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PREFERENCE FUNCTIONS, INTERTEMPORAL CHOICES, AND FORMS OF ECONOMIC ORGANIZATION FOR ALLOCATION OF RESOURCES*

GEORGE R. FEIWEL

I

What consitutes the "best" allocation of resources has a meaning only within the context of the adopted normative standards of valuation—the preference function. Abstracting from some perplexing problems associated with the concept of the social welfare function[1], the question is posed: Should the social welfare function be formed entirely of individual preference functions (be a summation of individual preference functions, with consumer preferences the only appropriate valuation standard), or should the social welfare function contain decisions independent of the individual preference functions[2], or should it reflect the political leadership s judgment only? Alternatively, the question may be posed: Are there spheres of state decision-making where state preferences are supreme—i.e., where the state preference function is not deduced from individual preferences, but can, in various degrees, be influenced by them—and the consumer's sphere where individual preferences are supreme, with perhaps a sphere where state and individual preferences interact?

During the celebrated interwar debate on the economic merit of socialism, a number of fundamental issues were raised, three of which seem to be particularly relevant to our discussion: (1) Apart from the provocative question of workability and viability of a socialist economy, the fundamental issue was—and still is—one of realative economic efficiency of economies working under various institutional arrangements. (2) The debate contributed to the elaboration of the necessary and sufficient conditions for solving the allocative problem in any society that faces choices between alternatives.

Among the possibilities of generating scarcity (opportunity cost, equilibrium) prices, three solutions may be noted, to be explored later: the genuine market (or pricing system); Lange's prewar competitive solution; and shadow prices, derived from an optimal plan. Three sets of data are required for a determinable solution to the allocative problem: a) a preference function to guide choice (which may reflect planners' or consumers' preferences or an interaction of both); b) a choice indicator; and c) a production function. If the data under a and c

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(1) K. J. Arrow *Social Choice and Individual Values* N.Y. 1956; A. Bergson *Essays on Normative Economics* Cambridge Mass 1966; *Collected Scientific Papers of Paul A. Samuelson* Cambridge Mass 1966; M. Dobb *Welfare Economics and Economics of Socialism* Cambridge 1969.

(2) Cf. J. Tinbergen in *On Political Economy and Econometrics*, Warsaw 1964 pp. 591–600.

are given, b can be determined. Hence, it is claimed that a centrally directed economy can operate with effective coefficients of economic choice without a market in the institutional sense (assuming that it can solve the informational problem).[3] This, of course, is not to say that the envisaged solutions are equally efficient.[4]

An issue that emerged from the debate, without having been elaborated at the time, was that of dynamic or intertemporal efficiency.

During the interwar discussion, Lange, among other defenders of the socialist economic system, considered the determination of the rate of investment as an unavoidably political and arbitrary decision. The fixing of the aggregate investment volume was not to be determined by market consisiderations, but was to be established by the planner to eliminate fluctuations and to promote faster growth.[5]

Probably under the influence of the realities of socialist planning as it was shaping up in practice, about two decades later, Lange restated his position by arguing that not only the share of accumulation in national income, but also the structure of investment, is within the bounds of political decision-making.[6]

Thus, contrary to the capitalist mode of production, the engine of economic growth of the socialist economy is propelled by two simultaneous political deci-

(3) It should be noted in this context that Professor Tinbergen emphasized that in very few writings about welfare economics is the very nature of this theory set out in clear terms so as to stress its tasks, and the unknowns of the main problem considered. These unknowns are precisely the complete set of institutions and their instruments which, as a set, satisfy the conditions for maximum welfare, given the constraints imposed by nature but no others. Tinbergen stresses that the set of institutions characterizing the optimum order should satisfy the complete set of maximum conditions. The ideal scientific process used in welfare economics consists of a) a definition of welfare, i.e., an identification of the variables that are the building blocks of the welfare function, and specification of how these variables influence welfare. The social welfare function entails choosing the ultimate aims of economic policy and of the economic order; b) stating the constraints, being the production techniques and endowments with natural resources; c) derivation of the conditions for maximum welfare under the constraints; and d) interpretation of these conditions for maximum welfare in terms of institutions and their instruments. ("The Significance of Welfare Economics for Socialism," *loc. cit.*, p. 592.) Cf. Also A. Bergson, *Essays on Normative Economics*, pp. 4–26, 79–90, and *passim*; E. Mishan in *Survey of Economic Theories*, I, 158 ff.; T. Scitovsky, *Welfare and Competition* (Chicago: 1951); and B. Baumol, *Economic Theory and Operations Analysis*, pp. 355–85. N.Y. 1964.

(4) Cf. Bergson, *Essays on Normative Economics* (Cambridge, Massachusetts: 1966), pp. 217 ff., and "Market Socialism Revisited," *JPE*, October, 1967; and G. R. Feiwel, *Economics of Socialist Enterprise*, N.Y. 1965 Chapter 2.

(5) O. Lange, "On the Political Economy of Socialism," in Lippincott (ed.), *On the Political Economy of Socialism* (Minneapolis: 1938), p. 85. Cf. Lerner, *Economics of Control*, p. 263; New York: 1949. H. D. Dickinson, *Economics of Socialism* (London: 1939), p. 80; Dobb, *Political Economy and Capitalism* (New York: 1940), pp. 295–99 and 311–12; and H.C. Pigou, *Socialism vs. Capitalism* (London: 1937), p. 132.

(6) Lange, "The Political Economy of Socialism" (The Hague: 1956), p. 22. It should be noted in this context that in addition to the above, Dobb suggested that the main technical forms (variants) in which investment is embodied also fall within the sphere of political decisions. *An Essay on Economic Growth and Planning* (London: 1960), pp. 2–5.

sions undertaken by the central planner for the planned period, affecting the pace and structural pattern of economic exapnsion: 1) determining the share of investment in national income, and 2) determining the composition of investment. The central planning authority is supposed to weigh the social benefits in the light of whatever ends the planner serves, on the basis of factors of a political nature, with costs depending on the techniques of production. These basic decisions in the socialist economy contain in themselves an element of free (political) choice of the planning authorities.[7] The market mechanism does not perform any function in this task, but the planning and organizational arrangements are of significance for implementing the state's decisions. It follows from the nature of these political decisions that it is not possible to prove scientifically their validity, but it is, however, possible to analyze their impact and consequences.

There are supposed to be fundamental differencee between the capitalist and socialist systems in effecting the growth processes: Divergent units of economic activity make those decisions; the premises on which the decisions are made differ; the hierarchy of decisions is dissimilar; and the mechanisms for carrying out the decisions vary. It is traditionally accepted that in the socialist economies the general conception of development strategy is an interpretation of the accepted "road to socialism," hence, it is derived from the overall political premises. Here, the equalization of the rate of profit is out of the question, contrasted with the conditions of capitalist competition where investment decisions are largely made by private decision-makers whose motivation is a quest for higher profits.[8]

One can conceive of a system where planners decide roughly on capital formation and the consumers on the product mix of consumer goods,[9] although, admittedly, such a division may encounter considerable difficulties in practice. The more orthodox version of the Soviet system resembles more an arrangement for resource allocation where not only the total consumption fund is predetermined by the planner, but where the rather minute allocation of resources within the consumer sector, instead of being guided by consumers' preferences, is directed by the objectives and scale of values of the powerful bureaucracy in charge of the administration and allocation of scarce resouces among alternative uses.

The guidance of production by consumers' demand is largely absent, with lack of a mechanism and rules that elicit a response of the producer to consumers' preferences. The distribution of the national product between personal and collec-

(7) Cf. Bergson, *Essays in Normative Economics*, p. 196.

(8) J. Drewnowski, "Basic Elements of the Theory of Growth of the Socialist Economy," *Eknonomista*, No. 3, 1962, pp. 522–39. Cf. J. Robinson, *An Essay on Marxian Economics*; P. Sweezy, *The Theory of Capitalist Development*, New York: 1948. "The chief engine of economic growth in a market economy (given the available labour force) is the application of technical improvements to production which comes about through the competitive struggle of firms seeking profitable outlets for investments (J. Robinson, *Economics: An Awkward Corner*, p. 42). N.Y. 1968.

(9) Cf. J. Robinson, "Consumer's Sovereignty in a Planned Economy," *Collected Economic Papers*, Vol. III (Oxford: 1965), 70–81. Cf. also my *Soviet Quest for Economic Efficiency*, N.Y. 1967, pp. 41–45.

tive consumption, size and composition of capital formation, and defense, are determined entirely as a political decision upon which the individual income earner has almost no influence. The volume of investment is virtually independent of the willingness of the income recipients to save. The investment plan is expected to be implemented as a sheer result of the allocation of physical resources. In principle, the dominant criteria of planning of production are the political objectives which the economy is supposed to serve. The basic design of the system is to insure that no preferences of consumers are to be allowed to interfere in the implementation of the system's objectives.[10]

In an interesting attempt to provide a rationale for a central plan derivation,[11] Professor J. Drewnowski asserted that there are two sets of preference functions (valuation scales) which are affected in the socialist economy (rather, any national economy, but with particular relevance of the distinction for economies where the means of production are publicly owned): 1) the multiple system of individual preference functions of the population which manifest themselves in purchases and sales on the market, and 2) the single state preference function (as a special case of the general welfare function) containing the scale of values of the state; i.e., the organ that actually possesses the authority over the economy, revealed *ex post* in the state's declarations and actions. In a socialist economy it is necessary, therefore, to analyze two sets of decisions, as some variables can be chosen by individuals (or the individual action parameters), and other variables can be selected only by the state (the area ruled by state preferences).

The state preference function is not deduced from the individual preference functions (that is, the individual preference functions do not constitute the ingredients, or building blocks, of the state function). The population, to a varied degree, influence the state preference function by political pressures. The degree of sensitivity and response of the state to the interests and aspirations expressed by the citizens is a measure of the degree of democracy in the political system. The consumers' preference function is revealed through the consumers' market behavior. The main shortcoming is the manifestation of consumers' preferences ex post. While no state, so far, "has published a white or blue book containing its preferences," the state's preference function is implicit in its activities. The state's preference function is revealed in the form of 1) declared (*ex ante*) target

(10) Cf. Lange, "Working Principles of the Soviet Economy," N.Y. 1944 pp. 12–15.

(11) It is noteworthy that, reporting on a number of recent optimal growth models, Professor T. Koopmans claimed that the models are not tied to any particular form of economic organization. Postulates concerning production possibilities or technology he claimed indeed to be universal, but as to postulates of intertemporal preferences, there are critical institutional differences in *how these are arrived at* and *given effect to* in various economic systems. But' in the present *pre-institutional* type of analysis, Koopmans stated: "I shall merely assume that such preferences are given, *without inquiring how they are determined and given effect* to" ("Objectives, Constraints, and Outcomes in Optimal Growth Models," *Econometrica*, January 1967, p. 2). Emphasis supplied.

of policies[12]—in socialist economies, the targets are officially set and published in the form of the national economic plan[13] and 2) *ex post* manifestations of policies actually carried out. The economist focuses on the revealed preferences; the *ex post* targets of economic policy (*after their adoption, however arrived at*) are then taken as data. Their derivation, or the basic allocative decision of the national product between alternative uses—consumption, investment, and the like, and the strategic structural composition of production—are largely formulated by political decisions, however and by what processes derived. The inquiry into the rationale for their derivation is, therefore, declared *ultravires* to het economist, as an economist. Hence, on these premises, by implication, the test of rationality of various commands, parameters, or indicators, circumscribing the behavior of the units of economic activity (output assignments, input norms and limits, etc.), is whether they are derived from and satisfy the conditions of the central plan, the structure of output postulated and revealed by planners. On these premises, it would be fallacious to speak of "rational" by using other preference functions than the relevant planners preferences, or for that matter, inconsistent, derivation from a largely *irrational plan* as, for example, the largely discredited Polish Six-Year Plan (1950–55).

