mathematical terms the aim of socialist production proceeding from the basic economic law of socialism—ensuring in the fullest possible way the satisfaction of the needs of the working people. So, the drawing up of the optimal plan makes it possible to integrate the aims set forth by society and the means for their attainment available to it. It is only natural that the accomplishment of these goals and objectives presupposes the maximum use of the labour, material and natural resources, as well as the use of the best technological means for the production of various commodities, i. e., the solution of the maximum industrial and agricultural output extremal problem.

In conformity with this concept, the optimal plan lays down the growth rate and growth ratios for all the branches of the economy, and establishes the consumption-accumulation ratio, the full balancing in physical volume terms of production-consumption ratios for all kinds of products and all types of services. The effectiveness of capital investments and the income of salary and wage earners are analyzed and established, as well as other problems relevant to the coordination of all the components comprising the optimal plan and the welding of it into an integral whole.

Simultaneously, the price structure inherent in the optimal plan will be established as a result of the solution of the dual problem of linear programming. So, all in all, the plan will emerge as a fully balanced integral whole in which account is taken, not only of purely economic processes, but also of their interconnection with the socio-political structure, sociological, ethical and other

factors affecting the efficiency of the machinery of production.

But such an all-round account, and the most careful coordination, of an immense complex of diverse factors does not imply that a new rigid centralized planning and management system is to be set up, a system in which everything will be planned in detail for each enterprise. Rather the opposite is true—an optimal plan system presupposes the soundest combination of centralized planning guidance with the fullest possible promotion of business initiative in all the echelons of the socialist economy.

The analysis of the national economy treated as a complex dynamic system becomes the main tool in studying it for the purposes of the optimal plan. In view of the immense size and complexity of the problem of determining the optimal planning and management of the socialist economy, its solution is simply inconceivable if it is formulated as a unified extremal problem covering simultaneously all the elements of production, distribution, exchange and consumption. One has to bear in mind that given the complexity of a modern economy, and the fact that its complexity keeps increasing at a very rapid pace, the possibilities of *direct control* of all the echelons and levels of a socialist economy are rather limited. This is so even with the use of electronic computers for the purpose. Any efforts to set up such a system will inevitably be confronted with the relative limitations of the technical facilities available for providing the maximum capacity of direct management communication channels. Attempts to build up that capacity to make direct

management possible will inevitably be at variance with economic expediency considerations.

Therefore, under the circumstances, the only correct approach is the solution of the overall problem by solving, in a fixed definite sequence, the pertinent local problems. In that case the economy is considered to be a complex hierarchical organized system, which it actually is. Indeed, the national economy comprises branches (or sectors) that, in their turn, fall into sub-branches and various production lines, uniting definite totalities of enterprises, that are made up of shops, sections, teams, etc. Basic management levels are chosen in that hierarchy (such as, for instance, the enterprise, the sector, the national economy). Local problems are solved for each of these levels in accordance with the optimal criterion established for the given level. But all these individual local criteria are coordinated in a most meticulous way, with the overall criterion established for the economy as a whole.

Planning decisions are adopted at each management level independently. The drawing up of the plan for the development of the national economy begins at the lowest level. Each enterprise solves its own extremal problem in accordance with its own optimal criterion. While doing so, the enterprise takes into account all the planning constraints conditioned by the actual and assumed availability of labour, material and natural resources. The use of these resources is planned in accordance with standing norms. As a result, the first variant of the plan is evolved, optimal for the given conditions and balanced in terms of the physical volume of production.

The draft of the plan drawn up at each enter-

prise according to the procedure outlined above is submitted to the next, sectoral management level. The physical indicators submitted from the "lower" echelons are aggregated in the process. As a result, there emerges the first variant (draft) of the sectoral plan, optimal for the given conditions.

To make an optimum approximation on a national scale the central planning agencies do not need any particulars on the activities of individual enterprises, nor even on those of whole sectoral ministries. So, the higher echelons of the planning receive technical and economic data in the most generalized and integrated form.

