NORTHWESTERN UNIVERSITY

A SIMPLIFIED POLITICAL-ECONOMIC SYSTEM SIMULATION

A DISSERTATION

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by

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PREFACE

The present work was undertaken as part of the Inter-Nation Simulation project of the Program of Graduate Training and Research in International Relations in the Department of Political Science at Northwestern University. It is part of a more extensive work projected by the author entitled Theory and Procedure for a Simulation of International Relations.

The present work relates to the latter in the following fashion. In the inter-nation simulation work, relations between nations are simulated by: 1) placing some number of simulated nations in juxtaposition; 2) specifying the means by which they may interact; and 3) providing a limited set of inducements to interact.* The content of the interactions is to a considerable extent left unstructured. These interactions constitute the principle output of the simulation for research purposes.

In the Northwestern work the simulated nation has consisted of a model political-economic system which is operated by one or more simulation participants. The model political economy that has been used approximates the special case of a controlled economy in which government makes all production decisions. The present model is intended to supplement the Northwestern work with another

*This work is described in detail in the work cited on page 2.

special case-- a free political economy in which the specifically economic decisions lie not with government but with a private sector. The economic operations of government in this present model are limited to certain fiscal policy alternatives. Politically the present model is pluralistic, whereas the other model is not.

It is hoped that the present model, together with the earlier model, will enrich the international relations simulation work by providing a larger list of alternatives to the simulator. It will be possible for him to set up a simulated international relations system consisting of simulated national units of both types. It is hoped in addition that the present model will also be found useful for straight national simulations, apart from its function in a broader international relations context. It has been designed with both purposes in mind.

The layout of the chapters reflects this purpose. Chapter I is a brief introduction. The intended function of Chapter II, "Overview and Review," is suggested by its title. It is intended as a manual for participants as well as a review of the whole work. In it is contained enough information for the participant to begin to participate. Then, in his leisure, he may leaf his way through the subsequent chapters to learn the precise nature of the political-economic system which he is operating.

In the preparation of this work the author has accumulated intellectual debts beyond possible acknowledgment. But the names Harold Guetzkow and Richard C. Snyder stand sufficiently far to the

front to warrant special mention. Through the several years of my tutelage by them, their guidance, encouragement, and above all, patience have been seemingly infinite in supply. The name Jerome Rothenberg stands also in this rank. For his contribution my indebtedness extends backward some eight years and forward without bound.

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Chapter I

INTRODUCTION

As the title suggests, this work is about a political-economic system simulation. The singular "a" should be emphasized. For, it is the intention here to engage in very little general discussion of political-economic simulations. Rather, our purposes are to describe one such simulation in particular and to provide all of the information required to operate and to participate in that simulation.

However, before proceeding with the particular, let us attempt to clarify what is meant here by the term "simulation." The word is often applied to a number of rather different things, from military operations on a mock battlefield to logical operations in an electronic computer. As one would expect, there is a common thread of meaning running through all such usage. For, the word "simulation" stems from the Latin verb, simulare, "to assume the appearance of, without the reality; to feign."[1] A simulation, then, can be anything which assumes the appearance of its real counterpart without the reality itself. It is artificial; it imitates something real. To the two examples already mentioned

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[1] Webster's Collegiate Dictionary, Springfield, Massachusetts: G. & C. Merriam Co., 1947.

can be added countless more; model railroads, maps, architectural models, etc., etc.

We mean at least this much when we use the word in the present case. But we also mean something far more specific. The present simulation is designed for use in pedagogy and scientific research. The technique of simulating things has long been used for such purposes in the so-called "hard sciences." More recently, there has been growing interest among social scientists in similar applications.[2] The idea is that, when it is not technically feasible to conduct certain studies or training with the real thing, it may be useful to do so by simulating it in a laboratory or classroom situation.

Certainly, research and pedagogical simulations do not try to imitate every detail of the real thing. This would hardly be feasible. Moreover, not all aspects of a given phenomenon may be relevant. Only certain key features of the real thing may be important in the context of the research or training goals in question. Nothing more need be simulated. For example, the fact that a jet aircraft simulator has neither needle nose nor swept-back wings does not hamper its usefulness as an aid to teaching pilots certain things about the behavior of its real counterpart. The same is true of studies of the behavior of man, machines, and

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[2]See Brody, Richard A., "Varieties of Simulations in International Relations Research," in Simulation in International Relations: Developments for Research and Teaching, by Harold Guetzkow, Chadwick Alger, Richard Brody, Robert C. Noël and Richard C. Snyder, Englewood Cliffs: Prentice-Hall, Inc., 1963.

materials in simulated space environments. In non-essentials the simulation may depart considerably from the reality.

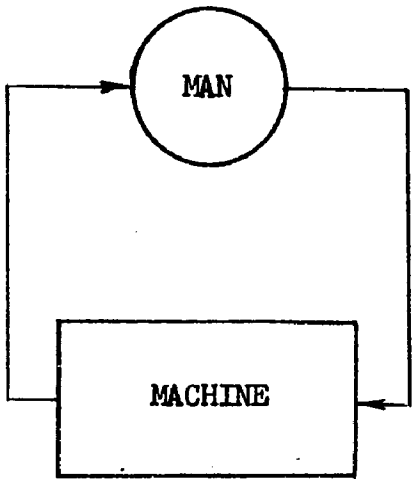
Within the class of scientific and pedagogical simulations a distinction is often made between those which involve only machines-- "machine simulations"-- and those which involve both man and machine-- "man-machine simulations." The former might refer to a physical model of something real which is operated in or subjected to realistic conditions-- say, for example, an airplane model in a wind tunnel. Increasingly, "machine simulation" is used to refer to work where the formal structure, or theory, of some real phenomenon, say a business inventory system, is programmed into an electronic computer and the logical operations relating the terms of the theory are carried out on a given set of data.

The machine part of a "man-machine simulation" is essentially the same. Man's presence is introduced in that he may be operating the machine physically, as in the flight training simulator mentioned above. Or he may make decisions as to what data are to be fed into a computer. In either case, man interacts with the machine. He transmits information to it; and the machine, in turn, transmits information to him. The tangible form of this information may be physical actions, or it may be symbolic. The man moves the controls in the flight simulator; the simulator banks or gives a meter reading in response. Or, the man feeds numerical and/or alphamerical symbols into the computer, and the computer prints out similar symbolic messages in response. This input-output interaction may be sequential, or it may be more nearly simultaneous.

The general form of a man-machine simulation is seen in Figure 1.1.