To analyze the interaction of state and individual valuations, the device of zoning the economy is introduced, distinguishing a)the state zone in which the state's scale of valuation is supreme—where no consumer preferences enter the

(12) The Soviet planning procedure relies on determination of priorities (leading links) by the regime's leaders, with crucial targets for key intermediate and final products singled out. The point of departure in plan construction is a set of exogenously predetermined targets for intermediate and final products. To *start* economic planning by target setting amounts, as Professor R. Frisch has shown, to wandering in the fog. To assure optimum use of resources, rational planning must take as its starting point and retain at all times a basic distinction between the preferences of the regime's leaders who are steering the economy (the selectionally free form of the preference function) and the fundamental data describing the structure of economy (those things that the planner cannot alter and must consider as data). Professor Frisch argues that the construction of the preference function must be absolutely free of the notion of target setting and should be approached in what he calls the "Santa Claus spirit." The pertinent question, to be addressed to the policy-makers to get the necessary information for constructing their preference functions, is—"Would you have this or would you rather have that *if you had a free choice*?" Frisch challenges the view that the preference function should reflect a set of quantity targets which is to become the focal point in plan construction. If this were so, the preference function would have little relevance since the policy-makers are unable to account for "the infinite variety of *structural* aspects which will determine whether a given set of quantity targets is *feasible* or not, and if feasible, whether it is optimal or not. Feasibility can only be adequately analyzed by a number of scientific specialists." The ultimate goal of plan construction is to arrive at and end up with a constellation of quantity targets for the development of the economy, but to start with such a set is to put the cart before the horse (*An Implementation System for Optimal National Economic Planning without Detailed Quantity Fixation from a Central Authority*, Oslo: 1963.

(13) Among the leading Western economists, Professor Joan Robinson expressed the view that

> . . . the overall rate of saving must be a political decision (represented by a 'social welfare function' which tells us no more than that the authorities prefer whatever plan they had decided to carry out). (*Collected Economic Papers*, III, p. 77.)

picture (for example, such a situation exists, as a rule, in capital goods industries); and b) the zone where individual valuations are supreme—called the zone of individual influence; and c) the zone where the state's and individuals' valuations interact. Where they meet, they constitute a restraint for each other. The latter zone, called the zone of dual influence (or "coexistence") is considered to be the crucial one.[14]

Laissez-faire capitalism is considered to be a system where the entire economy belongs to the individual zone. In modern capitalism, there is usually some state zone and quite a significant dual-influence one. Drewnowski views the boundary lines between zones as fairly stable in this case, attributing this feature to the greater rigidity of economic institutions under the capitalist mode of production.

Socialism is considered to be a system where the economy is divided between the state and dual influence zones, with the zone ruled by consumers' preferences as a residual. Granted different variants of socialist economies, the boundaries between the state and the dual influence zones are not rigidly drawn and, in fact, many different combinations may be conceived in the range between the limiting case where the entire economy is in the state zone, without market and with prevailing rationing (resembling the Soviet period of War Communism), with the only restraints in the form of endowment with resources and available techniques; and, on the other extreme, a system where the state zone is not much more extensive than under modern capitalism (mixed economy). Drewnowski speaks of the relative ease and speed with which transformation from one variant of the socialist economy to the other can be accomplished. Apparently, such transformation requires nothing more than the governmental decision—a contention of questionable validity, for it seems to detract from the array of institutional, group, personal, and other factors on which the implementation of the decision depends.

The limiting case of the virtual total supremacy of the state zone apart, in all consumer-oriented branches of industry there is a possibility of a dual zone, with the boundaries for the state preference zone drawn differently with alternative solutions. In the zone of dual influence, among the possible variants, three classes of socialist economic organizations with varied degrees of utilization of the market mechanism are singled out: 1) "First degree market economy"—a typical situation in the traditional Soviet-type economy—where the planner determines the quantities of particular goods, is the only supplier (probably the kolkhoz and black market aside) to the market, and the consumer is free to buy or not to buy, and how much to buy (purchase quantity adjuster) is subject to availability and personal budget constraints. But the consumer does not enjoy consumer sovereignty.[15] The production of consumer goods is largely not guided by the demand

(14) Taking a "short-run" standpoint, the influence that individual preferences have on the state's preference function through political pressures may be discarded, and the state and individual functions may be considered to be independent of each other.

(15) Drewnowki, "The Economic Theory of Socialism," *JPE*, August 1961, pp. 349–50. The principles of consumers' sovereignty essentially reflect the suppositions that:

of the consumer, for there is no mechanism or rules that would insure that changes in consumers' demand would inevitably elicit increase in the flow of output in the required quantities and composition. In trying to dispose of what is produced, the state will vary prices to match consumers' demand (as expressed by consumers' demand prices). In contrast to the case of state distribution by rationing, the boundary between the zones has been shifted so as to leave the allocation of consumer goods in the dual influence zone and to permit a market for consumer goods to be established. But it cannot be overemphasized that, on that market, consumer demand influences only the allocation and prices of output already produced; the volume and composition of output are not influenced, nor is the allocation of resources used in their manufacturing, or the allocation of resources among individual producers (plants) which are, as a rule, governed by the central plan.

For obvious reasons, Drewnowski does not mention the "labor market." But, in order to avoid compulsory direction and allocation of labor and restrictions on choice of occupation and place of work, the pattern of wage differentials must be governed by the conditions for demand and supply of different types of labor. In order for wage (income) differentials to retain their incentive effects, and to promote a willingness to produce, there must be freedom of choice of how to spend the income. The real value of the remuneration received and, consequently, the incentives to produce would be reduced with a rationing system and payments in kind, given the existing differences in individual tastes.[16]

2) In "the second degree market economy"—corresponding roughly to some of the proposed changes in the mechanism of functioning advocated in the socialist economies—the aggregate volume of consumer goods, the aggregate volume of resources employed in producing the consumer goods, and the capital goods employed in the production of consumer goods—all these are still, *inter alia*, governed by the central plan. In this case—in contrast to the first degree market economy—the variables that depend not only on the state's, but also on the consumers', scale of valuation as revealed on the market include the volume and composition of consumer goods produced in the current plan (presumably, Marshallian short run of production), the combination of variable inputs used in the

First, the overt preferences of any household such as might be expressed in the market are more or less indicative of the utility the household realizes from personal consumption. Second, the utility of any household for the most part depends only on its own personal consumption as distinct from that of other people. These are understood to be suppositions about utilities which enter in a familiar way as arguments in a criterion of social welfare. The criterion in turn is taken as a basis for the formulation of normative economic principles" (A. Bergson, "The Doctrine of Consumer Sovereignty," *AER*, May 1962, p. 284).

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Cf. also W. J. Baumol, "The Doctrine of Consumer Sovereignty, *AER*, May 1962, p. 289; and T. Scitovsky, "On the Principle of Consumer Sovereignty," *AER*, May 1962, pp. 262–68.

(16) Cf. Lange, "On the Economic Theory of Socialism, ' pp. 90 ff.; Dobb, *Welfare Economics and the Economics of Socialism*, pp. 48–49; J. E. Meade, *The Stationary Economy* (London: 1965), pp. 220–03; and Joan Robinson, *Collected Economic Papers*, III, 71.)

production of consumer goods, and the allocation of resources among plants.[17]

3) The third degree market economy is characterized by the determination of the pattern of new investments in consumer-oriented industries on the basis of consumers' demand as revealed in the market for consumer goods.[18] While the aggregate volume of consumer goods, resources in their production, and the basic allocative decisions on alternative uses of national product (investment, consumption, defense, and the like) remain the prerogative of the central planner, as a rule, the decision concerning the pattern of investment, supporting the product mix as reflected by the consumers' scale of valuations, choice of the executants of the investment program, etc., is assigned from the state to the dual influence zone.[19]

But while Drewnowski seemed to advocate—without giving any precise formula—a social welfare function composed of individuals and a state preference function, a satisfactory formulation of such a function has not yet been reached.[20] First of all, there may be good reasons for the state to "correct" some personal preferences (for example, abuse of alcohol or nonattendance at schools) for the consumer may be short-sighted in many respects, meaning in the end that the consumers' individual preference functions may be inconsistent. Secondly, a crucial question of "collective consumption" arises, for some requirements can be met only by collective goods. Here, a distinction should be made between the needs that can be satisfied only in a collective way and the production process which satisfies the needs. While the needs remain inidvidual, the production techniques, whether production should be carried out in a collective way or in

(17) Drewnowski, "The Economic Theory of Socialism," *loc. cit.* p. 352. Among the Western writers who have drawn attention to the flaws, Rosenstein Rodan has pointed out that free and unimpeded market mechanism works perfectly in allocating the existing stock of consumer goods, and less satisfactorily, but tolerably well, in allocating the flow of production, assuming a fixed size of plant and equipment and a given stock of land and labor, but with changes of the degree of utilization of capacity (short-run) (P. N. Rosenstein Rodan, "Programming in Theory and Italian Practice," in *Investment Criteria and Economic Growth*, Cambridge, Massachusetts: 1955, p. 19). The effective role performed by the pricing mechanish in the allocation of materials and power between alternative uses was also stressed by Joan Robinson: "The most important function of the pricing system is to allocate supplies of scarce resources to the most needed uses" (*Collected Economic Papers*, III, 73).

(18) Cf. Robinson, *Collected Economic Papers*, III, pp. 77–79; and Rodan, *op. cit.*, pp. 19–22.

(19) Drewnowski, "The Economic Theory of Socialism," pp. 341–54. It may be noted that Drewnowski envisages that as a consequence of the dual interaction of the state and the consumers, the collectivist economy will have two independent sets of prices: one emanating from the state's and the other from the consumers' preference functions. The "state prices" will be employed in all interstate-enterprise transfers and in all national economic calculations. The functions envisaged for "consumer prices" are in transactions between state enterprises and consumers (p. 353). Cf. Z. Czerwinski, *The Mathematical Concept of Planning Prices* (in Polish) (Poznan: 1963); and J. G. Zielinski, *Economic Calculations in Socialism* (in Polish) (Warsaw: 1961), Chapter 4.

(20) Cf. Tinbergen, "The Significance of Welfare Economics for Socialism," *loc. cit.*, p. 593.

smaller units, the form of ownership is not something given beforehand but one of the unknowns of the problem to be determined.[21]

II

Inquiries into the thorny question of the objective (criteria) function—in its mathematical programming formulation: whatever quantity is to be maximized subject to constrains—of the economies that adopted the Soviet mode of development and of centralized planning, are, for obvious reasons, not very advanced or illuminating. The very existence and measurability of an objective function for the Soviet economy is a controversial issue among Soviet economists. In recent years, some intial attempts have been made by the rising Soviet "Planometrics school" to formulate the goal of the Socialist economy, but the work is still in an embryonic stage.[22] To paraphrase Alfred Marshall, every short statement about the "objective function" of such an economy is misleading (with the possible exception of my present one).