The first draft of the optimal national economic plan is worked out at the highest planning level. This is also done by solving the extremal problem in accordance with the overall economic criterion set forth for the national economy. At this level the indicators for the physical volume of production are subjected to still greater aggregation. Production and consumption are balanced so as to ensure maximum approximation to the optimal structure of the needs of society. It is only natural that in these assessments allowance is made for the potentialities of scientific and technological progress, the exploitation of new natural resources, the balance of import-export trade, and a number of other relevant factors. At the same time, while balancing these indicators, the price structure is being established for all kinds of products. The structure reflects the interdependence of prices with various plan performance indicators and other pertinent factors as provided for in the given draft of the plan.

While the first draft (variant) of the plan of the national economy is being compiled, the labour, material and natural resources must inevitably be redistributed so as to ensure in the greatest possible measure the satisfaction of the needs of society. As a result of the redistribution there appears a considerable discrepancy between the projections made at sectoral planning levels and the estimates of the first draft. The correction is performed on the basis of data on the amount and nature of resources expected to be made available to the sector in question, the prices to be established for the procurement of those resources, as well as other pertinent standards and ratings. The correction of the sectoral plans, naturally, entails the necessity of introducing corrections into the plans of the enterprises in accordance with the sectoral plan's breakdown of resources, prices and planning norms and rates.

These corrections are followed up by the elaboration of a second draft of the optimal plan by the enterprise, which, if necessary, requests additional resources, the revision of certain specific prices or the changing of some norms and quotas. A new sectoral optimal plan is then elaborated on the basis of such corrections and adjustments. If the estimates reveal that the sector's own resources are not sufficient, requests for additional resources are filed with the higher management echelon. A new optimal draft plan for the entire national economy is drawn up on the basis of the adjusted sectoral plans.

If some discrepancies are again revealed in the course of such drafting procedure, a new correction and adjustment cycle takes place. It begins

at the top level, and the plan is passed down through all channels of the management echelons to individual enterprise level, and proceeds back to the top in reverse order. After a number of such adjustments have been made, the necessary coordination of the optimal draft plan is effected, and the plan is approved as mandatory for execution. Properly speaking, it is only the national economic development plan that is being approved, the lower echelons being formally advised only on the final prices and planning norms and rates. With these as guidelines, each management level draws up its own final plan.

Circumstances essentially changing the economic situation might arise while the plan is being put into practice. If the effect of such circumstances cannot be neutralized by falling back upon available reserves, corrections and adjustments might be needed to arrive at the final optimal decision.

Is that system not too bulky and cumbersome? The answer is in the negative. For a start, corrections and adjustments are made very speedily thanks to the use of computers. Then, as planning procedure is streamlined, the number of corrections and adjustments will progressively diminish, and the calculations on the optimal draft will become much more accurate.

It would be wrong to assume that with the optimal plan drawn up final planning decisions will come ready-made, and planners will have only to push buttons at the consoles of computers. It is hardly possible to devise such a mathematical model of an optimal plan that would be sufficiently accurate and complete to reflect the complex-



ity of all the relevant factors in their interdependence. That is why the optimal plan is no more than an outline plan, economically and scientifically substantiated. But final decisions can be taken only through knowledge of various ways of the economy's functioning, and the practical experience gained by managers, together with their intuition.

Adequate room for economic manoeuvring will be provided by the availability of reserves made by the plan, and the discovery of latent economic opportunities. Guided by commercial expediency, enterprises will establish direct links with other enterprises. In entering upon mutual contract obligations, enterprises, acting on their own, have the right to set, within definite limits, prices for the goods they produce.

The sectoral management level, likewise, enjoys considerable freedom of flexible economic policies. So, generally speaking, the optimal planning theory envisages the setting up of a system functioning with great accuracy, capable of prompt actions, and which, by using purely economic means, ensures its self-adjustment at all levels for an optimal mode of operation. The establishment and functioning of such a system are possible only under socialism.

### Step by Step

The theory of the optimal functioning of a socialist economy has not been yet finally elaborated. But the survey presented above shows that

only a system of economic management based on economico-mathematical methods and the use of electronic computation techniques can meet the needs of socialism and communism. Having high performance accuracy as its distinctive feature, it ensures the most consistent practical application in the economy of the principle of democratic centralism elaborated by Lenin. The setting up of such a system will be the logical culmination of the current economic reform.

