PART I

The circumstances in which the conceptual problems are posed: legislators deliberating upon how well an economic system is working
CHAPTER 1

Three main concepts that inhere in the circumstances cited

1.1 The three concepts introduced

The Wealth of Nations is said to have been the first systematic treatise upon the subject of economics, and students of that problem field should not be allowed to forget that it had its origin as a section in Adam Smith's lectures on jurisprudence. Its author referred to the subject as "the science of the legislator" (1976: 19, 428). To see the aptness of this characterization of "the science of political economy," one need only review the circumstances of its application in the actual practice of its prominent practitioners since the days of Smith. In his most characteristic role as practitioner, the economist is a specialist advisor to legislators and citizens in a legislative frame of mind. The advising of business firms and other administrative organizations or agencies with well-defined ends to attain is an altogether different activity. In the role by which he is familiarly known in the history of the subject, he has practiced his profession as counselor to legislators in their deliberations upon how well or ill an economic system is working and upon how it might be modified to improve its performance.¹

It is in this factual setting, in which the economist will have assumed his characteristic role of legislative advisor, that we may identify the basic concepts—the categories of things and relations that the reasoning and talk are all about. Three of these classes of things may be noted immediately. There is first the something that is said to be "working," referred to in these legislative discussions as the economic system—or in certain of its details as the monetary system or the tax system or the price system or the like. It is prodigiously difficult for one to even think about the task of describing an actual instance of the operating thing for which system in this context is the name; but a modification of it, when proposed, assumes a fairly definite form. Real human beings, in legislative and quasi-legislative capacities, do

¹ In proceeding upon this understanding, it is our belief that we are following a line of thought of F. H. Knight. This has been indicated in the Preface, and we shall subsequently elaborate upon the conceptual and descriptive problems to which this Knightian line of thought leads. See especially Chapters 2 and 3.
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in fact design modifications of currently operating tax systems, monetary systems, and price systems; they can be observed and listened to while doing so, and the specifics of what they design and propose for adoption can be laid out for anyone to see.2

Next, evidently distinct from this working thing that is subject to deliberately designed modification, is the outcome of its working. This is what the participants in such legislative discussions will have initially reacted to—observed properties of it conveying to each some sense of how well or ill the system is performing. In subsequent sections of this chapter, and in Sections 2.2 and 2.3 of the next, I think I make it clear, if there could be any doubt about the matter, that this outcome is manifested in strictly physical phenomena: populations of real elements distributed over geographic space and developing in time, and processes of real events occurring in space and time. It is this immense congeries of physical things and events that a conventional periodic census is an observation upon. When the term economy is used in legislative discussions of the sort that we are now contemplating, the reference seems frequently to be just these physical phenomena. But not infrequently this same term economy is used in such a way as to indicate that the reference is to the operating entity itself rather than to the outcome of its operation. We shall try to be consistent in our usage—understanding economic system to be the name of the directly modifiable mechanism that performs, and understanding economy to be the name of that in which the outcome of this performance is manifested. There is a modifiable something that performs, and we shall call that the economic system; and there is the outcome of that something’s performance, and we shall call that in which this is observed the economy. This latter, so far as I can identify it in actual discussions among persons responsible for how well a currently operating economic system is working, is that mass of populations and processes of events upon which a census is an observation. Note definitely and keep in mind this fact, for much is to depend upon it: that it is only the former, a specific identification of which is a main objective of this inquiry,

2 Congress, in 1908, directed the National Monetary Commission “to inquire into and report... at the earliest date practicable what changes are necessary or desirable in the monetary system of the United States” (emphasis added) (Report of the National Monetary Commission of the United States, Washington, D.C., 1912, p. 3). In due course the commission responded with a proposed alternative to the monetary system then in operation. And should one wish to see what a designed modification of a monetary system looks like, he may examine this alternative that the commission designed and submitted to Congress for its possible choice in preference to the system as it then stood.
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and in truth only one of two components of that, that is subject to direct and immediate modification and choice; that the properties of this latter—this collection of real populations and real processes of events—are not directly alterable by any human agency.3

The third basic notion is that of a numerical specification of the stable properties of the outcome in terms of which the performance characteristics of an economic system are described. It seems to me no less essential to the clarity of our thought that this distinction be maintained between the physical reality whose properties convey a sense of performance and the measurements made upon this reality for numerically specifying these properties, than that the distinction be maintained between the thing that is performing and the performance of that thing. The real entities that census enumerators classify and measure and count exist independent of this classifying and measuring and counting. And it is the properties of these real