Figure 1.1

General Form of Man-Machine Simulation

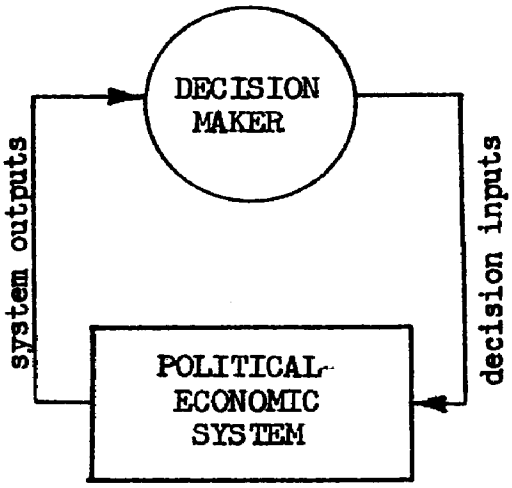


Although it is designed for non-machine use, the simplified political-economic simulation contained herein is basically the same in form as a man-machine simulation. Just think of the person who performs the manual computations as the "machine." The "machine" is programmed with a theory describing some basic features of real political-economic systems. On the basis of some set of given data, the "machine" carries out the operations called for by the theory and transmits information to the man, say, that the level of employment in the system is starting to slip. The man performs what are essentially decision-making functions, like the pilot in the flight

simulator. Think of him as the head of state, if you will. He takes decisions which provide input data for the machine, say, some particular act of fiscal policy. And so it continues. The basic outline of this simulation is seen in Figure 1.2, which is simply the general form of man-machine simulations with new labels.

Figure 1.2

Basic Form of Simplified Political-Economic Simulation



Needless to say, such a political-economic simulation will fall far short even of imitating all of the important features of its real counterpart. First of all, some things, particularly at the sociological and psychological level, simply cannot be accurately recreated in an artificial situation. For example, a strong feeling of moral responsibility for the physical security of one's people is not (one may be permitted to hope) too uncommon among heads of state in real political-economic systems. Similarly, fear for

one's personal safety is very much a relevant factor for some real decision-makers. Also, enduring personal gain of a material sort is often important in the real world. This kind of thing occurs only to an insignificant extent in an artificial situation.

But these handicaps are not unique to a political-economic simulation. Each of the ones cited, for example, has a direct parallel in the flight simulation without diminishing its usefulness. In fact, experience has shown that social simulations are probably considerably more effective in this sense than are many of the man-machine simulations in the so-called "hard sciences."[3]

A second reason for a political-economic system simulation falling short of imitating its real counterpart is simply that the latter is immensely complex and, as yet, little understood. We have no single body of theory, especially political theory, to program into the "machine." Consequently, the present effort must be but a tentative step. This said, however, let us hasten to add that, present shortcomings and all, man-machine simulations of social phenomena are increasingly finding a useful place in pedagogical and research laboratories in the United States and abroad.

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[3]See Noël, Robert C., "Evolution of the Inter-Nation Simulation," in Simulation in International Relations: Developments for Research and Teaching, by Harold Guetzkow et. al., Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1963; and Guetzkow, Harold and Anne Bowes, "The Development of Organizations in a Laboratory," Management Science, 3, 1957, 380-402.

Chapter II

OVERVIEW AND REVIEW

I. Conceptual Schema of the Political-Economic System

While Figure 1.2 may show the form of our political-economic system simulation as a man-machine simulation, as it is, it is not realistic in terms of political and economic theory. The reason is the obvious one. The decision-making functions of political-economic systems are not performed outside of those systems. Conceptually the decisions are made within the system.

But this is not all. As soon as we make a break-down of the overall system into its two principle components-- a political system and an economic system-- the possibility becomes apparent that decision-making functions for the two sub-systems may very well be performed by different people. This, in fact, is the case in our model. For we are dealing with a so-called "free enterprise," or "capitalist," economic system.

In such a system, there is a fairly clear differentiation of economic and political decision-making functions.[4] In the political

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[4]This differentiation becomes blurred as the pure type, governmentally controlled economy is approached. In that case all economic decision-making functions are performed by government.

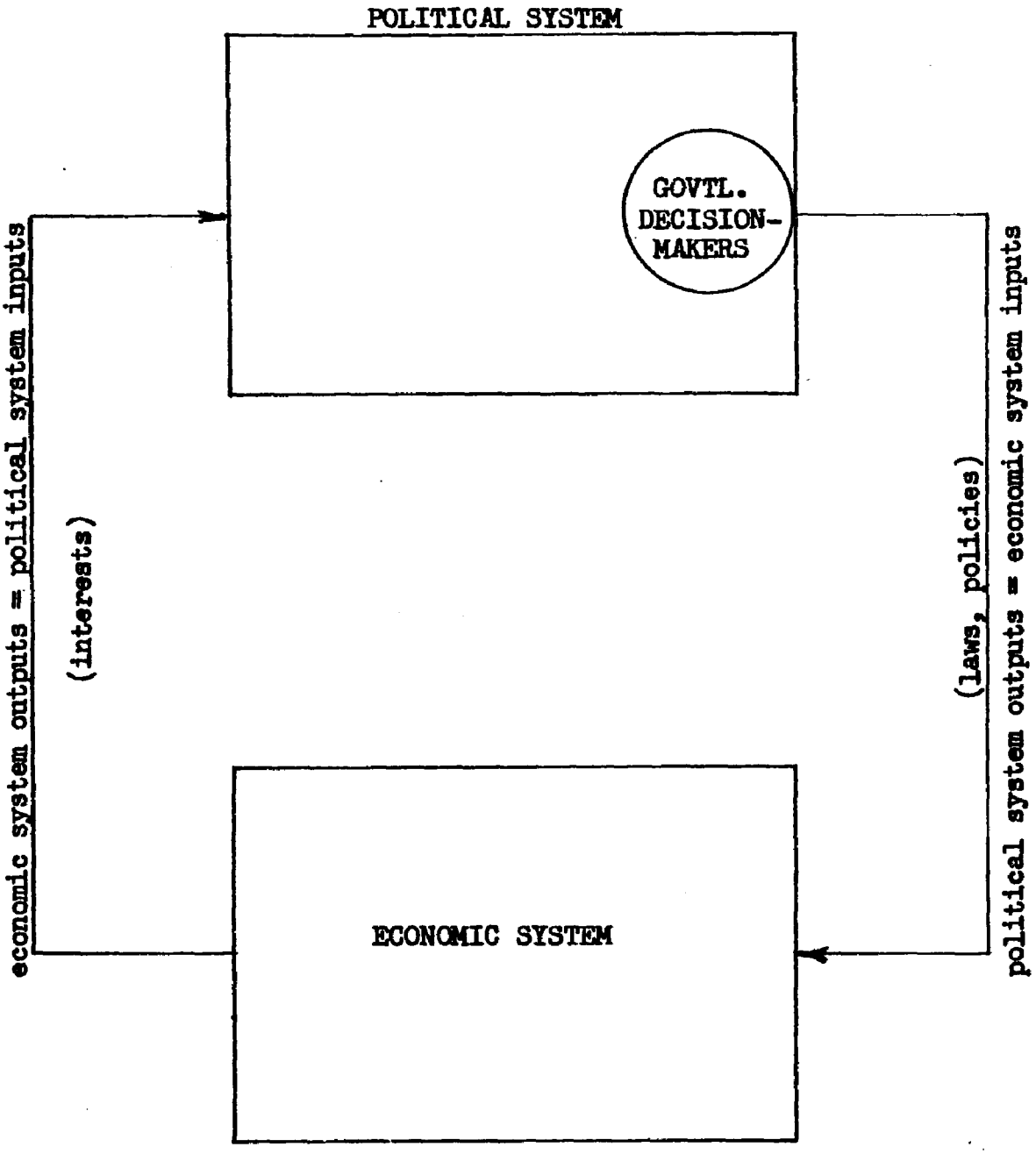
system there reside those decision-making functions usually associated with government. In addition to general social and political matters these include economic decisions relating to the role of government in the economy; for example, fiscal policies. There are institutionalized roles in the political system for the performance of these decision-making functions. These governmental decision-making roles are taken by the man-- the simulation participant.