The development and wide application of economico-mathematical methods in conjunction with computers in planned management practices is considered to be a matter of top national priority in the USSR.

Special departments charged with the introduction of electronic computation in economic management and planning practices have been set up in the higher research planning and management bodies of the Soviet Union—in the State Planning Committee of the USSR, in the Ministries and in various departments. The State Planning Committee of the USSR, the State Planning Committees of the Union Republics and Ministries have set up their own computation centres. A Central Economico-Mathematical Institute has been organized within the framework of the Academy of Sciences of the USSR; the establishment applies mathematics, cybernetics and electronic computation techniques to the solution of economic problems and heads research into the methodology of optimal planning and management of the national economy of the USSR. A number of research institutes and laboratories carrying on investigations along the same lines are now operating in many branches of the economy and the

constituent republics of the Union. Hundreds of various scientific research establishments, design offices and engineering research and development outfits have included economico-mathematical studies in their programmes.

It is clear that the setting up of a planning and management system based on the application of economico-mathematical methods and covering all the levels of the national economy cannot be done overnight. A number of stages are to be covered on the way to this goal. The first of these stages will be characterized by the solution of the most acute specific planned management problems inasmuch as ready-made economico-mathematical methods are available and allow it. At the same time, the most labour-consuming management operations are mechanized with the help of punch-card calculating machines and electronic computers.

Integrated automated economic data processing systems will be developed during the second stage of the programme. A definite number of pilot plants, production amalgamations, and territorial complexes will be selected for the purpose, and suitable economico-mathematical models will be worked out for them, while all relevant economic information will be processed by computers exclusively.

The third stage will see large-scale inculcation of the methods and models tested by economic experimentation at pilot enterprises, production amalgamations and territorial complexes during the second stage of the programme. To make that possible, a special network of computation centres is going to be set up, and maximum level-to-level coordination in the solution of manage-

ment and planning problems will be the objective of that stage.

This accomplished, the transition to the fourth and highest stage will become possible—the setting up of the optimal planning and overall management system covering the entire national economy through an integrated nation-wide network of computation centres. This highly developed system for managing and controlling the socialist economy will deal with both overall national economic problems and local problems arising at all levels of the management hierarchy. The system will continue to be improved and modernized as the socialist economy develops and computation equipment is being perfected.

This stage-by-stage development programme is now well under way. It is being promoted along two main lines characteristic of mathematical programming methods. Development along the first line proceeds with a view to elaborating mutually coordinated and balanced development programmes. The working out of branch-to-branch balances and report balances on past economic developments are of paramount importance here. The branch-to-branch production and distribution balance of the gross national product make it possible to establish in the fullest possible way the country's need for various types of raw materials, fuel, primary products, machine-tools and instruments, capital investments and manpower. Only with the aid of such a balance can the structure of the gross national product and that of the national income be properly proportioned and balanced.

The priority of initiating and promoting the balance statistics of the national economy belongs

to Soviet economics and no serious study of the efficiency of social production is possible without this division of economics. The first experiments in drawing up a branch-to-branch balance go back to the early twenties. But the technical means available at the time made it a most difficult venture. So only the key indicators of the national economy's performance were coordinated and dovetailed. The first ever report balance of the economy was compiled by the Central Board of Statistics of the USSR in 1926. In subsequent years, balance statistics were further developed, and by the beginning of the thirties the main features of the balance indicators were established for the national economy as a whole, including the balances of the national income and of the gross national product, as well as those of fixed assets and labour resources.

The advent of economico-mathematical methods and of computers made the elaboration of branch-to-branch balances a practical possibility. The drawing up of such balances was resumed in the USSR on a regular basis in 1956. Considerable progress has been made since that time. For example, over twenty drafts for the 1970 branch-to-branch balance have been made up in terms of value, and fifteen drafts have been compiled in physical terms. By and large, these drafts are static models. But along with these, a branch-to-branch balance was made up in value terms following a dynamic model that covered 33 sectors of the economy.