The nature of the problem was clearly conceived, in a different context, by Professors R. Dorfman, P. A. Samuelson, and R. M. Solow:

> In an economic context, the objective function [defined simply by the authors as whatever is to be maximized] is usually the measure of social valuation adopted by whatever social unit controls the values of the choice variables. To invest the objective function with meaning then involves locating the social unit which has effective control (which is not always easy) and ascertaining its objectives (which is almost never easy). Similarly the whole structure, social, economic, and technical, in which the deciding unit is embedded is involved in the practical identification of the choice variables, the processes, and the restraints, which specify the field of choice open to the unit of decision. These are the significant and difficult problems from the point of view of the economist.[23]

The critics of optimal planning oppose the existance of the optimand of economic activity, and then they question whether efficient planning is at all feasible, without that single magnitude to be maximized (or minimized).[24]

Academician N.P. Fedorenko, one of the leading lights of the Soviet school of planometrics and Director of the Central Mathematical Economics Institute of the Soviet Academy of Sciences, envisioned the tasks of national economic planning as: 1) determination and expression in quantitative terms of the end of

(21) *Ibid.*

(22) For an illuminating account, see A. Zauberman, *Aspects of Planometrics* (New Haven: 1967), pp. 171–84. For a nutshell exposition of the rising Soviet nathematical achool, see my *Soviet Quest*, Chapter 4.

(23) R. Dorfman, P. A. Samuelson, and R. M. Solow, *Linear Programming and Economic Analysis* (New York: 1958), pp. 30–31. Cf. Lange, *Political Economy*, I, pp. 177–82 and 207–25.

(24) Cf. Zauberman, *Aspects of Planometrics*, pp. 171–87; and L. Ya. Kazakevitch and L. V. Levshin (eds.), *Discussion on Optiaml Planning* (in Russian), (Moscow: 1968).

economic activity in the plan 2) preparation of variants of feasible plans[25] (in an economic system, the degree of freedom is usually significantly larger than one); 3) selection of the optimal program, from the standpoint of criteria or end of economic activity in 1 from the various feasible variants; and 4) working out of economic and noneconomic measure to insure the implementation of the chosen plan.[26]

Without discussing other aspects of the theory of optimal planning and functioning of the socialist economy, it should be noted at this juncture that the theory is based on the fundamental premise of the existence of a single optimand—a national economic criterion of optimality which should govern the functioning of the socialist economy. Fedorenko affirms that the fundamental economic law of socialism is maximum fulfillment of society s increasing wants, and that the national economic criterion of optimality should give *quantitative* expression to that law. Maximum fulfillment of wants means not only the requirements of intertemporal production and current personal consumption, but also defense, foreign aid, etc.[27] But, in contrast to the traditional planners who stress the primacy of production, the planometrics school generally stresses consumption as an end of activity.[28]

The critics of the recent attempts to formulate the criterion of optimality counter that it is impossible to reduce the multiplicity of goals of a socialist economy to a common denominator and to generalize magnitudes, as such a formulation would be based ont he untenable assumption (to most orthodox Marxists) that "use values" are comparable, commensurable and additive, from the standpoint of their usefulness, satisfaction, or the utility they render,[29] which was just the stand taken by Fedorenko. The logical foundation for the construction of a criterion of optimality, he argued, is the supposition that the behavior of the consumer reflects his aims to maximize satisfaction. From all available alternatives, the consumer chooses one—presumably his optimal choice under constraints for, otherwise, he would have selected a different combination. The task of the economist and econometrician is to study the revealed preferences, and to formulate a preference function so that consumers' preferences can be maximized.[30] This does not mean,

(25) Cf. my *Soviet Quest*, p. 193.

(26) N. P. Fedorenko in Kazaketich and Levshin (eds.), *op. cit.*, pp. 6–7.

(27) Fedorenko, *op. cit.*, pp. 7–8.

(28) For example, Kantorovitch in his dynamic model defines the maximand in terms of consumer goods alone. Cf. Zauberman, *Aspects of Planometrics*, p. 175. On Slutsky's build-up of the utility function as a point of departure for the recent work of Soviet planometrics school, see Zauberman, *op. cit.*, pp. 39–55.

(29) K. V. Ostrovitianov in Kazakevitch and Levshin (eds.;, *op. cit.*, p. 4; B. M. Vatyrev, *Ibid.*, p. 186; A. Pashkov, *Ibid.*, p. 93; Ya, Kronkod, *Ibid.*, p. 105 and *passim.*

(30) In the praxiological interpretation utility is conceived *not* in its "subjective school interpretation" from the utilitarian psychology standpoint—treating utility psychologically as pleasure, satisfaction, welfare, etc.—but is considered as a degree of realization of the aim of economic activity, independent of the nature of the aim (an end is conceived as a magnitude per-

Fedorenko qualifies, that, with the aim to accommodate consumers' preferences, he negates the necessity of the state's overruling consumers' preferences in all cases where such action is dictated by "scientific-ethical criteria," whatever that means (the standard case of limiting the consumption of alcohol is involked). Contrariwise, the formalization of the consumers' preference function and construction of models of consumer behavior would permit the state to influence consumer choices and the structure of total demand of consumer goods through price variation or the variation of income of some population groups.

Two other difficulties encountered are stressed in connection with the construction of the objective function: 1) It is widely held that the planning horizon (period) is arbitrarily determined. Such an approach opens the door for the adoption of "voluntaristic" solutions, as the length of the plan period materially affects the concrete content of plan assignments. 2) Traditionally, the relationship between accumulation and consumption is to a larger or smaller degree fixes *a priori*. According to Fedorenko, results of recent studies at the Central Mathematical Economics Institute on the formulation of the objective function permit hope of solving, at least in theory, the problems of the optimal development path, without fixing *a priori* any length of the planned period or ratio between consumption and accumulation.[31]

Even among the liberal economists, opinions are vastly divided on the reduction of the ends of the socialist economy to a single quantitative magnitude. For example, W. Brus, one of Poland's leading economists, argued:

> It seems that the expression of the economic activity of a socialist society in a uniform quantitative indicator (e.g., the size of national income) is of a guideline nature only. I believe that this ensues, *inter alia*, from the fact that from a sufficient distance the demarcation line between economic and noneconomic factors loses its sharpness. Under socialism the entire economic activity serves given social goals and it is very difficult, especially in perspective, to separate the strictly economic issues from the broad social ones.[32]

The traditional economists and planners contravene that the formulation of the national economic plan as constrained—extremal program—is both theoretically and practically impossible. The mathematicians demand that the economists provide them with the structure of the final output so that they can derive an optimal solution. But the determination of the structure of final output is the

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mitting various degrees of realization). In the praxiological interpretation, all psychological considerations are left aside and attention is focused on a "logic of rational choice" aimed at maximization of preferences so conceived. Lange, *Political Economy*, I, Chapters 5 and 6; cf. Kotarbinski, *Treatise on Good Work* (in Polish), (Lodz: 1955). On the Soviet resurrection of the concept of consumers; choice and dissociation from the concepts anchored in the behavioristic assumption of welfare economics ("subjective theory of value") see Zauberman, *Aspects of Planometrics*, pp. 39–55 and 71 ff.

(31) Fedorenko, *op. cit.*, pp. 9–11.

(32) W. Brus, *General Problems of the Functioning of a Socjalist Economy in Plish* (Warsaw: 1961), p. 220.

main problem in plan construction—the quintessence of planning. Is it possible in the multifarious and complex socialist society to generalize the multiplicity of nonadditive goals into one universal criterion of optimization that will find the optimal solution concerning output and composition?[33]

While basically in agreement with the above, the Polish planometrics expert K. Porwit went as far as to argue that there is "no point in seeking a universal optimum," and that his own model of central planning has nothing to do with such an approach.[34] Porwit's reasoning and framework of analysis are pervaded by pragmatism. He treats decisions such as distribution of national income, limits of employment, foreign currency balances, trade with particular countries, etc., not as decision variables in the model but as planned constraints, externally given; i.e., limitations imposed as a consequence of given decisions.[35] This stand is reminiscent of that of many Soviet economists doubting whether one can even speak of theoretical foundations for finding an optimal plan for the economy as a whole.[36]

It may be alluded here that Lange has demonstrated that even if it is assumed that the objectives of the centrally planned socialist economies are expressed by a multiplicity of ends, mathematical methods can be used effectively to find a

(33) A. J. Boiarski, *Essays in Mathematival Economics* (in Russian;, (Moscow: 1962;, pp. 350–55.

(34) Porwit proposes two alternative objective functions: 1) Maximization of total personal consumption during the period covered by the plan, simultaneously insuring a fixed increase in real wages, a predetermined level and structure of collective consumption and unproductive investments (housing construction, hospitals, parks, hotels, schools, etc.) as well as the size and composition of productive investment unfinished at the end of the period covered by the plan, hence producing returns only in periods beyond the planned one. He is vague on the difficult choice of the capital stock remaining in existence at the end of the planned period (post-plan horizon). 2) Maximization of labor expenditures, with appropriate constraints on labor and consumption respectively. The conditions are elaborated under which the two objectives will produce identical plans. *Inter alia*, Porwit focuses attention on the crucial problem of exchange of information between the central planner and sectors (subsectors;, but does not specify precisely the implications of the process of exchange. The calculations at the center involve a solution of an aggregate linear program (choice of a plan) and entail the determination of dual prices for groups of products. The dual prices would be taken as externally given parameters in the sectoral (subsectoral) calculations. How and to what extent can the results of the calculations of lower units of economic activity, containing information contaminated by self-interest, be used as basis for the computation at the center to formulate a simplified model of the economy's interrelationships*g* It is questionable that prices based on fallacious information would result in efficiency sectoral (subsectoral) calculations. Porwit, *op. cit.*; cf. E. Malinvaud and M. D. L. Bachrach (eds.;, *Activity Analysis in the Theory of Growth and Planning* (New York: 1967).

(35) K. Porwit, *Questions of Economic Calculation in the Central Plan* (in Polish), pp. 51 and 44–46. Cf. P. Sulmicki, *Economic Proportions* (in Polish), (Warsaw: 1962), pp. 90–91. Understandably, Porwit devotes virtually no space to meaningful discussions or informative facts about the pertinent decisions derived or reached in the existing process of planning.

(36) Porwit, *op. cit.*, p. 50. Cf. Zauberman, *Aspects of Planometrics*, pp. 266 and passim. B Ward, *The Socialist Economy* (New York: 1967), Chapter 3; J. M. Montias, *Central Planning in Poland*, Appendix A; and my *Soviet Quest*, pp. 185–204 and passim.

Pareto-like optimum. When there is a multiplicity of objectives (aims) to be obtained in an optimal way, programming problems can be solved, under certain conditions, by linear programming methods.[37]

Many of the advocates of planometrics explain that optimal planning cannot furnish a final and definite prescription for the economy's development path. Planometrics can offer merely feasible variants, summarized in a clear-cut and coherent fashion. A final decision, within the bounds of actually existing growth potential and constraints, must be made, as thertofore, by the competent authorities (Presumably the political leadership).[38]

We can trace this position back to the earliest Soviet planners. Feldmann was emphatic that his task was to explain to the top planners the basic growth relationship and to furnish them with several alternative development patterns, while it was up to them to select the development path in the light of their objectives and their evaluation of the existing economic and political conditions and prospects of development.

> The policy maker must determine the rate of growth, G_{kp} [consumer goods capital], and consequently also T_p [consumption], which is acceptable and desirable, and the final m agnitudes these rates are to attain. Technicians and statisticians must provide indications as to the coefflcients of effectiveness [the reciprocal of the capital coefflcient] which are attainable, and in what periods of time. Then the social planner can formulate a plan of development for the economy.[39]

Arguments were advanced that if the costs of selecting a suboptimal variant dictated by political considerations—would be known, the system's directors might revert to the "optimal" one (or second best;, recognizing that the sacrifice is incommensurate with the political benefits.[40] One wonders whether the demonstrated proclivity to enforce the party leadership's scale of values in planning may not be a serious handicap in unveiling the imputed cost of the departure from the "optimal" variant.