In the economic system, on the other hand, lie decision-making functions relating to what will be produced and who will consume it. In contrast to the political system, these decisions are made on a highly decentralized basis. In a capitalist economy countless thousands of them are made daily by individual businessmen, workers, consumers, etc. Such decisions are made in the simulation not by real people but by the "machine," according to theoretical formulae which reflect the way they are made (in the aggregate) by the real people in a free enterprise economy.

Figure 2.1 summarizes the ideas just presented. Let us compare it with Figure 1.2 in the previous chapter. First of all, the political and economic systems have been distinguished. Stated differently, one part of the "machine," programmed with a theoretical model of a political system, has been separated from the other part. The latter part is programmed with a theoretical model of an economic system. Secondly, the decision-maker of the earlier diagram is now seen to be part of the political system. Actually, the "governmental decision-maker" circle represents the whole governmental decision-

Figure 2.1

Conceptual Schema of the Political-Economic System



making apparatus. It may involve several, differentiated roles taken by simulation participants. Third, since decision-making in the economic system is decentralized and purely conceptual, it is not represented in the diagram. Finally, the links between decision-maker and political-economic system in the earlier diagram have been modified in part. The decision inputs remain the same. They consist in governmental policies and laws which affect the operation of the economic system. But the line of system responses (outputs) to the decision-maker now follows a different course. The economic outputs originate in the economic system but are filtered through the political system before reaching the decision-maker. These political inputs consist in "interests."[5]

What is the content of these interests? They emanate from the economic system, so they must be interests in economic matters. Allusion was made to the fact that decisions are made in the economic system concerning, among other things, the allocation of human and material resources to various productive uses, how much of what products will be produced, and how the fruits of economic activity will be shared. The economic system may also be viewed in terms of the results of the decisions taken in it. Thus, in aggregate terms we may speak of the total production of the economy and of the

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[5]The general form of the present model leans heavily on Professor Jerome Rothenberg's The Theory of Economic and Political Decision-making as a Single System, a manuscript currently under preparation for publication. Professor Rothenberg's original and insightful analysis, however, goes considerably farther than the present simulation model.

distribution of the fruits of production. The latter result is of particular importance in the present context. For, directly or indirectly, the distribution of economic rewards is the substance around which most of the political process revolves. People are generally concerned with their slice of the economic pie. For many of them this concern is sufficiently strong to motivate them, under certain conditions, to partake in political activity. Thus interests in the "allocation of economic values" serve as the well-springs of political action.[6] They transform economic man into homos politicus.

What conditions are most likely to give political expression to economic interests? Certainly one such condition is when people feel they are not getting a sufficient share of the economic rewards. For many, of course, this condition will simply give rise to increased effort within the economic system as it is. However, others, often whole groups of people, for various reasons may find this alternative impossible, impractical, or perhaps imponderable. For them political activity constitutes a possible means for achieving redress of their grievances about the distribution of economic rewards.

Political activity is a natural resultant of economic grievances because it may influence the decisions of government. The decisions of government in their turn-- laws and policies-- are

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[6]This is a paraphrase of Professor Easton's conception of the political process as being concerned with the "authoritative allocation of values." The idea is part of the basic posture with respect to politics which underlies the present model. See David Easton, The Political System, New York: Alfred A. Knopf and Co., 1953.

capable of effecting changes in the operation of the economic system such that the distribution of rewards will be altered. This is seen as the flow of outputs from the political system to the economic system in Figure 2.1.

The foregoing political activities were motivated by grievances. In contrast, satisfaction with economic rewards is another condition which can give rise to political activity. For any alteration of the distribution of economic rewards in response to demands of one group of people is likely to have adverse effects on other people. These people too will be moved to political activity in order to defend their interest in the economic status quo. The result, of course, is a conflict of interests among various groups. The arena of the conflict is the political system.

It was mentioned above that the people in the economic system are only "conceptual people"-- that is, they are merely concepts in our conceptual schema. The same is true of the groups of people who take part in the political system. How, one may ask, can "paper people" influence the decisions of real people? The answer, in our democratic political system simulation, is with votes. The "people" in our model political system do have votes. Their voting decisions are made according to theoretical formulae much as the decisions are made in the economic system. Thus, in the final analysis, the "people" have actual control in the simulation of the official tenure of the governmental decision-makers (simulation participants).

Here we encounter a gaping hole in our conceptual schema. We have claimed a democratic political system without having provided the voters in that system any real choice. The only simulation participant that has been mentioned is the governmental decision-maker, and it was suggested that he (possibly they) represents the whole governmental decision-making apparatus. Let us hasten to plug this hole. For simplicity we shall assume that the most important, responsible decision-making roles are taken by members of a single political party at one time-- the party in power. Then, enter from the wings one or more political parties out of power played by one or more other simulation participant(s). The parties out of power, of course, do not have decision-making authority with respect to the economy. But they can say what they would do if they were in power. They can offer alternative programs to the people. Thus the people do have choice, a prime requisite for any democratic system.