However, branch-to-branch balances taken by themselves cannot prompt an optimal projection of the economy's development draft plan. That is why so much attention is being given to investi-

gations of the second part of the mathematical programming theory—the elaboration of optimal economic development plans. A programme for the elaboration of sectoral optimal development plans was adopted in 1964 so that those plans might be used in drawing up the 1966-70 five-year plan for the development of the national economy of the USSR. In accordance with the programme the following plans were made up: the optimal fuel pattern, the optimal plans for the development of new enterprises of the cement and the tyre industries and the industry producing nitric, phosphoric and potassium fertilizers. This opened up new possibilities for raising the economic efficiency of production. Thus, the cement industry's plan for optimal expansion and siting of new enterprises permits saving during the five years in question, 20 million roubles in transportation costs, 15 million roubles in production costs and 75 million roubles in capital investments, as compared with the plan worked out by old conventional methods.

The year of 1968 saw the beginning of the elaboration of the long-range optimal plans for the expansion of old enterprises and the siting of new ones in 75 economic sectors in the 1970-80 decade. The All-Union Economic Conference that met in May of the same year recommended all the Ministries and Departments to ensure, within two or three years, transition to optimal plans in all basic sectors of the economy.

What are the advantages offered by the analysis of a number of draft plans and the selection of the optimal draft (variant) among them? According to estimates, optimization of sectoral expansion and location plans will reduce total pro-

duction and transportation costs by ten to twenty per cent.

Further planning improvements will include, as one of the most important lines of research, long-range forecasts of the development of the national economy. Of special importance is the drawing up of the long-range plan that will include, not only a listing of the state targets, capital investment limits, salaries and wages funds, etc., but a system of economic norms and rates that will allow for the flexible management of the economy's development and permit the enterprises themselves to make decisions on many issues they confront in their activities.

The modern scientific and technological revolution results in mass modernization and renewal of equipment and production techniques. This brings about, naturally enough, substantial changes in the rate of development of various branches of the economy, which, in turn, affects the sectoral structure of the country's economy. If this is disregarded in the drawing up of plans, planning will cease to play its organizing role. So forecasts of technological progress become tremendously important in efforts to further improve planning procedures.

This is why the drawing up of development plans for the national economy for the 15-20 years to come becomes a matter of considerable importance in the activities of the State Planning Committee of the USSR, as well as of other central planning agencies of this country. Such long-range plans are a prerequisite for the drawing up of five-year plans which are properly balanced in all their sections and rest upon sound scientific foundations. The second prerequisite comprises

the correct definition of the main objectives and goals for the economy and of the means of securing them, as well as schemes for improving the economic efficiency of production and listing measures ensuring the fulfilment of such schemes.

At the present time work has already begun upon macro-economic models for computing the rate of growth of the national income depending upon its distribution for accumulation and consumption purposes. Such forecasts have been made up to 1985. So far extrapolation has been used for their calculation. Now efforts are being made to assess that most important plan performance indicator through mathematical programming techniques. A system of economic information gathering and processing that would provide the necessary data for the elaboration of such models must be created to make assessment possible. The existing system of information, so far, does not meet the needs of optimal planning. However, even at the present time, possibilities of obtaining the necessary initial data required for the purpose set forth above should be explored and used. This can be done by resorting on a wide scale to expert evaluations and the use of other approximation methods.

Economico-mathematical methods and electronic computers are now being used in managing and planning the economy of the USSR in a wide range of applications. This opens up new prospects for making the principles laid down by the economic reform work still better.

Of late the Western press has more and more often admitted, sometimes quite openly, that, by increasing the efficiency of the Soviet national economy, the economic reform will make the So-

viet Union still more powerful and that hopes and expectations of a "transformation" of the Soviet economy are nothing more than so much wishful thinking. The Western press has definitely changed its tune since its first comments on the economic reform when it was announced in September 1965. For instance, the *Daily Telegraph* wrote triumphantly in its issue of September 29, 1965, that "the planning mechanism is in large part to be dismantled and a market economy installed in its place."<sup>1</sup>

The successful implementation of the economic reform in the USSR is a matter of tremendous economic and political significance. The reform is a landmark ushering in a new higher stage in the development of the socialist economy. By ensuring a still greater degree of the proper combination of public, collective and individual interests, the reform creates a climate favourable for ensuring the steady growth of the initiative of the working people in the economic field.