In all fairness, one cannot overemphasize the point that the very existence of the optimal solution (especially as it pertains to resolving the intertemporal choice conflict) is a bone of contention among some eminent economists, both East and West—and not without good reasons. Stressing the strategic practical importance in deciding about the rate of production to be chosen, Professors J. Tinbergen and H. C. Bos called attention to the failure to determine quantitatively an "optimum rate of development." "The well-known fact" that in communist countries the

(37) Lange, *Optimal Decisions* (in Polish), (Warsaw: 1964), pp. 164–76.

(38) V. F. Pugachev, *Optimal Planning* (in Russian), (Moscow: 1968) pp. 20 ff. On Novozhilov's defense of the assumption of *exogenously* predetermined output and Nemchinov's stand, see *Soviet Quest*, p. 188 ff.

(39) Feldman, in *Foundations of Soviet Strategy for Economic Growth*, p. 310; cf. Domar *Essays* . . . , p. 254. Cf. also my *Soviet Quest*, p. 163 ff.

(40) M. Lesz, Gospodarka Planowa, No. 7, 1964, p. 15. Cf. Lesz, *Models of Optimization of the Central Plan* (in Polish), (Warsaw: 1966).

growth rates of national product, and, consequently, "the rates of saving applied are almost double those of non-communist countries illustrates the wide differences in these decisions taken. *The question may, therefore, be asked whether economic science can give a clue to a numerical choice. Attempts made by the present authors seem to justify a negative answer.*"[41]

Academicain S. Strumilin wrote in 1963 that the Soviet planning practice has been shaped mainly by empirical groping in solving the problem of optimal proportions of the structure of production and distribution of national product between consumption and investment. Concrete solutions to such problems are not yet known in Soviet planning practice.

With some modification, there is much truth in Professor Tinbergen's observation, made in another context, that in the Soviet Union, "the first country to make deliberate choice" of the rate of savings, "it seems that no theoretical concepts have been at the basis of the choice" of the rates actually adopted.[42]

Granted the imprrtance of the serarch for the "optimum solution" and the difficulties involved, one wonders whether, on more "pragmatic" grounds, it is not "sufficient" to know that a certain measure leads to an improvement in the sense of a better realization of the aim (or reduction of the cost of achieving the aim). And, although it is preferable to know both the direction and the magnitude of a change in the economic situation, it is still better to know the direction of the movement and to form some notion of the empirically relevant range of magnitudes than to simply react, say, *a posteriori*, to some intolerable overheating of the economy due to overinvestment. Even if the optimum share of investment in national product cannot be realistically determined on the basis of available techniques and information (barring a sheer programming exercise), for example, it was not difficult to predict the adverse effects of the Czechoslovak Third Five-Year Plan that precipitated the retardation and the "inverse" economic miracle in the 1960 s as the author has shown elsewhere.[43]

As could be expected, the choice of the optimand has been a matter of considerable controversy.[44] Among others, Lange has argued for the adoption of national product as the proper maximand. He pointed out that the solution was already advanced by Pareto in connection with the investigation of the question

(41) J. Tinbergen and H. C. Bos, *Mathematical Models of Economic Growth* (New York: McGraw-Hill, 1962), p. 24. Professor O. Eckstein has argued that the determination of the proper total level of investment "is perhaps the most difficult theoretical problem in planning. It is the normative or welfare economics side of capital theory." O. Eckstein, "Capital Theory," *American Economic Review*, May 1961, p. 92. In another context, Dr. A. K. Sen insisted that the success of the search by economists for the "optimum rate of saving" . . . "has not yet been vastly more successful than for the holy grail." "On Optimizing the Rate of Saving," *Economic Journal*, September 1961, p. 479.

(42) Cf. J. Robinson, *Collected Economic Papers* (Oxford: 1965), III, p. 36; cf. R. M. Solow, *Capital Theory and the Rate of Return* (Amsterdam: 1963), p. 11.

(43) I was told by a Czech economist that, apparently, when Professor Michal Kalecki was shown the Czechoslovak plan, he predicted all the ensuing consequences.

(44) Cf. Lange, *Optimal Decisions*, Chapter 6.

of general welfare. Pareto s reasoning was based on the very assumption that if national income increases, and if there are options for unrestricted divisions of the increment, there is always the possibility of compensating the reduction of welfare of some individual that suffered as a result of the change, but there would still remain some surplus (an optimum position must satisfy the condition that it is impossible for any reallocation of resources to enhance the welfare of some individuals without reducing the welfare of others). Given the existence of such a surplus, growth of national income affects the rise of general welfare. Lange offered mathematical substitution and argued that Pareto s optimum can be expressed as the maximization of Lagrange function and may be interpreted, given appropriate assumptions as to prices of goods, as maximization of national income.[45] Similarly, other Polish economists tend to choose national income as the planner's maximand.[46]

But these proponents of the concept of growth of national income as the maximand of the economy should be warned that, if the concept of growth is "complex and illustive," the problem of measuring growth is fearsome. Not only are adequate data lacking, but the qualitative and nonmaterial aspects of growth processes are impossible to quantify.

A confession of St. Augustine more than 1500 years ago about the concept of time ought to be repeated daily by all who purport to measure economic

(45) *Ibid.* The problem of the maximand being solved, Lange stressed the maximization of national income as the paramount aim of the socialist economy. "The national economic plan determines the goal in the quantified and measurable form: as a rule in the form of a given national product." Lange, *Political Economy* (in Polish), I, 231.

(46) Among others, Professor Kalecki has chosen national income as the planner's maximand for his growth model. Acknowledging the controversial nature of the subject, J. Pajestka has also adopted national income as the "best synthetic measure of economic growth." Jozef Pajestka, *Employment, Investment, and Economic Growth* (in Polish) (Warsaw: 1961), p. 9; cf. J. Robinson, *Economics*, p. 41; Bergson, *Essays in Normative Economics*, pp. 131, 156; M. Rakowski, "Equations of Balanced Growth and Their Use in Perspective Planning," *Ekonomista*, No. 6, 1962, p. 1267. Dr. Mishan has recently assailed "growth mania" and obsession with readily measurable indicators such as the production rate. He vigorously argued that economic growth is not necessarily synonymous with general welfare. According to Mishan, the chief sources of social welfare are not to be found in economic growth *per se*, but in a far more selective form of development which must include "a radical reshaping of our physical environment with the needs of pleasant living, and not the needs of traffic or industry." He argued that the social process by which technological progres s is accommodated is almost certain to reduce our sources of gratification and a sustained technological advance tends inexorably to destroy the sources of of satisfaction of ordinary people, regardless of the form of economic or social organization. *Costs of Economic Growth* (New York: 1967), p. 148.

An expanded version of this thought-provoking book was published under the title *Growth: The Price We Pay* (London: 1968), incidentally, priced so as to pay for the growth in volume. See also the provocative *New Industrial State* (New York: 1967) by J. K. Galbraith: J. E. Meade, "Is the New Industrial State Inevitable?", *Economic Journal*, June 1968, pp. 372–92; E. S. Phelps (ed.), *The Goal of Economic Growth* (New York: 1968); and R. Aaron, "The Growth Rate Fantasy," The *Radical Humanist* (Calcutta), February 23, 1964.

growth: 'For so it is, O Lord My God, I measure it; but what it is that I measure I do not know.'[47]

Whereas political and other considerations may suggest favoring GNP as the relevant measure of growth performance, those who stress consumer welfare as the ultimate and towering objective oould make consumers' welfare or utility a function of consumption.[48] The adoption of such a view implies a radical tu about in the approach to plan construction.[49] Some may argue that invesment should be derived from consumers' demand (as a support for future consumption) and generally should not be allocated according to planners' development prefeferences.[50]

A number of recent Western models of optimal growth have assumed that the objective of economic growth depends exclusively on the path of consumption as foreseen for the future, i.e., "the capital stock is not regarded as an end in itself or as a means to ends other than consumption."[51]

A Russian economist of the turn of the century Tugan-Baranovsky, emphasized that the production of consumer goods does not constitute the "objective function" of the capitalist economy, nor does the demand for consumer goods constitute the propeller of the engine of economic development of the capitalist mode of production.[52] Tugan-Baranovkys's developed capitalism was a system in which machines are to produce machines to produce more machines, *ad infinitum,* assuming complete independence of development of capitalists from the behavior of the market for consumer goods and with consumption becoming increasingly an expandable variable. Tugan-Baranovsky's answer to those critics who maintained that a system where investments are not earmarked for the production of consumer goods, but for machines, is irrational and absurd, was that the "objective function" of the capitalists is not fulfillment of consumers' wants, but profit.

In Professor Kalecki's interpretation, granted the premises of the capitalist system, it is not at all absurd for expansion to rest on the growth of production of "iron and coal" which serves always the purpose of further expanding the production of "iron and coal." The production of "iron and coal" has "equal rights" with the production of "bread," provided that it is profitable. Consumption is the ultimate goal and criterion of a "harmonious" but not of an "antagonistic" system The capitalist system is considered by Kalecki to be an antagonistic one whose purpose is to ensure profit for capital.

(47) W. A. Wallis, "Economic Growth," in Phelps (ed.), *op. cit.*, p. 26.

(48) Cf. James Tobin, "Economic Growth as an Objective of Government Policy", *AER*, May 1964, p. 7; cf. Tinbergen and Bos, *op. cit.*, p. 24.

(49) Cf. Zauberman, *Aspects of Planometrics*, pp. 39 ff.

(50) Tobin, *op. cit.*, p. 7.

(51) Koopmans, "Objectives, Constraints, and Outcomes in Optimal Growth Mod els," *Econometrica*, January 1967, p. 2.

(52) Kalecki, "The Problem of Realization in Tugan-Baranovsky and Rosa Luxemburg," *Ekonomista*, No. 2, 1967, pp. 241–49.

III

It may be argued that a perfectly competitive system, even satisfying optimum conditions for maximizing welfare, is not necessarily the *optimum optimorum.* Quite apart from the question of equitable distribution of purchasing power, there are many market flaws. Virtually every government tampers with intertemporal choices, which is not by itself a reason that it should. But powerful reasons are advanced for some type of direction, correction, and influencing of economic activity. Although most of these arguments still arouse controversies, they have come to be taken vor granted by many Western economists. Some economists in the socialist countries understandably stress the advantages of a market mechanism (price mechanism), without a clear recognition of what the market can and cannot do. Without attempting the Herculean task of exhaustive presentation, both the pro and con arguments should be presented for they fully bear on the issues of growth of centrally planned socialist economies.

There seem to be two different, although related, questions: Can public policy over a longer period perceptibly affect the growth rate of national production and, if it can, will the results be beneficial in the light of the adopted scale of valuations and, if so, what are the available choices of strategies? Should it do so if such action would result in overruling the traditional criteria of normative economics—consumers sovereignty? Logically, the inquiry concentrates on the frame of reference itself and on the mechanism, or its alternative variations, that is proclaimed to lead to the optimum allocation of resources, and on the meaning of the "optimum."