II. A Concrete View of the Simulation

By this time the reader who has never witnessed a man-machine simulation may be thoroughly confused by all the talk about "conceptual people," "theoretical formulae," etc., etc. So let us attempt as well as we can with words to portray concretely just what one sees when he looks at a simulated political-economic system from the inside. What is a "participant's-eye-view" of the simulation like?

Let us begin with the people. It has already been seen, concretely, that some of the people are real and some of them not.

When we speak of the "people" who are not real, we are simply using the term figuratively. The participant sees evidence of the existence of the "people," but he hever sees any people. He receives information about their economic activities and about their interests, wants, satisfactions and/or dissatisfactions, campaign activities, and their votes. All of this information is derived from the theoretical model with which our "machine" is programmed.

The real people, of course, are the simulation participants. They represent the party in power-- governmental decision-makers-- and the parties out of power. How many of them are there? This depends to a large extent upon practical matters. It would be possible to have as few as two-- one representing the party in power and one representing a single party out of power-- or as many as, say, fifteen (or even more). The larger number indicates an increased number of political parties and an increased number of persons in each political party. For illustrative purposes we shall discuss a three-party system, and let us say for simplicity's sake that there is just one person in each party-- the party head-- who will represent the entire governmental decision-making apparatus when his party is in power.

Just as the participant sees no people, he sees neither factories, nor machines, nor guns, nor butter. These too are evidenced only by information about them. Concretely, the simulated world is a pencil and paper world-- pencils, papers, desks, and

chairs-- and participants using them. Everything else exists only in "conceptual space," so to speak. The immediate empirical referents of the concepts are entries on the operational paper used in the simulation.

After a fashion, the foregoing paragraphs have located the simulation in physical and conceptual space. Now, let us try to locate it in time. The economic and political processes which are represented in the simulation are continuous in the real world. Nonetheless, for heuristic purposes the analyst breaks them up into discrete periods-- a fiscal year, for example. A similar procedure is followed in the simulation. We simply cut into the on-going process at some point and say that that point constitutes the end of a period of time. Since it is a continuous process that is being interrupted, the end of one period is also the beginning of the next. How much calendar time does a unit of simulation time (a period) represent? It is difficult to say precisely. But the general order of magnitude is roughly a year. How much laboratory clock-time does a period consume? This is largely a technical matter. It may be anywhere from one half hour to a day or even more.

What events mark the passing of a period in the simulation? At the beginning of a period the governmental decision-maker is called upon to submit (to the simulation staff) his "Governmental Decisions." At the same time the parties out of power submit their

"Party Programs." Toward the end of the period an "Economic Report" is published (by the staff) together with a "Political Report." As mentioned, the end of one period is the same as the beginning of the next period.

A talk-through of the entire procedure may help tie together what has been said. Let us suppose that we are about to assume office as governmental decision-makers at the beginning of some period, i. Suppose also that we are not new to the simulation, since our party has been in opposition. Therefore, we are familiar with the past history of our political-economic system. Moreover, there are available for study all of the documents from past periods of simulation time.[7] The most recent of these documents are the "Economic Report" and the "Political Report" from the last part of period i-1.

First, consider the "Economic Report." It contains two categories of information. The "Economic System Variables" are the economic factors with which we shall be most concerned during our tenure in office. As the term implies, they are the elements of our model economy that vary through time. Take the first one, for example-- Gross National Product. This is a measure of the value of the total production of the economy during the period just ended (i-1). It is also the total amount of income distributed among income earning units. Gross National Product is indeed a "variable."

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[7]In period 1 these contain hypothetical information supplied by the simulation staff.

ECONOMIC REPORT

Period _____

Economic System Variables

1. Gross National Product (GNP)_____
2. Population (P)_____
3. Per capita income (GNP/P)_____
4. Potential labor force (Lp)_____
5. Employed labor (Le)_____
6. Unemployed labor (Lu)_____
7. Accumulated stock of capital (K)_____
8. Total investment expenditures ($I = \Delta PC + \delta PC$)_____
   a. Induced investment (ΔPC)_____
   b. Autonomous investment (δPC)_____
9. Accumulated governmental debt (D)_____
10. Interest on governmental debt due this period ($\bar{G}_d$)_____
11. Tax structure (TS)_____
12. Regulatory structure (RS)_____
13. Degree of equality of income distribution (E)_____

Economic System Parameters

1. Average productivity of capital and labor (a)_____
2. Investment lag factor (b)_____
3. Short-term business expectations factor (b')_____
4. Marginal propensity to consume (c)_____
5. Rate of depreciation and obsolescence of productive capacity (d)_____
6. Rate of interest on governmental debt (e)_____
7. Rate of population increase per period (r)_____

For, left to its own devices without systematic intervention by government, a model, free-enterprise economy such as ours will produce cyclical fluctuations in Gross National Product through time.[8] There will be occasions when it decreases for several periods and occasions when it increases, possibly at an inflationary rate.

If Gross National Product in period i-1 is divided by the total population at that time (line 2), the result is per capita income in that period (line 3). Per capita income is an indicator of the overall economic well-being of our people. Of course, it tells us nothing about how income is distributed among the people. We will get to that in a moment. Since population grows at a constant rate in our model (see line 7 under "system parameters"), its variations will not cancel the variations in Gross National Product. Thus per capita income will display cyclical characteristics the same as Gross National Product.

Continuing down the list of economic system variables, item 4, the size of the potential labor force, during the period just ending is related to the size of the population. It grows at the same rate. The level of employed labor during the period just ending is indicated on line 5. Variations in the level of employment are highly correlated with variations in Gross National Product. Clearly, the level of employment is also a measure of the economic well-being of the

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[8]See Figure 3.4.

people. Full employment is attained when employed labor equals potential labor. When there is a difference between the potential labor force and employed labor, unemployed labor (line 6) becomes positive.

What does it take to maintain full employment? Succinctly put, it takes jobs. The creation of jobs follows from the creation of new plant and equipment-- that is, from additions to the accumulated stock of capital which is shown (line 7) as of the end of period i-1. For full employment to be maintained, net additions to the stock of capital must be sustained at a rate equal to the rate of increase in the potential labor force.