<sup>1</sup> *The Daily Telegraph*, 29.9.1965, p. 16.

## CONCLUSION

The wide application of economic-mathematical methods in the Soviet economy has led some bourgeois economists to assert that these developments in the USSR imply the renunciation of Marxist-Leninist economic theory. In the works of R. Campbell, A. Nove, A. Zauberman and a number of other Western writers on economics, one finds numerous inventions on the alleged contradiction between the theory of value advanced by Karl Marx and the basic laws of mathematics. Campbell states that bourgeois economics presents an advanced stage compared with Marxism and that the former is gradually finding its way into Soviet economic theory.

But let us see what makes bourgeois economics an "advanced stage" in that science as they claim it is. By using economic-mathematical methods, bourgeois political economy tries to give credence to two theoretical concepts that have long since been part of their stock-in-trade. The two theories in question are the "theory of three factors" and the "theory of marginal utility" whose pseudo-scientific nature was exposed by Marxists at the turn of the present century.

Let us take the "theory of three factors." Its basic idea is that three factors take part in production—labour, capital and land. The owner of each factor gets his share of the products produced corresponding to the factor he possesses.

The worker gets his wages for his labour, the capitalist gets profit on his capital and the landowner receives rent for his land. This view is followed by the assertion that no exploitation exists whatsoever because each gets as great a share as his factor entitles him to. The implication is that the capitalist order of things is exceptionally just, and that class struggle is a notion without substance. The advocates of the theory are persistent in "forgetting" the most important point about the three factors—among the three, labour is the only creative agent, the one that breathes life into the other two. Without labour neither land nor capital can give anything to people.

One can easily understand the joy of bourgeois economists when they discovered that the "theory of three factors" "found confirmation" in the method used for solving economico-mathematical problems by linear programming. It is true that, along with other production factors, labour is treated as a constraint in solving the extremal problem of the maximum-minimum criterion function. Each of the constraints, and labour among them, makes its "contribution" to the achievement of the optimal decision. On the face of it the argument appears to offer convincing proof of the validity of the "theory of three factors."

Since in the solution of extremal problems resort is made to such notions as marginal product and marginal cost (or revenue), yet another theory engendered by bourgeois vulgar political economy is brought into the picture—the theory of marginal utility. This doctrine is used to provide an interpretation of the economic nature of marginal values in the solution of extremal pro-

blems. The application in economics of the mathematical theory of limits came to be known as "marginalism." The essence of economic marginalism is, on the one hand, a subjective interpretation of economic phenomena—the subjective value of material wealth items, defined by their marginal utility, being used by "marginalists" as the basis for economic measurements. On the other hand, "marginalism" proceeds from an erroneous initial premise—the "law" of diminishing returns covering the utility, productivity and revenue factors in production. The main theoretical evil of economic "marginalism" is its tendency to reduce the laws of intricate economic processes to formalized increment relations, regardless of their economic nature and the place they take in the system of objective relationships.

"The theory of marginal utility" owes its origin to the strivings of the advocates of capitalism to "denounce," at any cost, the labour theory of value that is the corner-stone of Marxist-Leninist economic teaching. The intentions behind such strivings are quite clear—Marx elaborated the theory of surplus value proceeding precisely from the methodological principles of the labour theory of value, and it is Marx's theory of surplus value that reveals with inexorable logic the machinery capitalists use to exploit hired labour. Furthermore, the consistent development of the theory of surplus value unfailingly leads to the conclusion of the inevitability of a revolutionary replacement of capitalism by socialism.

The labour theory of value proves that value and the price that expresses it are formed by the expenditures of social labour. To counterbalance this fundamental principle, the advocates of the

"theory of marginal utility" try to assert that the price is determined, not by labour, but by the utility of things. They assert that, in the exchange process, each transactor is guided by the utility of various goods and production factors. The value of goods and of production factors is determined by the minimum or marginal utility that can be obtained through the given stock of material wealth. The subjective value of a commodity that can be bought at market for a definite price is determined, not by the utility of the article in question, but by the utility of those commodities that the transactor could have bought, had he not chosen to buy what he actually purchased. Hence, it is not objective factors such as the expenditure of social labour, but subjective evaluations made by men that determine the price.