Without attempting to summarize the lengthy literature on the subject, let us concentrate at this juncture on the second question. Those against abandoning the market solution for intertemporal choice maintain that if the competitive conditions are satisfied and if the market mechanism is unimpeded, a maximum national product would be produced. Abstracting from the normative questions of income distribution and disregarding special cases of increasing returns to scale, the maximum national product so achieved would also be the optimum national product. The idea of forced economic growth and forced savings is repugnant to these economists. Only the amount that is saved voluntarily by the population can be legitimately translated into capital formation. There is an utter dislike of policies which are likely to increase governmental control. Utmost significance is attached to the respect for individual acts of choice and valuation, including individual time preference between the present and the future. The process by which enonomic development is being promoted affects the assessment and the very meaning of the achievement.[53] A social welfare function based on the principle of consumers' sovereignty must accept individual tastes, including their

(53) P. T. Bauer, *Economic Analysis and Policy in Underdeveloped Countries* (London: 1957), pp. 113–14.

intertemporal preferences on the allocation of income.[54] A leading champion of (qualified) government neutrality, Professor Milton Friedman, advocated:

> The appropriate goal for growth is the fullest opportunity for each individual to devote whatever fraction of his income he wishes to providing for the future . . .
>
> The strings of countless individuals for a better world will produce some rate of change in the statistical aggregate we call national income or output, but there is no way in a free society to say in advance that one or another numerical rate of change is needed or desirable, or that a higher rate of change is better than a lower. And there is no way to compare validly the rate of change in output that occurs in response to the demands and needs of free men with the rate of change in output that occurs in response to the orders of dictators. Whatever rate of change in the statistical aggregate results from the effort of free men to promote their own aspirations is the right rate.[55]

With a capital market operating under conditions of perfect competition, perfect foresight, with market imperfections removed and leaving intertemporal decisions to market forces, the market mechanism properly reflects the individual time preferences, and the relative weight the individual attaches to short- and long-run benefits. Then the market-determined rate of interest will equal the marginal rates of intertemporal substitution in consumption and production—one of the necessary conditions for an optimal development path.[56]

Weighty arguments have been presented, with varied emphasis, for abandoning or limiting the market solution for intertemporal choices. Some economists stress the imperative need for stronger value judgment over and above that suggested by consumers' sovereignty. Others regard government decisions and measures as having a legitimacy at least equal to that of private decisions on the market in a modern capitalist economy.[57] A completely individualistic solution in respecting individual time preferences is hardly conceivable as every government operates monetary and fiscal policies, inevitably influencing the rate of interest, hence the intertemporal choice. Admittedly, on that premise, the most one can ask is that the political component of the decision variable be democratically responsive to the individual savers, although most of the interested parties, the generations yet unborn, are necessarily disenfranchised from that process. A leading neoclassical economist, Professor R. M. Solow, is willing to admit "that pure time preference is either an irrational weakness of character or a national

(54) O. Eckstein, "Investment Criteria for Economic Development and the Theory of Intertemporal Welfare Economics," *Quarterly Journal of Economics*, February 1957, p. 75.

(55) M. Friedman, in *Employment, Growth, and Price Levels.* Hearings before the Joint Economic Committee of the U.S. Congress, Part 9a (Washington: GPO, 1959), p. 3019. Cf. Friedman, *Capitalism and Freedom,* and Hayek, *Road to Serfdom* and *Studies in Philosophy, Politics, and Economics* (Chicago: 1967).

(56) Cf. O. Eckstein, "Capital Theory and Some Theoretical Problems in Development Planning," *AER*, 1961: and I. Fisher, *The Theory of Interest* (New York: 1907).

(57) H. G. Johnson, *AER*, May 1964, pp. 21 ff.; J. Tobin, *AER*, May 1964.

reaction to individual mortality and that, in either case, there may be good reason for social decision to ignore it." Political decisions must necessarily be made in this sphere and the basic problem is to determine some rules on which they should be based. The possibility cannot be ruled out that those responsible for key economic policy decisions also suffer from an "irrational time preference scale."[58]

The weighty political component of the growth rate-choice decision seems to be largely recognized among Western economists. Granted that the decision is made on the political level, emphasis appears to be on economic benetfis and costs in terms of alternative rates of growth.[59]

An often cited precedent for the violation of consumers' sovereignty is found in Professor Pigou's argument about consumers' fallibility or short-sightedness owing to a defective telescopic faculty which tends to undervalue future compared to present satisfaction of wants. It follows from this argument that without overruling consumers' sovereignty in intertemporal choices, the aggregate saving, investment, and future flow of output would be less than socially desirable, and that there is a good case for overruling consumers' intertemporal preferences.[60]

The "intertemporal consumers' sovereignty" solution has also been rejected on the grounds of the "isolation paradox"—that, while the individual is not ready to make sacrifices for future generations, the "interdependent" (i.e., the one that does not ignore the interdependencies between individual utility and moulding of preferences by social forces) is perfectly prepared to save more, provided that he can be assured that other individuals are ready to join in. In this interpretation, accumulation is considered as a "collective good," with the individual willing to save more if his contemporaries are ready to act likewise. While this apparent paradox could be expressed in the sense of "external economies," the usual connotation of the term implies maximization of personal utility, with the possibilities of personal gain from the action of other individuals. The emphasis here is on the individual readiness to sacrifice his own satisfaction for future generations, provided that other individuals act likewise.[61]

In some interpretations, the legitimacy (or, rather, the imperativeness) of government growth promoting policy (overruling consumers" sovereignty), even in nonsocialist economies, rests on the imperfections of capital markets, as the

(58) Solow, "Some Problems of Theory and Practice of Economic Planning," *Economic Development and Cultural Change*, January 1962, p. 217.

(59) Eckstein, *AER*, 1961, p. 94 ff.; Tobin, *AER*.

(60) Cf. Bergson, *Essays in Normative Economics*, p. 196. Bergson considers that Pigou did not especially succeed in his attempt to establish empirically the prevalence of a defective telescopic faculty. However, Bergson consents that there are circumstances where one might wish nevertheless to overrule overt preferences where choices are made between present and future. Bergson, "The Doctrine of Consumers' Sovereignty," *AER*, May 1962, p. 285.

(61) A. K. Sen, "On Optimizing the Rate of Saving," *EJ*, 1961. These arguments have been stressed by Dobb and others as support for the contention that distribution of resources over time must necessarily be a governmental or social decision in the socialist economy and that there is no need for the rate of investment to be governed by the intertemporal preferences of individual savers. Dobb, *Essay on Economic Growth*, Chapters 1 and 2.

private saving decisions do not reflect the real pay-offs which nature and technology offer the economy, and on the unlikely attractiveness of the terms of trade between present and future consumption. The contention is that, should the market rule on the allocation between the present and the future, the outcome will be a sub-optimal social choice.[62] The rate of interest determined by market forces (even by a perfectly operating market) has nothing, or little, to do with the social time preference discount rate and is inapplicable to public policy.[63]

Assuming the volume and composition of investment are to be determined by a multitude of independent private decisions on the market, they may lead to sub-optimal allocation of resources between competing ends because:[64] 1) The private investor maximizes the private, not the social, net marginal product. The famous Pigouvian analysis of the divergence between the marginal private and the marginal social product is the case in point here. Externalities are not adequately exploited as some investments produce returns which transcend the limits of the investor carrying the burden of the expenditure (e.g., research and development, investment in human capital, "learning by doing")[65]. Complementarities of industries are so extensive that investment decisions should be simultaneously induced rather than relying on their autonomous coincidence.[66]

2) Owing to the individsibilities (lumpiness) of capital, large, rather than marginal, variations are of utmost relevance. Howevr, the market mechanism performs satisfactorily if marginal variations are postulated.[67] The phenomenon of complementarity, together with the indivisibility problem, have become the focal points in viewing the economy as a conglomerate of interdependent parts, where capital formation must take place on a broad front in order to safeguard the various parts from moving forward in imbalance and from inconsistencies in the growth pattern.[68]

3) By its very nature, investment decision relates to anticipated future returns over the expected lifetime of a capital asset. Inevitably, the question is bound

(62) Tobin, *AER*, 1963, pp. 10–13.

(63) Cf. M. F. Feldstein, "The Social Time Preference Discount Rate in Cost Benefit Analysis," *EJ*, June 1964, pp. 360–79; B. Horvat, *Towards a Theory of a Planned Economy*, Chapters 2 and 5.

(64) Rosenstein Rodan, "Programming in Theory and Italian Practice," in *Investment Criteria and Economic Growth* (Cambridge: 1955), pp. 19–22.

(65) Cf. Tobin, *AER*, 1963, p. 14; Baumol, *Economic Theory and Operations Analysis*, pp. 368–71.

(66) The phenomenon of complementarity of different industries provides the most convincing set of arguments in favor of large scale of investments. Cf. Rosenstein Rodan," "Problems of Industrialization of Eastern and South Eastern Europe," *EJ*, June-September, 1943, pp. 204 ff., and cf. E. Preobrazhensky, *New Economics*, and A. Erlich, *The Soviet Industrialization Debate*. Cambridge, Mass: 1960.

(67) Rosenstein Rodan, "Programming . . . ," p. 20.

(68) Cf. my *Soviet Quest . . .* , p. 17 ff. See also the contribution by A. Hirschman, R. Nurkse, R. Streeten, and H. Singer on "Growth-Balanced or Unbalanced" in Meier, *Leading Issues in Development Economics*, New York, 1964, pp. 252–65.

up with issues of risk, uncertainty, limited foresight, and hazards to the investor.[69] Since the lifetime of a capital asset is likely to be of a long duration, the investor's foresight is likely to be more imperfect than that of the producer, and risks and hazards higher. Erroneous investment decisions resulting in a loss of capital afflict not only the individual investors but the economy as a whole.[70]

4) While the main motive force of private investors is expected (private) profit, the expectations are significantly influenced by past experience. The past experience is partly irrelevant in case of pronounced shifts in the economic structure; present prices do not reflect future scarcities.

5) Market imperfections, e.g., capital markets, are governed not only by prices, but also by institutional rationing quotas,[71] various forms of monopoly and restriction,[72] wide gaps between lending and borrowing interest rates.[73]

Some argue that there are reasons to believe that the institutional structure of the modern capitalist economy tends to hamper economic growth and that some of the restraints originate in the measures taken by the government itself. Admittedly, contrary to the classical liberalist philosophy, the government and political process are not inherently malevolent and untrustworthy. Governments do seek the public interest, but to a significant degree the state's action is a vehicle for the pursuit of private profit maximization by other measures than competition on the market. The record of government's intervention does not indicate that it has always been designed to serve public interest.

The presence and character of market imperfections and failures in the competitive system, reinforced by the position and policies of government, point to the need for a growth-oriented policy. It does not immediately follow from this contention that the only correct way of promoting growth is exclusively by means of a macroeconomic policy of increasing saving and capital formation by fiscal and monetary measures. Some interpretations tend to suggest that the preliminary requirement is a series of essentially microeconomic redesigning of the fiscal structure, supported by policies that would make a private competitive system produce results more in conformity with the ideal represented by the Pareto optimality of welfare economics. In redesigning the fiscal system, this approach

(69) "Capital problems are inevitably bound up with questions of uncertainty, limited foresight, and reactions to the unexpected. One must admit that economics has barely scratched the surface here. Yet without a satisfactory account of behavior under uncertainty we cannot have a complete theory of capital." R. M. Solow, *Capital Theory and the Rate of Return* (Chicago: 1965), p. 13. Cf. M. Kalecke, "The Marxian equations of reproduction and modern economics,' *Social Science Information* 7 (6! [1968], p. 78. Cf. G. L. S. Shackle, *Expectations, Investment and Income* (London: 1968).

(70) Cf. Dobb, *On Economic Theory and Socialism.* Society could possibly pool such risks and realize with a much smaller margin of uncertainty the actuarial return on investment. Tobin, *AER*, May 1964.