It will be noted that total investment expenditures are broken down into two parts: induced investment and autonomous investment. Their values for the period just ending are noted on lines 8a and 8b. The former consists in those adjustments in the stock of capital which were undertaken by businessmen in the previous period in response to changes in demand for final product. Induced investment is a source of the cyclical fluctuations in Gross National Product. Moreover, because of its cyclical character, it contributes little to the long-term growth of the stock of capital. Autonomous investment, on the other hand, is different. It consists in those additions to the accumulated stock of capital which are a result of the long-term plans for expansion by businessmen. These are difficult to predict. But they are influenced by a large variety of things-- technological innovation, changing tastes, population growth, etc.,

etc. One thing in particular that influences these long-term projections is businessmen's estimates and anxieties about the posture of government with regard to business and the economy-- whether it is sympathetic or hostile. Thus our behavior as governmental decision-makers influences autonomous investment.

Line 9, the accumulated governmental debt, is self explanatory. The value reported is as of the end of period i-1, after changes brought about during i-1 by either deficit spending or a tax surplus.

The economic data reported in entries 1 to 9 concern the macro-aspects of our economic system. Items 11, 12, and 13 concern the distribution of gross income within the economy. The tax structure reflects the incidence of taxes in general. The regulatory structure describes the net effect of all economic laws and regulations on the distribution of income. Line 13 characterizes that distribution.

The "Economic System Parameters" are the things which, to a considerable extent, give the economic system its basic characteristics. They change only infrequently, if at all, and then only in response to outside influences beyond government's direct control. Let us glance down the list. 1) The average productivity of capital and labor is an index of the efficiency of the two factors of production in the economic system-- capital plant and equipment, and labor. The greater is the average productivity of capital and labor, the greater is the output of final product per unit of capital and labor. The next two economic system parameters have to do with investment in new capital plant and equipment undertaken by businessmen in the economy. 2) The investment lag factor reflects the fact that not

all investment projects are completed in the same period in which they are undertaken. There is a time lag. The greater is the investment lag factor, the greater is the time lag. 3) The short-term business expectations factor is just what the term suggests--an indication of the expectations of businessmen as to the profitability of investment projects in the near future. The greater is the short-term business expectations factor, the greater is (induced) investment. 4) The marginal propensity to consume describes the consumption habits of consumers in the economy. It indicates the portion of each unit of extra income that consumers will spend on consumption. The greater is the marginal propensity to consume, the greater is the increment in consumption that results from a given increment in income. The rate of depreciation and obsolescence of productive capacity (5), the rate of interest on governmental debt (6), and the rate of population increase (7) are all self explanatory. These economic system parameters have considerable common sense meaning. Their technical role in our model economic system will be discussed in Chapter III.

The "Economic Report" is only part of the information with which we are supplied. A "Political Report" was also mentioned. It summarizes the reactions of various groups in our political system to the economic (and some other) events that occurred during the period just ending (i-1). It provides us with information as to how satisfied each of a number of different political interest groups is with the performance of the party in power and the programs of the parties out of power.

Look at the sample "Political Report" on page 23. At the left is a list of fourteen issues on which various of the groups' satisfaction is recorded. Not every group is concerned with every issue, of course. Only certain issues are deemed relevant. They are indicated by an entry in the column labelled "w" which is a "weight" indicating the relative importance of an issue to a group. The numbers entered in the cells of the table are measures of "group satisfaction" with the various parties with respect to various issues. Group satisfaction varies from a high of +3 to a low of -3 (extreme dissatisfaction). Zero is interpreted as indifference. At the bottom of the "Political Report" is entered the (weighted) mean satisfaction of each group with each party's performance and/or program over all relevant issues. Only two groups are shown here for illustrative purposes. In Chapter V our political system will be seen to contain many more such groups. The "Political Report" in actual operation of the simulation will contain the above mentioned information for each group.

Just prior to an election period we will receive an "Election Support Matrix." This document summarizes the tentative commitments of election support for the various parties made by each of the political interest groups. Here the groups have made a choice as to the party that has pleased them most over the periods since the last election. The extent of a group's enthusiasm for that particular party is indicated by a number entered in the appropriate cell of the matrix. The index of election support varies in our three

POLITICAL REPORT

Period _____

Issues	GROUP I				GROUP II			
		Party				Party		
	w	A	B	C	w	A	B	C
1 per cent change in Gross National Product								
2 per cent change in per capita income								
3 degree of income equality								
4 equalitarian-ness of tax structure								
5 equalitarian-ness of regulatory structure								
6 level of unemployment								
7 total government spending and taxes								
8 government spending for military purposes								
9 government spending for business subsidies								
10 government spending for interest on the debt								
11 government spending for social welfare								
12 government spending for education								
13 size of the accumulated governmental debt								
14 anti-recession fiscal policies								
Mean group satisfaction								

ELECTION SUPPORT MATRIX

Period _____

Group	Level	Party A	Party B	Party C
I	V			
II	V			
III	V			
IV	V			
V	V			
VI	V			
. XIV	V			
Parametric Support				

party system from -3 to 15. The commitments described here are only tentative, however, in that a group can change its mind as a result of the performance and/or programs of the parties during the election period itself. The election does not take place until the end of the period in which it is scheduled. Note that along side of each group is an entry indicating the power of the group (v)-- that is, its ability to deliver votes for the party of its choice. Note also the row labelled "Parametric Support." This is a distribution of election support among the parties which is a given from the viewpoint of the decision-maker. It is a reflection of issues which are not part of our political economic system.

The actual results of an election are reported on yet another form-- an "Election Review" at the end of the election period. This document is similar to the "Election Support Matrix," but its entries are actual votes and it has no group power data.

Having studied the information in these documents, we are now ready to consider the policy decisions that will be called for at the beginning of period i. As governmental decision-makers we shall have to arrive at some objectives for our political-economic system. None are prescribed in the simulation. We are free to do what we think should be done. However, the groups of people in our political system do have some preferences concerning what should be done. This we just saw. Unless we formulate policies that will please enough of them enough of the time to gain enough support to win an election, our tenure in office will be short lived.

ELECTION REVIEW

Period _____

		Party A	Party B	Party C
Parametric Support (votes)				
Votes Delivered by Various Interest Groups	I			
	II			
	III			
	IV			
	V			
	 XIV			
Total Votes				

What are the policy alternatives from which we, as decision-makers, may choose? The list is short, this being a simplified political-economic system (see p.28). Essentially, we can spend, we can tax, and we can pass laws. The overall levels of government spending and taxation (I. and II.) are important for their effects on Gross National Product (GNP) and on the distribution of income. The allocation of expenditures among the five competing uses also affects the distribution. In making a decision as to changes in the tax structure (III) we are deciding how the total tax burden will be spread among our people-- "equalitarian-ness" referring to the net effect of all taxes on the income distribution. Finally, we can decide to alter the nature of the complex of laws and rules regulating commerce and industry (item IV.). The effects are quite similar as with the tax structure. The current nature of both the tax and the regulatory structures will be carried over to this decision sheet from the last one.