It might seem that these formal logical constructions are confirmed when mathematical functional analysis is applied to the solution of economic problems by linear programming methods. The optimal criterion, it might appear, can be construed here as a certain utility measuring-rod, and utility is what is sought in the optimum solution. The valuations of all the constraints obtained in the process might be interpreted as prices expressing the "contribution" of each constraint to securing the maximum utility effect. The numerical expression of such valuations is determined by the relations of all the constraints accounted for in the problem.

The presence of a certain outward semblance between the construction of linear programming models and the logical canons of the theory of "three factors," as well as those of the theory of "marginal utility," has convinced many bourgeois

economists that the application of precise mathematical analysis in economic studies is feasible only in bourgeois schools of economics. It is in this vein that R. Campbell has made his attempt to "refute" the Marxist labour theory of value and replace it by "modern economic science." But a study of Campbell's views shows that he has but a very perfunctory knowledge of economics. He does not differentiate between such elementary notions as value, production cost, optimal plan evaluation methods. It is important to point out that Campbell conjures up his own concept of capitalist society that, born of his own imagination, is quite remote from reality. An "equilibrium of prices" has been attained by that society, a state that has never been, nor can ever be reached under capitalism as prices and the rate of profit are constantly fluctuating. And the prices are such that additional investments in various branches of the economy yield equal profits. Expressed in mathematical terms this condition means that there exists an equality of partial derivatives of profits yielded by investments in various branches of the economy. It is noteworthy that the mathematical analysis presented by Campbell completely ignores the presence of antagonistic classes in capitalist society, the ruthless competition of "everybody against everybody," the crisis depressions, etc.

Having made his frivolously light charge against Marxism, Campbell announces glibly that Marxism and mathematics are incompatible. Then, in one breath, he declares that L. Cantorovitch, V. Novozhilov and V. Nemchinov—the scientists who pioneered economico-mathematical studies in Soviet economics—"have overthrown and

refuted" Marxism and are now subscribing to bourgeois economic theories. A telling denunciation of those ridiculous slanderous inventions is the fact that the three Soviet economists mentioned above have been awarded the Lenin Prize—the highest distinction for scientific achievement in the Soviet Union—for their investigations in the economico-mathematical field.

There is no contradiction between Marxism and mathematics. Marx is known to have been an ardent supporter of the application of mathematics to economic analysis. Paul Lafargue recalls that Marx stated most emphatically that "... a science is not really developed until it has learned to make use of mathematics."<sup>1</sup> It is noteworthy that many critics of *Das Kapital* held its author's passion for mathematics against him. Even those who have but an elementary knowledge of *Das Kapital* will know that mathematical analysis is the basis of the research described in it. Moreover, Marx hoped to elaborate mathematical methods of forecasting economic crises. It was only a strict mathematical approach to economic phenomena that made Marx proceed from the principles of the labour theory of value. Only qualitatively homogeneous and quantitatively comparable objects can be treated in mathematical terms, Lenin wrote: "... the homogeneity of the object of physics—this is the condition that makes the application of measurement and mathematical calculations possible."<sup>2</sup>

Marx used the very same approach in elucidating

the basis of the exchange values of commodities. The use-value and the utility of commodities cannot serve as such a basis—it is exactly what makes a commodity *qualitatively* different from another commodity that determines its exchange value, as qualitatively different objects cannot be directly compared with each other. So a property common to all the commodities has to be found. The property which all commodities share in common is that they all are products of labour, and the comparison of all commodities is possible only by comparing the amount of labour embodied in each of them, this being the substance of the value of a commodity. Price is the monetary expression of this value that fluctuates up or down depending upon the supply and demand correlation.

Thus, the labour theory of value determines quite clearly that labour is the yardstick for evaluating economic processes and phenomena. In contradistinction, the theory of marginal utility, having proclaimed utility as the basis of price for almost a century, has now failed in its attempts to evolve a means of measuring utility. The matter has given rise to much controversy and two trends—the cardinalists and the ordinalists—developed in the course of the discussions. The cardinalists uphold the traditional views of the subjective school and believe that utility can be measured in quantitative terms in spite of the fact that no way of accomplishing such measurements has been discovered throughout the many decades the theory of marginal utility has been known in political economy. The ordinalists, realizing the futility of the search for a quantitative definition of utility, have tried a new approach to the pro-

<sup>1</sup> *Reminiscences of Marx and Engels*, M., 1957, p. 75.