(71) Rosenstein Rodan, "Programming . . . ," p. 20.

(72) Tobin, p. 13.

(73) O. Eckstein, *AER*, 1961, p. 93.

insists that the existing personal, corporate, and commodity taxation introduces a gap between the private and social pay-off to accumulation of material and human capital that discriminates against growth in a variety of ways. The policy promoting minimum wage legislation can be growth-inhibiting. One of the key questions posed is to what extent the government is under- or over-compensating for externalities by various tax concessions and by sharing part of the cost of investment—an issue particularly critical in case of investment in human capital.[74]

Joan Robinson forcefully argued against the claim of Western orthodox economic theory, based on the assumption that a price system that would prevail in the ideal conditions of atomistic competition models would ensure effective use of resources for the benefit of society as a whole. This theory is most at its ease in a stationary state, for its treatment of accumulation has never been satisfactory. A serious weakness is that it "is impossible to regard the rate of saving as representing the 'will of society' in a sense which gives it authority. The amount of saving must be supposed to be strongly influenced by the distribution of income and wealth between families, which in this model is completely arbitrary. Moreover savings decisions are made by mortal men whereas society must conceive itself to be perpetual."[75]

Other reasons for rejecting the perfectly competitive model as leading to optimal allocation of resources include: In a market for certain products, demand and supply are very inelastic in the short run. Consequently, slight shifts in market relationships produce violent price fluctuations, often exaggerated, rather than tampered with, by speculation. The terms of trade of primary producing nations deteriorate in the long run, inhibiting their development. An unrestrained system of international trade is likely to produce balance of payments vagaries. Imperfect competition will prevail in industry.[76]

The position taken by the advocates of "Perfectibility Fallacy" has encouraged a "myopic concentration on problems of marginal adjustment as though it were the only type of efficiency problem." Once the context of discussion is shifted to "displacement, change, and movement," the uncertainty factor immediately enters the picture, as an adjustment processes-affecting factor, and may indeed obstruct it insofar as attainment of any particular equilibrium is concerned. The dynamic growth path may be very unstable, the adjustment process may involve fluctuations which can be self-perpetuating or cumulative; and even should fluctuations be of the self-dampening kind, the process of convergence may be quite protracted.[77] In all such cases, there is no optimal quality attached to the solutions achieved by a decentralized market, however competitive it may prove to be;

(74) H. G. Johnson, *AER*, May, 1964, pp. 22–24.

(75) J. Robinson, *Collected Economic Papers*, III, p. 76. Cf. J. E. Meade, *Efficiency, Equality, and the Ownership of Property* (London: 1965).

76) J. Robinson, *Collected Economic Papers*, III, p. 70.

(77) On the difficult question of convergence, see the survey article by T. Negishi, "The Stability of a Competitive Economy," *Econometrica*, 1962, pp. 635–39.

"the latter is as likely to get bogged down in a state of chronic stagnation as to be straining after growth rates, which are thwarted by a chronic condition of inflationary pressure."(78)

For a system operating with a competitive, decentralized market mechanism, there is not even a major probability, Dobb argues, that a Von Neuman maximum and balanced growth rate will be achieved. The prevalence of high growth rates is warranted only on the postulation of some kind of Schumpeterian entrepreneurs or the prevalence in the economy of an inordinately high degree of "technical dynamism" supported by unusually compliant labor (absence of what Joan Robinson has called "the inflationary barrier"). Dobb concludes that sustained growth can be the resultant of "a free market system *plus* some *deus ex machina.*" Under all such circumstances, "planning, in the sense of coordinated control and intervention from the center, has at least potential superiority."(79)

The validity of Say's Law of the Market—supply creates its own demand—which maintains that effective demand always tends to be sufficient to support capacity (appropriately defined full employment) output, regardless of the size of money supply,(80) is a subject of heated controversies. Since the advent of the Keynesian Revolution (or the Keynes-Kalecki breakthrough), the inevitability of macroeconomic equilibrium at full employment level cannot be assumed (full employment is only one limiting case of the general theory of employment). The maintenance of nearly full employment is considered an imperative governmental policy of modern capitalism (just as curbing inflationary forces). Each country nowadays, with a bulky governmental sector and an array of fiscal and monetary measures, affects savings and investment and, to a smaller or larger extent, chooses the rate of growth. The full employment policies are not the same thing and may conflict with policies to promote growth.

With some simplification, it may be said that the principal advantage of a well-operating market (pricing) system is its simplicity and its effort-releasing effect. Considered in this form, the market economy does not give the statesman or the economist many headaches: "the ship moves *automatically* whither the wind blows." Assuming convergencies, if there is excess demand, prices rise; and if there is excess supply, market prices will decline. Marshallian equilibrium, or Marshallian cross, is reached. Both excess demand and excess supply equal zero, *ceteris paribus*, the quantity willingly supplied equals the quantity willingly demanded—one of the most powerful analytical constructs in economics.) But the moment the statesman starts (or is compelled) to formulate preferences regard-

(78) Dobb, *Welfare Economics and Economics of Socialism*, pp. 121–23.

(79) *Ibid.*, p. 123.

(80) Cf. W. Fellner, *Modern Economic Analysis* (New York: 1960), Chapter 8; J. A. Schumpeter, *History of Economic Analysis*, New York: 1954, pp. 615–25. For the ambiguity in the meaning of Say's Law, see B. Patinkin, *Money, Interest, and Prices*, New York: 1964, p. 193. Patinkin argued that his own sympathies are with those who deny that this Say identity is a basic component of the classical and neoclassical position.

ing the objectives to be reached, or the course which the ship ought to follow, then the many headaches begin. Once attention shifts to the paramount questions of rapid economic growth, near full employment, antiinflationary policies, market flaws and failures, cleaning up the environment, more equitable distribution of income, and justice and welfare, certain novel and crucial issues emerge: How can human and material resources be best (or better) utilized? How can the undesirable effects of price variations be corrected? How can the harmful monopolistic practices be eliminated? Etc. If the general questions of simultaneous attainment of rapid economic growth, more equitable distribution, and avoidance of some of the costs of growth are considered in all their ramifications, "we are forced to realize that the *simplicity* of the free market will have to be abandoned forever." The major problem that arises, then, is: What should be done to salvage as much as possible of the simplicity inherent in the market mechanism, while eliminating the adverse effects and flaws?

A free market economy has the effect of putting each individual in the lower and middle income brackets against the two alternatives: To spur his efforts and all his energies to achieve higher economic rewards, or to run the risk of going downhill, with the possible destination at the bottom of society. In moving toward correction of social injustice in the distribution of income through national economic planning, "we must be very cautious that we *do not lose more than strictly necessary* of the effort releasing effect of the free market system."(81)

It still remains to be proven whether an unimpeded competitive market would produce over the "long run" a greater extension of the range of effective alternative choices to the citizen than an appropriate government tempering by generating a higher rate of saving (rate and pattern of investment) through interference with the functioning of the market mechanism. There is considerable support for the contention that with an appropriate public policy (although opinions differ as to what the appropriate policy is) the range of choices would be extended.

The argument advanced by P.J.D. Wiles comes to mind at this point. He argued that in weighting the pros and cons of forced saving and investment, one shouod remember that both are clearly indispensable if the actual growth rate is to "exceed the 'natural, warranted, or laissez faire' rate of growth." The expanding economy may write off the "irredeemable errors of its program of forced investment as a cause of growth." The violation of the criteria of welfare economics is not considered to be an absolute, "unconditional crime," but it depends on the magnitude and duration of such violation. Rapid development induces not only the adverse effects resulting from the violation of consumers' sovereignty, but also those from the violation of the welfare rules of allocation of

(81) R. Frisch, "An Implementation System . . . " It is noteworthy that one of the most acute economic problems encountered, for example, in Czechoslovakia and Poland, is nation-wide reluctance to work and absenteeism.

resources in general.[82] Wiles repeats his provocative "hairbrushes and nailbrushes" argument advanced in 1953: "in the Soviet economy there are, as it were, always too few hairbrushes and too many nailbrushes in view of the resources available, while in a Capitalist economy this proportion is always more nearly right. But the production of both these articles is growing at about 10 per cent per annum in the USSR and about 2 per cent per annum in Capitalist countries. In the end the Soviet citizen will be supplied better even with hirbrushes."[83]

IV

The market solution for intertemporal choice is rejected also on the grounds of the ethical questions that it raised about inter-generation distribution of welfare to which we have alluded before. Granted that such a decision is a fundamentally social or political one, some economists attempt to determine the general principles on which such a decision should be based.

The most widely adopted method of taskling the intertemporal allocation is to use a utility maximization function that purports to be valid over a time horizon. In his pioneering attempt to solve the intertemporal choice question, the brilliant philosopher Frank Ramsey employed this form of the traditional construct of utility maximization.[84] It is even implicit in Irving Fisher's classic exposition of the theory of interest as determined by the impatience to spend and the opportunities to invest (and perhaps we should add "and as influenced by the government's monetary and fiscal policy measures") of almost a generation earlier.[65] The utilitarian approach of Ramsey, some thirty years after the publication of his study, has been revived and generalized by a number of writers.[86]

Ramsey assumed that the maximum attainable state of enjoyment (utility maximization)—referred to as "bliss"—was identifiable, which permitted him to arrive at some very simple rules for optimal intertemporal equity.[87] Some scepticism

(82) P. J. D. Wiles, *Political Economy of Communism*, Camblidge, Mass, 1964, pp. 213–17.

(83) *Ibid.*, p. 217.

(84) F. Ramsey, "A Mathematical Theory of Saving," *EJ*, December 1928, pp. 543–59, reprinted in G.E. Stliglitz and H. Uzawa, *Readings in the Modern Theory of Economic Growth* (Cambridge, Massachusetts: MIT Press, 1969). For a nonmathematical exposition, see J. E. Meade, *An Introduction to Economic Analysis and Policy* (London: 1937), Chapter 5, and D. H. Robertson, *Lectures on Economic Principles* (London: 1958), II, 271–80.

(85) Solow, "Some Problems of the Theory and Practice of Economic Planning," *Economic Development and Cultural Change*, p. 217. Cf. *Ten Economic Studies in the Tradition of Irving Fisher* (New York: 1967), and Fisher, *Theory of Interest*.

(86) Cf. Koopmans, "Objectives, Constraints, and Outcomes in Optimal Growth Models," *Econometrica*, January 1967, pp. 6 and 7 and references therein; O. Eckstein, "Capital Theory," *AER*, May 1961, p. 93.

(87) Ramsey's answer to the question, "How much of its income should a society save?," is a general rule (further elucidated in the essay) which runs as follows: "The rate of saving multiplied by the marginal utility of money should always be equal to the amount by which the total net rate of enjoyment of utility falls short of the maximum possible rate of enjoyment"

was expressed on the usefulness of an identifiable "bliss," and the use of a more general kind of utility maximization was suggested—deriving the solution of the optimum rate of saving from assumptions on the shape of the utility function (logarithmic and hyperbolic) and the value of time discount. The rate of saving is a policy variable, and such a rate is selected that would maximize the sum of discounted social utilities over time. The decision on the rate of saving is here taken by a grand act of a single choice which once so determined remains invariable over the length of the entire process of economic development.[88] But one of the entire process of economic development.[89] But one of the most significant aspects of the question of optimizing the rate of saving is the manner in which it varies, or ought to vary, with the process of economic change.[89]

In a thoughtful paper on optimizing the rate of saving, Professor A. K. Sen considers the utility maximization approach to solving the intertemporal allocation problem totally unsatisfactory. The use of the utility function is an invalid method of introducing political elements into choice.