3 It is a fact not properly taken into account, as I am led to view the matter, in the formal structuring of welfare economics—in particular, the welfare function as commonly conceived. The argument of this function typically consists of some combination of quantities defined upon this collection of populations and processes of events—e.g., an “allocation of resources” or a “distribution of income.” It is something such as this—some combination of measurements made upon these real populations and processes—that is posited as an alternative subject to a people’s choice. The function is conceived to be such as would assign a value or order to each alternative; and the choice is assumed to be of the means—end kind: the end being the maximizing of the value of the function, and the means being the function’s argument, i.e., this combination of measurements. But a choice implies a chooser—and there plainly does not exist any human agency that chooses an allocation of a nation’s resources or a distribution of a nation’s income, or any of these other things that are specified by measurements made upon existent populations or processes (say, e.g., a spatial distribution of variously sized cities, an “optimizing” of which one may sometimes see expounded upon). These are aspects of the outcome of the “working” of what in fact is subject to being directly chosen by or on behalf of a people. The alternatives subject to direct choice are alternative designs of statutory law and administrative rule, i.e., of rules of the game. So that for a pertinent modeling of a people’s choosing of what is called social policy, and if in this modeling the existence of such a function is to be postulated, the argument of the function, i.e., the thing to which an order is to be assigned by the function, must surely be that which is actually being chosen by the choosing agency whose behavior is the subject of the description—and this thing is a modification of statutory law, i.e., the “rules of the game.”

The form assumed by the theory as it has come down to us follows along the lines of the earlier theory that purports to model, i.e., to describe in terms of its elements, the choosing behavior of an individual firm or family—and this form does not fit the reality of the supposed subject of the description. A close study of this reality of a people’s choosing of its social policy—i.e., of its agents in the very act of designing and adopting changes in its economic and social legislation—leads, I think, to a distinctly different form, one that follows more or less along the lines of the yet earlier “fair game” theory. See footnote 12 of this chapter, and especially Sections 3.4, 3.5, and 3.6.
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phenomena—that is, the real populations of identifiable elements and the real processes of identifiable events—to which responsible discussants will have reacted who are contemplating possible modifications of a currently operating economic system. A description of these properties is required inasmuch as the choice being exercised is a joint one: The discussants are obliged to communicate one to another what those properties are to which they are respectively reacting, what they think these properties depend upon, and why they think their reactions reasonable. This description is formed from such data as result from classifying, counting, and measuring real things and events and consists of graphic and tabular presentations of sums, ratios, averages, variances, and other numerical specifications of features of form of frequency distributions. In actual discussions among real choosers of modifications of economic systems, one may see that the statistical properties of selected populations and processes of events are submitted in these numerical terms as being descriptive of the performance characteristics of a particular economic system, the existent one that is currently operating. We shall emphasize in subsequent sections and chapters that this official talk and practice—indeed the very notion of democratic public policy choice itself—is not intelligible apart from a supposition that the statistical properties thus described are stable in some sense and also dependent upon the statutory and administrative rule and law that is subject to legislators’ choice.

Conventional terminology would seem either to confuse or else to gloss over essential differences among these three basic concepts; and as an aid for keeping them distinct in one’s thought, I shall propose a notation. The modifiable operating mechanism, the thing for which economic system is the name in the special usage here proposed, I shall denote by \( \{\theta, S\} \). The \( \theta \) is to represent a set of constraining and prescriptive rules—“the rules of the game,” as Knight expressed it. It is this set of rules that legislators alter by their enactments of “economic legislation” and by their authorizing or acquiescing in changes of administrative rules. What the \( S \) is to represent is more difficult to put briefly. An identification of just what this \( S \) comprises is the main thing that I think this inquiry has made a start upon; and I wish to proceed circumspectly so that the reader will not too hastily pass it over and miss its peculiarity and the significance that I attach to it. In subsequent sections of this chapter, and in Sections 2.4 and 2.5, I shall consider somewhat more what the \( S \) part of this \( \{\theta, S\} \) is. And in Section 5.5 and in the following Section 6.1, I submit all that I am prepared to do toward setting forth just what it
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is for which economic system is the name, conceived as an operating, working, modifiable mechanism.

The physical outcome of this thing’s “working,” (that is, the economy in our special usage, I shall denote by \( \pi \). In later sections of this chapter and in Sections 2.2 and 2.3 I shall try to be explicit, with the aid of concrete examples, about what it is that \( \pi \) denotes. Finally, I shall denote by \( \beta \), a performance vector whose components numerically specify statistical properties of \( \pi \) that have acquired meaning as operating characteristics, that is, that convey to responsible persons a sense of how well or ill a currently operating economic system is working.

1.2 Rudimentary illustrations

As our notation now has it, \( \{ \theta, S \} \) is the system or mechanism that performs, \( \pi \) is the mass of developing populations and processes of events whose statistical properties convey a sense of performance, and \( \beta \) is a numerical specification of these statistical properties in terms of which performance characteristics are described. These distinct categories of things may be illustrated with a familiar case in which they stand forth clearly.