What about our opposition? Reference has been made in several places to "party programs." How do the groups of (conceptual) people in our political system learn of the programs formulated by parties which are out of office? The party heads simply complete a decision format just like the one we use as governmental decision-makers. Of course, these party programs have no actual effect on the economic system. They serve only as political platforms.

This brings us to the point of submitting our policy decisions to the "machine."

GOVERNMENTAL DECISIONS

Party in power:_____ Period _____

I. TOTAL GOVERNMENT EXPENDITURES (G)_____

A. Military expenditures (G_m)_____

B. Business Subsidies (G_s)_____

C. Interest on the government debt (G_d)_____

D. Social welfare expenditures (G_w)_____

E. Education expenditures (G_e)_____

II. TOTAL TAX REVENUE (T)_____

III. TAX STRUCTURE (TS)

(circle one)

-5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5

highly inequalitarian — highly equalitarian

IV. REGULATORY STRUCTURE (RS)

(circle one)

-5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5

highly inequalitarian — highly equalitarian

PARTY PROGRAM

Party _____ Period _____

I. TOTAL GOVERNMENT EXPENDITURES (G)_____

A. Military expenditures (G_m)_____

B. Business Subsidies (G_s)_____

C. Interest on the government debt (G_d)_____

D. Social welfare expenditures (G_w)_____

E. Education expenditures (G_e)_____

II. TOTAL TAX REVENUE (T)_____

III. TAX STRUCTURE (TS)

(circle one)

-5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5

highly inequalitarian — highly equalitarian

IV. REGULATORY STRUCTURE (RS)

(circle one)

-5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5

highly inequalitarian — highly equalitarian

Chapter III

THE ECONOMIC SYSTEM

In the overview of the political-economic system simulation we went lightly over the things that occur in the economic system. In this chapter we turn to a closer examination of these economic workings.

Before we begin, however, one of several assumptions embodied in our model economic system should be made explicit. It concerns the units (numbers) in terms of which all of the system's component variables are expressed. These numbers are assumed throughout this work to represent the money value of real wealth, where the monetary unit has constant value. For example, if we say income is 100, we mean that the money value of real income in terms of, say, dollars which never vary in value, is ($)100. In this manner we by-pass the complexities of the monetary system and of prices. In effect, we speak as though the numbers are homogenous units of real wealth.

I. The Circular Flow of Income and Expenditures[9]

In Figure 3.1, the conceptual scheme for the political economic system as a whole has been reproduced (from Figure 2.1). It will be seen, however, that the boundaries of the two main systems have been faded into the background so as to highlight the component parts. In addition, the political system is being "held constant," so to speak (unchanged from Figure 2.1), while we focus our attention on an enlargement of the economic system. The contents of the latter box will be recognized by most readers as a familiar "circular flow of income and expenditures" diagram.

Look, if you will, at the two boxes in the economic system-- the "household sector" and the "business sector." Note also the flow lines that link them. All of the income received by households goes for consumption expenditures (C). Since what is consumed in the household sector has to be produced in the business sector, aggregate production is equal to consumption expenditures. But at the same time the total value of aggregate production is paid out by businesses to those who contribute to the productive process-- to the owners of the factors of production. Then, if "Gross National Product" (GNP) is the (constant) money value of aggregate production, it is also the

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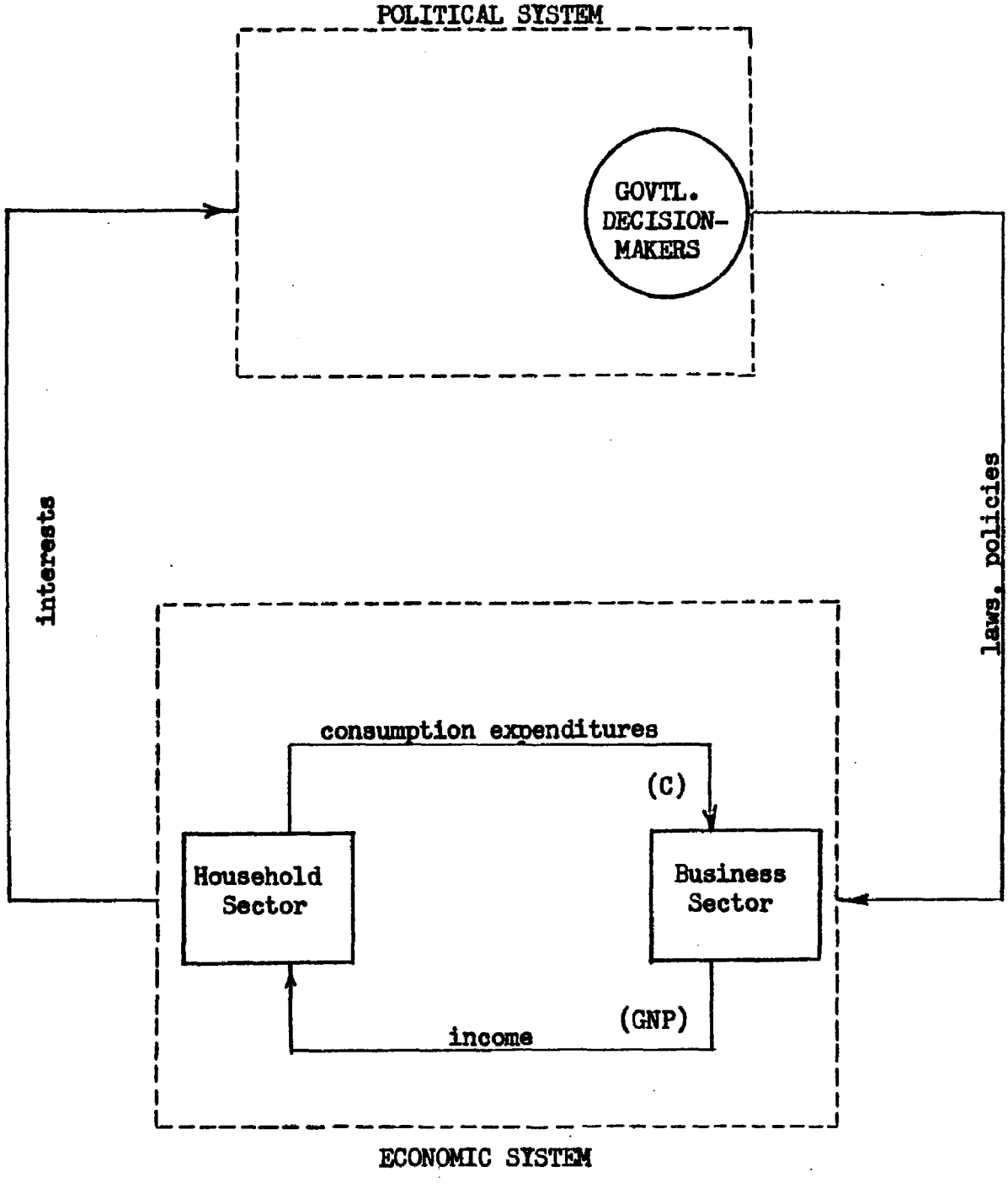
[9]The following discussion presupposes little more than basic familiarity with modern income and expenditure theory. The reader who feels the need for review is referred to any basic economics text, for example: Bach, George L., Economics: An Introduction to Analysis and Policy, Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1960, chapters 11 and 13. The more advanced reader is referred to the appendix where the complete model underlying the discussion is stated in mathematical form.