The main strength of the utility approach lies in its accepting the notion of diminishing marginal utility of increasing consumption; and its main weakness lies in finding a satisfactory way of measuring it.[90] Generally, people care less for a unit of consumption when they are affluent than when they are poor. This notion provides a good ground against having inordinately high rates of saving, leading to considerable inequality between present and future utility.

Utility may be defined either as a quantity that, according to our normative value judgment, we wish to maximize (the maximand in some welfare functions), or, alternatively, the term utility is used as synonymous with the "satisfaction of the people." In such a sense, an intertemporal comparison of utility is a non-

(p. 543). With some heroic assumptions, such as "that enjoyment and sacrifices at different times can be calculated independently and added, "Ramsey has produced a rather 'finespun' theory of the optimal rate of capital growth. In Samuelson's restatement, Ramsey's theory" assumes that society tries to maximize over all time the sum of 'utilities the latter being the same concave function of current consumption of each time period. Society should then do positive saving until either the 'productivity of capital' is zero, or 'bliss' has been attained with all goods free. The rate at which this happy state should be reached is determined by balancing the loss of present satisfaction from one more increment of present saving against the gain in future satisfaction involved in advancing the date that we reach bliss. This means that society should ultimately save a percentage of the national income almost equal to the percentage income by which we fall short of bliss; e.g., if society now enjoys only three-fourths of the maximum producible income, it should save almost one-fourth of its current income. This is a rather fanciful prescription based on fanciful assumptions." *The Collected Scientific Papers of Paul A. Samuelson*, II, 1321–22.

(88) Tinbergen, "Optimum Rate of Saving," *EJ*, December 1956, pp. 6 and 9 ff. Cf. Tinbergen and Bos, *Mathematical Models of Economic Growth*, pp. 24–31, and A. K. Sen, *EJ*, September 1961, pp. 11 ff. For a sharp criticism of the "once and for all" decision, see Leontief, *Essays in Economics* (New York: 1966), pp. 182–83.

(89) Cf. Sen, *EJ*, September 1961, pp. 480 ff.

(90) Indeed, O. Eckstein argued that the utility function has no empirical foundation (apart from Frisch's data). The utility function has to be postulated and so, in effect, the result is assumed. "Capital Theory," *AER*, May 1961, p. 93.

normative comparison, done on some sort of behavioristic grounds. In trying to use the latter definition of utility maximization as the policy maximand, two problems are encountered: While it is difficult to measure the rate at which marginal utility of consumption declines in the case of any given individual consumer,[91] to discover and measure it for the whole society over time is practically an impossible task. In the second place, if utility is defined in this non-normative sense, there is no compelling reason for treating it axiomatically as a maximand. The trouble is that the rate cannot be satisfactorily measured, as other factors not normally included in the term "satisfaction"—such as noneconomic reasons for growth[92] (national pride, prestige, strength, rapid industrialization, equitable distribution of satisfaction between different generations)—are highly relevant to the problem. The maximization of utility ceases to be treated as the sole target to be achieved.

While the term "utility" may also be used to mean the magnitude that is defined by our welfare function, given by our intertemporal value judgment which becomes, automatically, the maximand, the trouble with this approach is that it cannot be proved that the marginal utility of consumption will decline for certain with an increasing consumption. It cannot even be definitely maintained that utility is a single-value function of consumption and depends on nothing else. Rapid industrialization can, and in many cases does, satisfy the "self-respect" of the nation.

Notwithstanding the questions that utility maximization poses, admittedly it is reasonable to assume that the chief determinat of social welfare, in conformity with the value judgments normally held, will be the level of consumption or consumption per capita,[93] and that the common sense assertion of diminishing marginal utility will have some validity in this sense too. The question arises: How should the selection be made among the endless alternative variants of functions with diminishing marginal utility of the plausible utility function to be employed? While the obvious answer seems to be to resort to the problem of choice of utility function by public political debate, such a method of political ratification may be dismissed, for limited results can be expected from asking, "Should we maximize the logarithm of consumption?" The problem is that the utility approach introduces intertemporal value judgments in such a manner that the only persons who can appreciate the meaning of this valuation are the "professionals" in this field. Ruling out a popular ratification of a utility function as unrealistic, it is difficult to conceive how the planners, guided by the community s time preferences, should select between alternative utility functions of the appropriate type.

The temptation is to employ a utility function that can be handled most comfortable, and "we find ourselves in a slightly curious position where the implicit

(91) Cf. H. O. A. Wald and L. Jurin, *Demand Analysis* (New York, 1953), and R. Ferber, in *Surveys of Economic Theory*, III, 114–54 and extensive references therein.

(92) Cf. Tobin, *AER*, May 1964, pp. 5–6.

(93) Cf. Tobin, *AER*, 1964, pp. 6–8.

policy objective is making the planner's life comfortable, which is a worthy aim, but a limited one."[94] While the concept of a pure psychological discount of the future in favor of present consumption is of respectable antiquity, it cannot be justified, in Sen's view, even on the grounds of consumers' sovereignty.[95]

It may be recalled in this context that Sir Roy Harrod considered the "law of diminishing utility" more fundamental than "pure time preference." The former has wider application, for example, to "a planned regime in which the volume of saving is fixed by a benevolent government. After all, pure time preference is a weakness: a man may choose to sacrifice 2 units of utility—of utility not money—in 20 years from now for the sake of 1 unit now; but in 20 years' time he will presumably regret having done so. Unfortunately—he will not then be able to reverse the process." Assuming that a government can plan what is best for the community, "it will pay no attention to pure time preference, a polite expression for rapacity and the conquest of reason by passion."[96]

V

Instead of maximizing utility, it was suggested that maximization of production over a lifetime of a generation be taken as a criterion; the maximum growth is optimal and the assumed objective is the maximization of growth rate.

> Maximization of welfare of *every* generation is maximization of the total volume of consumption in the lifetime of *any* generation, consistent with the similar maximization of *any other* generation. Any other policy would lead to diminution of welfare for the generation which undertakes to make the respective saving decision.[97]

Two principal economic propositions were advanced:

1) Any economy is capable of being expanded at a certain maximum rate (also at a lower, but not a higher, rate than the potential). For every national economy, there is a maximum investment rate which can be effectively absorbed by the economic system. One of the great advantages of Horvat's approach is the emphasis on productive capacity constraint.[98]

The optimal rate of investment is defined as that rate at which the "social marginal efficiency of investment with respect to the period of twenty to twenty-

(94) Sen, p. 481.

(95) *Ibid.*, pp. 482–83.

(96) R. F. Harrod, *Towards a Dynamic Economics* (New York: 1966), p. 40. Cf. Dobb, *Welfare Economics*. Cf. Also Sen, pp. 482–83, and O. Eckstein, "Capital Theory," pp. 93–94.

(97) B. Horvat, *Towards a Theory of Planned Economy* (Beograd: 1964), pp. 199–200.

(98) The reader's attention is drawn again to Feldman's painstaking model of growth admirably analyzed by E. Domar in "A Soviet Model of Growth," *Essays in the Theory of Economic Growth* (New York: 1957), pp. 223–261.

five years becomes zero."[99] Additional investments beyond the maximum rate of investment that can be absorbed by the economy produce no increments of

(99) Horvat, "The Optimum Rate of Investment Reconsidered, ' *EJ*, September 1965, p. 565. The twenty to twenty-five years' period as the relevant time horizon for output maximization (consequently, the social marginal efficiency of investment must be driven to the zero mark with respect to this time horizon) was determined by Horvat in the following manner: In modern economies the average life expectancy of individuals at any particular moment of time varies between 30 to 50 years, representing, at the same time, the generation's life span, with respect to which consumption has to be maximized. As the investment absorptive capacity is limited, the marginal efficiency of investment falls as capital formation per unit of time advances. Due to uncertainty, the prospective plan's horizon is rarely extended over 20 years and practically never over 25 years. The adopted practice as to the planning time horizon is taken as the relevant time for output maximization period. The life span of every generation considerably exceeds the plan horizon. Consequently, every generation maximizes not only production but very likely sonsumption too. (pp. 574–75)

One of the main problems for a satisfactory solution to the question of optimum rate of saving is to form some idea of the widths of the range from which such choice is to be made, for it cannot be assumed that any mathematically conceivable rate (from zero to 100 per cent) can be selected. The upper level of the relevant range from which the optimum can be selected is circumscribed by the difficulties of reducing the level of consumption in any particular community suddenly below a certain limit determined by historical forces. Revolutionary governments have some advantages in the form of a certain relaxation of these barriers. In an economy where the share of luxury consumption is small, the lower limit of consumption roughly equals the real wage fund of the community plus the necessary doles for those who depend, temporarily or permanently, on society for their support. There is a sociologically determined lower or narrow range below which consumption cannot be reduced, and this correspondingly constitutes an upper limit (range) on the saving rate. Raising this upper limit would likely materially affect the efficiency of production as the saving rate is inordinately increased—a fact that was also emphasized by Horvat, although he tends to identify the upper limit with the optimum rate. (Cf. Preobrazhensky, *New Economics*.) It is inappropriate to identify the upper limit with the optimum—it is a limit that ends to reduce the width of the range from which the choice of the rate of saving is to be made.

If, beyond a certain point, expansion of investment may actually lead to a negative marginal return, there is generally no point in pushing the rate of investment beyond this point, for a reduction of investment would increase total output. If this limit is encountered before the limit set by the socially accepted level of minimum consumption, this will, of course, constitute the effective limit.

A number of factors is supposed to circumscribe the lower limit of saving. Generally, protracted actual decline in the standards of living will not be tolerated. The required capital to maintain the existing capacities of production intact and to ensure a sufficient flow of production (directly or indirectly) so as not to lower per capita consumption provides a lower limit for the rate of capital accumulation. Generally, a higher growth rate of the population will tend to raise the lower limit of saving.

The determination of the optimum rate of saving should be considered as a long-term program, for among the factors limiting the variation of the saving rate are the existing technical specificities of production processes. The possibility of real savings is restricted by the immediate possibility of real investment, and it is not always possible to switch promptly from the production of consumer goods to the production of capital goods, since the factors of production are not sufficiently versatile. If the techniques of production limit substitution in the short run, then the capacity to accumulate capital is constrained by the size of the existing stock of capital and by the ability to secure capital goods by exporting consumer goods. Cf. Sen, pp. 491–92.

output or even contribute to a reduction of output. Optimum investment is defined as the maximum investment that can be productively absorbed by a given economy.[100] Over-investment reduces consumption on two counts, as the output is smaller than it other-wise would have been due to "negative returns." In this reduced output, the investment share is higher than required. The limited absorptive capacity is not only circumscribed by the economy's production possibilities, but by the adverse effects of a decline in consumption levels on the state of health, strength, and willingness to produce by the worker. It destroys the incentive to produce and may prove to be self-defeating by retarding the rate of expansion. Moreover, strains and bottlenecks develop if the capacity to absorb investment is exceeded in any period of time.[101]

2) The increase in output from any increase in investment, below the maximum level, is of such relatively high order of magnitude that it considerably outweighs the opportunity cost in terms of sacrificing immediate consumption (the benefit from the powerful compound rate of output expansion is significantly greater than any near-zero sacrifice of immediate consumption).[102]

Horvat elucidates his argument by arithmetical illustration, considering three alternative growth patterns.[103] He assumes a regularly growing economy, with a share of gross investment in GNP[104] equal to 15 per cent, with a gross capital coefficient equal to 3, and with, consequently, a growth rate of 5 per cent per annum. Pattern 1 shows output and consumption for the next years when the investment rate is maintained invariably at 15 per cent. Alternatively, he assumes that each year 1 percentage point (Pattern II) or 2 percentage points (Pattern III) are added respectively to the investment rate, causing the following years an additional increase in output and, consequently, increasing continuously the rate of growth of output on the limiting assumption that the incremental capital coefficient remains invariable (i.e., unaffected) by these changes. No larger increases in the investment rate than 1 or 2 percentage points per year are postulated. The variations occur with the rise of the investment rate from 15 per cent to the absorptive capacity level located in a range of 30 to 35 per cent.