Think of a group of responsible persons in a diagnostic frame of mind deliberating upon the congestion that they will have noted in the outcome of the working of what is called a traffic or queueing system.\(^4\) Congestion is a state of things that such persons observe in the motion and momentary arrangement of physical things in space and time. From a vantage point in a high building, one may look down upon a pattern of passageways and literally see congestion and sense differences in its amount at different places and at different times. A scaled-down three-dimensional model could easily be contrived so as to show placements and motions of small objects that would concretely depict what one directly perceives as greater or lesser amounts of congestion. This spatially dispersed population of real elements in motion is in fact a component of that comprehensive thing that we are denoting by \( \pi \)—and it of course exists

\(^4\) The distinctions that we are now drawing—among a population of real elements upon which responsible persons make observations, the measurements that such persons define upon this population for specifying stable properties of it that convey sense as performance, and the modifiable circumstances and conditions upon which these measured properties are presumed to depend—are evident in Chapter 3 of F. A. Haight’s Mathematical Theory of Traffic Flow (1963) and in Chapter 2 of W. D. Ashton’s Theory of Road Traffic Flow (1966). Also see the preface of the book by Mr. Haight.
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apart from any measurements that might be defined and made upon it.\(^5\)

The next step in the group’s consideration of this more or less dense spacing and more or less impeded movement of things is the counting, timing, and computing whereby the greater or lesser degree of congestion is measured. A discussant of the traffic problem typically expresses this measure of degree or amount in terms of averages and variances; and he describes the phenomena somewhat more comprehensively by referring to the relative frequencies with which certain sorts of events are observed to occur—for example, the frequency with which the time required for a “passage,” or with which the number of vehicles that are waiting, exceeds some specific value. As intimated earlier, we are to bear in mind that when one submits such averages, variances, and frequency distributions as a description of the performance characteristics of a currently operating system whose modification is being deliberated upon, a stability and steadiness in time is being attributed to the values of these averages and variances and to the forms and shapes of the frequency distributions. The properties that are being described are not simply those that were in evidence during the observation period. It is an expectation, in the sense assigned to this term in the theory of probability, that is being estimated—a description of statistical properties of the populations and processes in question that one may expect in the future if no modifications in this currently operating system are effected. The observed averages, variances, ratios, transition rates, and frequency distributions are submitted as estimates of stable parameter values and stable frequency ratios and forms of distribution functions that are descriptive of the particular system. As such, they are instances of components of what we propose \(\beta\) to denote.

There is finally the working thing whose performance characteris-

\(^5\) I very much hope that the reader will closely attend to the point of what now is being said—and that he will see its bearing upon matters that are of more direct concern to practicing economists. Congestion is the name of a quantity; and measures of its amount are provided by values of variables defined upon a population of real elements. But no less is this the case when one comes to the inequality of the distribution of a nation’s income or the unemployment of a nation’s labor force. These, too, are quantities whose measures are defined upon populations of really existent elements. And it is of utmost importance for the reader’s understanding of the intended direction of our inquiry that he acquire a capacity for visualizing the comprehensive realities in which these quantities are manifested. All that is being said here about this more easily visualized quantity called congestion will be set forth again in later sections and chapters in our discussions of quantities that are subjects of economists’ deliberations.
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tics are thus specified. We may be reminded that a proposed modification of a traffic or queueing system invariably assumes the form of an alteration either of a system of rules, analogous to “rules of the game” that one may imagine an individual driver to be playing, or else of some part of the physical “layout of the game,” the apparatus and arrangement of terrain that set the constraints upon the players in their respective private choices of actions. An alteration of the traffic system is brought about by enactment of a statute or ordinance or by lawfully authorized administrative action—so that the choice that is exercised by real human beings in the act of choosing a modification of a system that is currently in operation is between alternative systems of statutory law and administrative rule resembling in essential respects “rules of a game.” It is this modifiable system of rules and physical apparatus and terrain that we propose be represented by the $\theta$ in our notation $\{\theta, S\}$.

Bear in mind that this case of a traffic system and its performance characteristics, and the problem that confronts real people who are obliged to choose between a version of it that is currently operating and some proposed modification of the thing, is not being submitted here as a mere analogy. Rather, it is presented as an instance of identically the same kind of situation, involving the same classes of phenomena and the same kind of motivations. There are actual persons who are induced by the degree of congestion that they observe in the outcome of the working of a presently operating traffic system to inquire into the possibility of this system’s being modified so as to reduce the expected amount of congestion and thereby