Figure 3.1

Closed Circular Flow of Income and Expenditures



income that businesses distribute among households. Everyone in the business sector also lives in a household. The distinction between the two sectors is an analytic one. As long as households in the aggregate continue to spend all of their income, the next time around this circular flow will produce the same result. Income will continue to equal consumption expenditures (C). The latter, in turn, will continue to equal income the next time around, and so on. This simple system is in "income equilibrium."

In terms of the conceptual scheme in Figure 3.1, where does a period start and end? A period starts after the income flow crosses the boundary of the household sector and before it leaves that sector in the form of consumption expenditures. The period ends at the same place after one "loop," at which point a new period begins. That is, if "i" refers to the time period, then:

$$GNP_i = C_i \ ,$$

but:

$$C_i = GNP_{i-1} \ . \tag{3.1}$$

Thus,

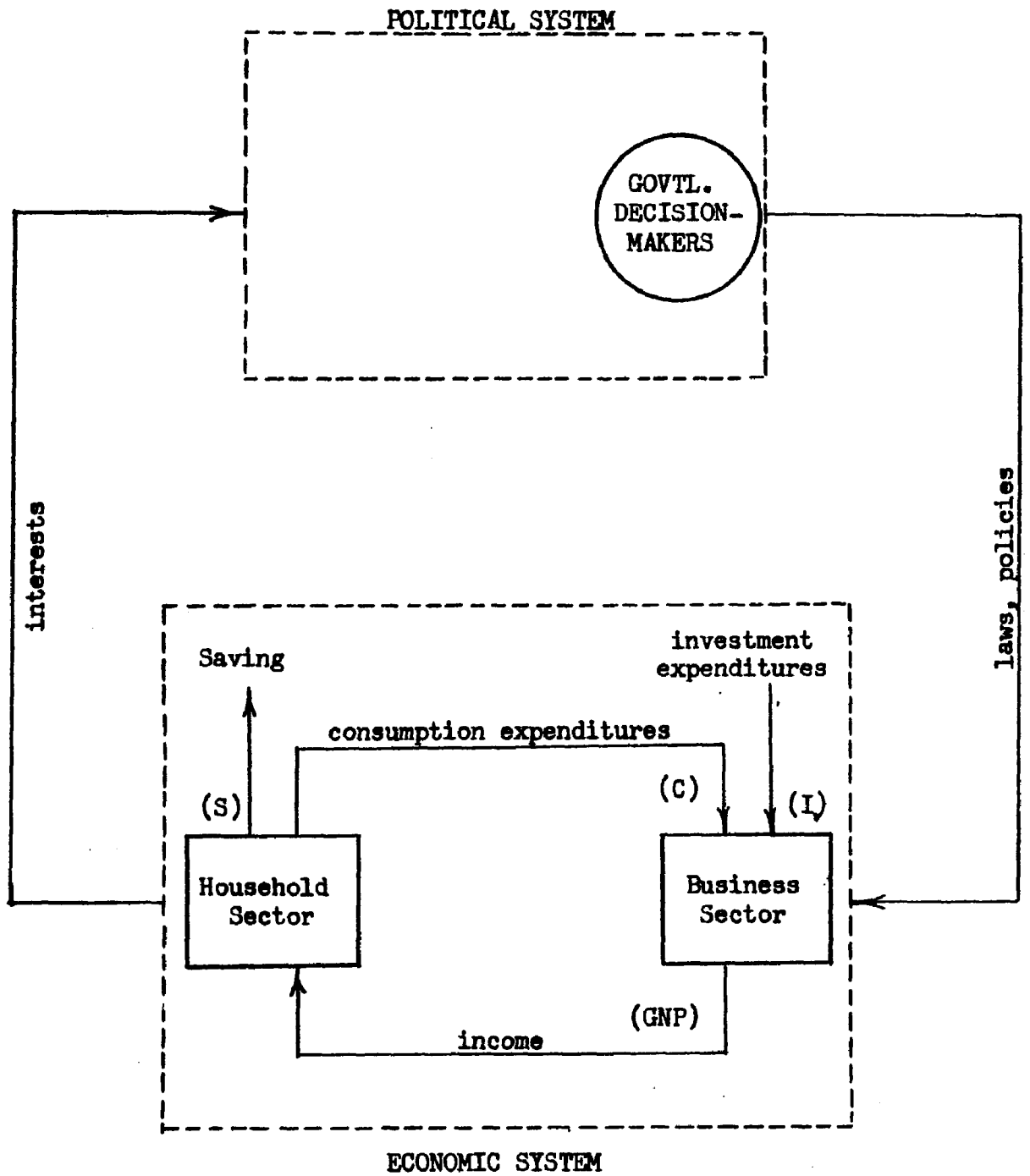
$$GNP_i = GNP_{i-1} \tag{3.2}$$

describes income equilibrium.

Now let us consider the case where this circular flow "springs a leak" in some period, i (Figure 3.2). Assume, for example, that some

Figure 3.2

Open Circular Flow of Income and Expenditures



portion, say, 10 per cent, of income is saved by households instead of being spent for current consumption. That is,

$$S_i = .10\ GNP_{i-1} \tag{3.3}$$

where S = saving.

Consumption expenditures would thus be reduced to the remaining 90 per cent of income. What is not saved is spent and vice versa. Thus,

$$C_i = .90\ GNP_{i-1} \tag{3.4}$$

This means, in turn, that Gross National Product (GNP_i) would decrease. Thus, consumption expenditures in period i+1 would also be less, even if 100 per cent of GNP_i were consumed.