<sup>2</sup> Lenin. *Coll. Works*, Vol. 14, p. 298.



blem. They want to see the old ideas of utility value replaced by ordinal indicators that reveal nothing but the order of priorities which a transactor attaches to his needs without even pretending to be able to define precisely the utility degree of this or that commodity. Such ordinal indicators, however, cannot be either subtracted or added to each other, divided or multiplied by each other.

And in general, a preference priority order cannot be identified with a utility priority sequence. Some Western economist-mathematicians realize that. Thus, R. Duncan Luce and Howard Raiffa write: "...it is easy to slip into saying that one was preferred to another because it has a larger latent index of 'satisfaction' or 'utility.' This is an unrewarding slip—indeed, it is a trap one must be careful to avoid. This usage was once a burning issue in economic literature, but it has been totally discredited. One of the reasons is the striking non-uniqueness of the index."<sup>1</sup> Scientific integrity has convinced these authors that experimentally it is most difficult to define the individual utility function, even under ideal conditions. So it is only logical that they should arrive at the following conclusion: "It is so difficult to determine utility functions under the best of conditions, there is certainly no hope at all that it can be done under field conditions for situations of practical interest."<sup>2</sup>

Neither will the situation be saved by the appearance of a new economic category—the optima-

lity criterion used in linear programming for the solution of economic problems. The imperative demand that all economic values be commensurable by a single qualitative indicator still holds good here. It becomes clear that economic problems of a limited local scope can be solved without special difficulties—the reason for it is quite simple—in this case the criterion and the constraints values can quite easily be adjusted to and made commensurable with each other. For instance, if an optimal transportation problem is to be solved, the minimization of the cargo run can be chosen to act as the criterion. But as soon as problems of larger scope present themselves, the difficulties immediately become formidable. The solutions of overall economic problems pose especially great difficulties—one deals here with an immense number of heterogeneous economic parameters. And once again the problem of finding a common yardstick for the comparison of all those parameters arise before the economists. There seems to be only one such yardstick—the labour time used for the production of various items of material wealth, i.e., Marx's labour theory of value. That explains why such prominent representatives of the economico-mathematical school in the USSR as L. V. Kantorovitch, V. V. Novozhilov, the late V. S. Nemchinov, A. G. Aganbegyan and, to a certain extent, A. L. Lurie hold that prices established under an optimal plan must express the socially necessary expenditure of labour.

The attempts of bourgeois scientists to set mathematics against Marxism and pronounce them incompatible were to no small degree encouraged by the fact that some time ago a considerable

<sup>1</sup> R. Duncan Luce and Howard Raiffa. *Games and Decisions*, 1957, N. Y., p. 16.

<sup>2</sup> *Ibid.*, p. 36.

number of Soviet economists took a negative view on the idea of using economico-mathematical methods and computers for planning and managing the economy. The stand they took on the issue can, to some extent, be explained by the fact that investigation into the range of the application of mathematics in economics had begun somewhat earlier in the capitalist countries than in the USSR. These earlier investigations were unfailingly accompanied by the interpretation of economico-mathematical methods according to vulgar bourgeois theories of political economy. Such theoretical interpretation, naturally enough, met with severe criticism on the part of Marxist economists. Now, economico-mathematical methods are gaining wide and increasing recognition in Soviet economics. It would be wrong to assume from this, however, that Soviet economists, by putting to use many of the mathematical methods elaborated by bourgeois scientists, are deviating from Marxism. "It is one thing, however, not to close one's eyes to bourgeois science, by keeping watch on it, and using it, but being *critical* towards it, and refusing to surrender the integrity and definiteness of one's world outlook; but it is another thing to give way to bourgeois science and to repeat, for example, catchwords about Marx being 'tendentious,' etc., which have a very definite meaning and significance."<sup>1</sup>

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<sup>1</sup> Lenin. *Coll. Works*, Vol. 3, p. 632.

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