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6 Our persisting problem throughout these chapters is that of formulating a statement of what the thing is for which system is the name in this specific context—the context being strictly this and only this: wherein responsible persons are reacting to what they observe as properties of physically existent populations and random processes of events, and being induced by these observations to seek for some modification of the system upon which these observed statistical properties are presumed to depend. This is the task that I hope will attract the reader’s attention and interest, so that he might himself help straighten out and clarify what I have been able to do. Getting at and getting clear this truly fundamental concept of an operating mechanism called by the name system is the main thing that I have in mind to do in presenting Sections 1.6 and 1.7 in this chapter, Section 2.4 and the Appendix in Chapter 2, Section 4.5 and the Appendix in Chapter 4, Section 5.5 in Chapter 5, and Section 6.1 in Chapter 6. In these latter two sections I think at least a beginning is made toward specifying in operational terms just what this machine or mechanism or system is that is said to generate the forms and patterns of variation that are observed and reacted to—i.e., that do in fact convey to responsible persons a sense of performance of the system. If what I have been able to come to in these final sections should seem anticlimactic to the reader, not up to what a finished mathematician and probabilist might have done, it is at least a start upon an absolutely fundamental identification and descriptive problem.
improve in this respect the system’s operating characteristics. In essentially the same setting, in which identically the same categories of concepts are involved, actual persons are induced, by the degrees of instability of employment and prices, inequality of distribution of income and wealth, concentration of power in industry, immobility of families among status classes, or the depression, inflation, stagnation, imbalance, underdevelopment, and the like that they observe or somehow sense in the outcome of the working of what they themselves call the presently operating economic system, to inquire into the possibility of this more inclusive system being modified so as to reduce the amounts of what these names connote and thereby improve this system’s operating characteristics. Congestion is the same kind of phenomenon—in a sense that we shall take especial pains to illustrate—as instability, concentration, inequality, depression, immobility, stagnation, underdevelopment, imbalance, and the rest. And it is a group of legislators, or persons who will have assumed advisory roles in a law-making or law-administering context, who are induced to make the inquiry, whether in the one or the other of the cases. To modify the system in either case, the group drafts and enacts ordinances or statutes or else stipulates some administrative alteration of rules or physical apparatus and layout.

This seems evidently to be the plain fact of the matter—readily confirmable by close examination of any actual instance of legislators, their specialist advisors at their sides, in the act of deliberating upon how well an economic system is working for whose performance they are responsible. And there is an important point to this fact for those of us who are concerned with the pedagogy of our subject. These advisors are called upon to describe, in the very special sense in which description is understood in the theory of probability, random variables defined upon populations of really existent elements and upon random processes of really occurring events—and description in this context must aspire to a finding and specifying of the critical factual circumstances that may be said to generate the variation that is being observed and responsibly reacted to (see Section 5.5). These are demanding technical tasks upon which economic theory as familiarly conceived and taught has no analytic bearing at all—distribution functions, and what it is that generates and accounts for their analytic shapes and forms, are not what it is about. The truly cogent theory that immediately and directly bears upon these particular descriptive tasks is the theory of stochastic processes. And the typical curriculum and academic training program for authenticating economists for this characteristic advisory practice does
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not presently see to it that practitioners are suitably grounded in this specifically applicable theory.

1.3 Further illustrations marking the distinctions to be drawn

Having proposed a notation for the three categories of things—the operating system, the physical outcome of its operation, and the numerical specification of stable properties of this outcome in terms of which the operating characteristics of the system are defined—I shall now consider in a preliminary way illustrations of these three concepts in a context of more direct concern to economists. And as a point of departure for this consideration, I shall use a 30-year-old essay by Frank H. Knight,7 “The Sickness of Liberal Society” (1947a: 370–402).

There is a section in this essay of Knight’s that he addresses to “the system as it actually works” (1947a: 379). This working thing, called by the author “the system,” is the gamelike entity that we are denoting by \{θ, S\}. In his comments, he remarks that “the system as it actually exists” has certain “mechanical imperfections” and thus “fails to work” in the way that “theory” may lead one to expect. In particular, he discusses “two major mechanical weaknesses”—“mechanical imperfections of the system as it actually works” (1947a: 379, 384): (1) a tendency for the degree of inequality of wealth and income to increase progressively and (2) a degree of instability of prices and employment rates that a people might sensibly look upon as being excessive. In these terms, Knight is referring to specific performance characteristics of a currently operating economic system \{θ, S\}. The performance vector β, as we conceive this to be, and were it known, would consist of components some of which would numerically specify these particular operating characteristics.

It would seem evident enough on the face of things that the defects, such as they may be, are attributes of the system that is currently in operation. It is not the outcome of the working of the system that may be said to be “mechanically weak,” but rather the working system itself. But a person in this role that Knight assumes will have been led to believe that such is the case by the results of certain observations made upon the outcome of the working of this system—that is, upon the economy π, this term and notation having

7 I suspect that Knight would not have liked, at least on first encounter, the illustrative use that I here make of some of his expressions. In the following chapters this same essay is drawn upon again, and in ways more in keeping with the emphasis of its author.