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(100) B. Horvat, *Towards a Theory of Planned Economy*, pp. 178 and 184.

(101) Polish economists have maintained, with good reason, that the Kalecki growth model of the socialist economy—is far more superior, elaborate, and concrete as a guideline toward determining the optimal rate of accumulation in a socialist economy than the one presented by Horvat. Cf., *inter alia*, P. Sulmicki, *Economic Proportions* (in Polish), pp. 110–11.

(102) Horvat, *Towards* . . . , pp. Cf. O. Eckstein, *AER*, May 1961, pp. 94–95.

(103) Cf. *Ibid.*, Table of p. 190.

(104) Horvat speaks of gross investments in "gross social product." He is deliberately vague on the notion of social product in this context: "Gross social product and, consequently, the additions to gross social product, will be conceived and computed as net of services not intimately connected with material production." This definition "is adopted partly with regard to available empirical evidence and partly because it simplifies analysis," *Loc. cit.*, p. 177. Cf. *Ibid.*, Chapter 11.

Given the parametric scaffolding,[105] Horvat shows that a gradual (during a decade or so) rise of the investment rate from the current level of 15 per cent to the absorptive capacity level of about 35 per cent can yield thereafter a steadily increasing output of about 10 per cent or more annually.[106] He argues that "increase in investment has not reduced the *absolute* amount of consumption. But in the first year the change in investment policy *relatively* reduces consumption. Since then the rate of growth of consumption is constantly increasing, it will take 9 and 10 years respectively to surpass the level of consumption of the original pattern of growth."[107] Patterns II and III show that under assumed conditions there is no long-run burden for maximizing growth of output; i.e., after a decade or so, the population benefits from higher consumption *ad infinitum* than if it had moved along Pattern I without speedup. Admittedly, in a shorter period, there are several years during which growth of consumption lags behind that of investment in the alternative Patterns II and III when compared to Pattern I. But in all fairness, the lags are not of considerable duration. The assumption that the sacrifice of present consumption will lead to a larger volume of additional consumption within a given period rests, *inter alia*, on the assumed size and constancy of the capital coefficient, but can hardly be treated as a universal rule for maximizing the rate of growth.[108] It is doubtful that at relatively low levels of consumption a rechanneling of a few per cent of output from consumption to capital formation would create virtually insurmountable difficulties for the planners and adverse effects on the system's productivity.[109]

The empirical underpinning for the questionable argument that the maximum rate of expansion is likely to be associated with the approximate 35 per cent investment rate mark is based on the Soviet and Yugoslav experience (and is also corroborated by the Polish and Czechoslovak experiences), when for a certain period the system has tended to operate near this mark and "as the empirical evidence suggests, occasionally even overshot the mark of productive investment."[110]

The Soviet and Yugoslav experience seems to support the argument that the absorptive capacity of the economy was below the 35 per cent rate of investment

(105) Cf. B. Ward, "Marxism—Horvatism," *AER*, June 1967, pp. 508 ff; Sen, *EJ*, pp. 484–85; and Horvat, "The Optimum Rate of Investment Reconsidered,' *EJ*, September 1965, pp. 573–74.

(106) *Ibid.*, p. 565.

(107) Horvat, *Towards a Theory . . .*, p. 191. There are good reasons to suppose that the calculations underlying Horvat's table would be considerably affected by shifts of the burden of miscalculation and inefficiency by the planners on the consumers, resulting in a divergent consumption path than that envisaged by Horvat.

(108) Sen, p. 485.

(109) Cf. O. Eckstein, "Capital Theory," p. 95.

(110) Horvat, *Towards a Theory . . .*, p. 192. Cf. G. T. Bombelles, *Planning and Economic Growth of Yugoslavia* (Stanford: 1969); Horvat, *Note on the Rate of Growth of the Yugoslav Economy* (Belgrade: 1963). For a summary of avilable evidence and illuminating analysis of the Soviet experinece, see Erlich in Milikan (ed.), National Economic Planning (New York: 1967), pp. 234 ff, and my *New Economic Patterns in Czechoslovakia*, Chapter 1.

in national income. However, it is difficult to provide a meaningful quantitative estimate instead. (As a result of the failures of the Polish Six-Year Plan, there was an empirically formed notion, among Polish economists, that if the rate exceeded 25 per cent, overheating would occur and barriers emerge.) There seem to be no compelling reasons to justify why the rate of investment below the upper limit in Horvat's model should be ruled out. There are good reasons to support the view that before investment becomes completely unproductive, the incremental productivity of investment will have a very low rate of return, while marginal time impatience of the individual will be relatively high. An incremental unit of comsumption sacrificed may not be recovered in less than, say, a few hundred years. What is the point in justifying marginal investment with a net return of less than a fraction of 1 per cent or so Horvat's model has been described as one of "infinite social impatience," which, therefore, eliminates the problem of intertemporal choice altogether.(111)

Maximization of consumption during the life span of one generation, or of a somewhat limited version of this time horizon, seems to be an inequitable and unrealistic prescription, should such a policy lead to significant inroads into consumption during a long span of life of that generation, or should it produce such consumption paths that the fruits are to be enjoyed only in a relatively distant future. The implications of such a policy were brilliantly driven home by Professor Kalecki:

> Nearly two years ago I was shown a working paper on setting the share of investment in national income with the aim of maximixing total consumption for the long-range plan period. Through mathematical analysis the method offered not too attractive results: it showed that for a twenty-year period productive investments should constitute about 80 per cent of national income. This is not even as bizarre as it might appear; a high share of productive investments in national income allows for its high rate of growth and this so raises its level in the following years of the long range plan, that consumption not only in those years, but even for the entire period of the plan, is higher than with a lower share of investment in national income. But that which is comprehensible is not always reasonable: even if one would not be concerned with the suffering of the unfortunate population in the first years of the long-range plan, one would have to take into account that, with the assumed standard of living, this population would soon perish, and thus would be unable to fulfill the plan.(112)

The longer the time horizon taken into account, the greater will be the benefits of postponing current consumption in favor of future consumption, and the higher will be the share of national income diverted to capital formation.

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(111) Sen, p. 485.

(112) Kalecki, "Accumulation and the Maximization of Consumption," *Ekonomista*, No. 3, 1962, p. 706.

VI

The key problem of development strategy is the choice of the period of maximization of consumption. Professor B. Minc elaborated a model of intertemporal allocation whose political underpinning seems to be to defend the high rates of accumulation in national income in the practice of socialist countries. The point is to refute that the present generation is sacrificing itself for the sake of the future one, or that at best the fruits of the present abstention will be reaped in only twenty years; and to show that in Polish experience the benefits are forthcoming within a much shorter period (i.e., about eleven years).(113)

The higher the share of accumulation in national income, the longer the period of maximization of the consumption fund, and vice versa; the higher the share of accumulation, the slower the rise of consumption in the beginning of that period. Assuming invariable output-investment coefficients (the increase of national product caused by an incremental unit of investment), Minc postulated the following regularity for the socialist economy: 1) the higher the rate of net investment, 2) the higher the growth rate of consumption in *further* periods, and 3) the *lower* the rate of growth of consumption in *nearer* periods. Should the rate of investment exceed a certain value, consumption may decline.(114) The contention that for the increase of the growth rate of national income it is sufficient to increase the share of accumulation in national income, without affecting the effectiveness of investment (output-in-vestment), is untenable. Variation of investment, generally within the wide range discussed by Minc, is likely to encounter certain physical and organizational barriers and bottlenecks, and especially labor shortages. Should the labor shortage be remedied by an appropriate increase of investment, them the assumption of an invariable output-investment ratio cannot be maintained. There are good grounds for assuming that it is likely for the coefficient of efficiency to decline as the share of investment increases sharply and that the gestation period would be extended, as, indeed, Minc himself hints at elsewhere.(115)

In order to depict the functional relationship between the period of maximization of consumption and the share of productive investment in national income, W. Przelaskowski has translated Minc s formulation into a mathematical formula and applied it to Polish data. Assuming the share of net productive investment in national income (x) for the period 1957–60 as 11.7 per cent and deriving the coefficient of effectiveness of investment (a) as 1/3, Minc and Przelaskowski derive from the equation on the postulated functional relationship between the

(113) B. Minc and W. Przelaskowski, "Once Again on the Question of Accumulation and Maximization of Consumption," *Ekonomista*, No. 3, 1962, p. 710.

(114) Minc, *The Political Economy of Socialism* (in Polish), pp. 637 ff; and Minc and W. Przelaskowski, "Equations of Accumulation," *Ekonomista*, No. 6, 1961, pp. 1211–19.

(115) Minc, *The Political Economy of Socialism*, p. 634; and Minc and Przelaskowski, "Once Again on the Question of Accumulation and Maximization of Consumption," *Ekonomista*, No. 3, 1962, p. 710.

period of maximization of consumption and the rate of productive investments the period during which consumption is maximized (t) to be eleven years.[116]

$$atx^2 - a(t-1)x + 1 = (1+ax)^{1-t}$$

(Actually, Professor Kalecki has shown that even on these limiting assumptions, there is an error in computation and the period should have been about eight years.)[117]

Granting the limiting assumption, the major problem is that Minc has not calculated the alternate t for other x. Kalecki provided such a computation. For x approaching 0, the corresponding t is about seven years; for x of 11.7, t is about eight years; for x of 34, t is about 10 years; for x of 50, t is about 12 years; for x of 65, t is about 15 years; and for x of 75, t is about 20 years.[118]

It is evident that not only when t is extended to 15 to 20 years is x fantastically high, but also for a period of 12 years it is 50 per cent, and even for 10 years it is 33 per cent. A reduction by only one year from the computed t for Poland for that period of 8 to 7 years would result in a reduction of the share of investment in national income to about 0.

In order to get even modest increases during the period of maximization of consumption, it is necessary to make heroic sacrifices. The share of investment in national income must be increased from 11.7 per cent to 33 per cent in order to increase t from 8 to 10 years. It is doubtful whether the benefits from the increase of the period of maximization of consumption from 8 to 10 years warrant such sharp increases in the share of investment in national income.[119]

While the intertemporal choice is customarily presented as a resolution of the conflict between the present and future consumption, the problem is complicated as the "future" can be interpreted as a time interval of varied lengths. The choice is not only one between the present and future generations (or between future generations), but is one of intertemporal allocation in the life span of the present generation. The resolution of conflicts between immediate burdens and more or less distant benefits for the present generation is the crucial choice, where it is not only the overall size of consumption during that period that matters, but where the *time distribution* is the key issue.[120]

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(116) On the limiting assumptions, see Minc and Przelaskowski, "Equations of Accumulation,' *Ekonomista*, No. 6, 1961, pp. 1211–12.

(117) Kalecki, "Accumulation and Maximization of Consumption," *Ekonomista*, No. 3, 1962, p. 706.

(118) *Ibid.*, p. 707.

(119) *Ibid.*, pp. 707–708.

(120) Cf. My "Growth Determinants, Processes, and Barriers in a Socialist Economy" *Keio Economic Papers* November 1970.