An "injection" of investment expenditures (I) into the flow has the opposite effect. "Investment expenditures" refers to spending within the business sector for new plant and equipment.[10] Investment expenditures do not plug a saving leak. They simply pump new income into the flow.

For some particular equilibrium level of income to persist, any leaks in the flow must be compensated by some injection.

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[10]No other kinds of investment are incorporated in the model.

Conversely, any injection must be compensated by some leak. Otherwise, a new equilibrium will be sought. These equilibrium requirements are:

leaks = injections

that is,

(3.5) $$S_i = I_i$$

To this point our income-expenditure model may be summarized as:

income = expenditures

(3.6) $$GNP_i = C_i + I_i.$$

Investment expenditures (I) have been taken as given thus far. Consumption expenditures (C) are determined by the previous period's income, that is:

(3.6a) $$C_i = cGNP_{i-1}$$

where c = the marginal propensity to consume (mpc), that is, that portion of each extra unit of income which will be spent on consumption.

In the above example, equation 3.4, c = 0.90.

That portion of income which will not be spent on current consumption is (1.00 - c). This latter term is called the "marginal propensity to save." We may write:

$$S_i = (1.00 - c)GNP_{i-1}. \tag{3.7}$$

In the above example,,equation 3.3, (1.00 - c) = 0.10.

A numerical illustration will be helpful here. Let us say that the economic system is in equilibrium at the outset with Gross National Product of 100. The marginal propensity to consume, it is assumed, is 90 per cent. The marginal propensity to save is thus 10 per cent. Further, let us assume that investment expenditures are a constant 10 per period. Periods 1 and 2 in Table 1 show this equilibrium situation.

Now, let us introduce a disturbance of this equilibrium during period 3. Say that investment expenditures increase from 10 to 20 per period. Assuming all other conditions remain the same as they were before the disturbance, let us see what happens to income.

First of all, the business sector must increase production from 100 to 110 to meet the increase in total expenditures resulting from increased investment spending. This means that Gross National Product, which is the income distributed to the productive factor owners, also increases. The new income figure is 110 in period 3. Continuing with the same marginal propensity to consume (90 per cent)

Table 1

Numerical Example of Circular Flow of Income and Expenditures
(mpc = 0.90, mps = 0.10)

Period	Consumption(C) $C_i = .90\,GNP_{i-1}$	Saving(S) $S_i = .10\,GNP_{i-1}$	Investment(I)	Total Expenditures GNP = C + I
1	90	10	10	100
2	90	10	10	100
3	90	10	20	110
4	99	11	20	119
5	107.1	11.9	20	127.1
6	114.4	12.7	20	134.4
7	121.0	13.4	20	141.0
8	126.9	14.1	20	146.9
9	132.2	14.7	20	152.2
10	137.0	15.2	20	157.0
11	141.3	15.7	20	161.3
12	145.2	16.1	20	165.2
13	148.7	16.5	20	168.7
•				
•				
•				
•				
n	180	20	20	200

and marginal propensity to save (10 per cent), saving, in period 4 increases from 10 to 11. Consumption spending increases from 90 to 99. Put differently, the 10 of extra income from period 3 is divided by households in period 4, 90 per cent (9) going for increased consumption spending and 10 per cent (1) going for increased saving.

Let us continue to trace through the flow. With consumption expenditures up to 99 and with continuing investment expenditures of 20, total expenditures and gross national product in period 4 are 119, 19 above the original level. In period 5, then, saving becomes 11.9, while consumption spending is 107.1. Total expenditures in period 5 are 107.1 plus the continuing level of investment spending of 20--that is, total expenditures are 127.1. And so it goes on, as in Table 1.

It should be clear from this example that an increase in investment expenditures, all other things unchanged, produces increased income. Moreover, income increases by far more than the increase of 10 in investment expenditures that initiated it. It is seen still to be growing ten periods later, although at a lesser rate. This happens even though investment is constant at the new level of 20. Will income ever stop growing? Will it find a new equilibrium level after this disturbance in period 1? The answer is yes. Still assuming no changes in the marginal propensities to consume (c) and to save (1.00 - c), income will settle into a new equilibrium when it has increased to the point where 10 per cent (1.00 - c) of it, which is <u>saving</u>, <u>equals</u> 20, which is the new level

of investment. This is precisely the equilibrium requirement described by (3.5). It is satisfied in some future period, n, when income is 200. Thus, an increase in investment expenditures of 10 has the final effect of increasing income by 100, a multiple of 10 times the increase in investment.

Here we encounter a very important macroeconomic concept, the Keynesian multiplier. Briefly, here, it is derived in our model. The equilibrium condition was seen in (3.5) to be: $S = I$. Given an increase in investment (ΔI) the economic system will not find a new equilibrium until saving increases (ΔS) such that:

$$S + \Delta S = I + \Delta I. \tag{3.8}$$

Since $S = I$ at the start, it follows that:

$$\Delta S = \Delta I. \tag{3.9}$$

This is the condition that must obtain by way of equilibrating changes. How large an increase in income (ΔGNP) must occur for the portion of that increase which is saved ($1.00 - c$) to equal ΔS?

$$\Delta S = (1.00-c)\Delta GNP$$

Substituting from (3.9),

$$\Delta I = (1.00-c)\Delta GNP$$

and

$$\Delta GNP = \frac{1}{(1.00-c)}\Delta I. \tag{3.10}$$

That is to say, an increase in investment (ΔI) sets off a reiterative process of income growth which continues until income has increased (Δ GNP) by an amount equal to the product of the increase in investment and the reciprocal of the marginal propensity to save. The term: $\frac{1}{(1.00-c)}$, in (3.10), is the "multiplier." In our numerical example:

$$\Delta GNP = \frac{1}{0.10}\ \Delta I$$

$$= 10\ \Delta I$$

$$\Delta GNP = 100.$$

It must be stressed in the present discussion that the multiplier is a double-edged sword. If the change in investment in our example had been negative instead of positive, the resulting change in Gross National Product would have been a negative multiple of that change. That is, if:

$$\Delta I = -10$$

then $$\Delta GNP = \frac{1}{0.10}(-10)$$

$$= 10(-10)$$

$$\Delta GNP = -100.$$

It should also be noted that, thus far, our model economic system is a stable one. The disturbance of an initial equilibrium is absorbed by the system as it seeks out a new equilibrium level of income. This is perhaps better seen if we plot income against time (Figure 3.3) using the figures from Table 1.

In the overview of the simulation (Chapter II) it was suggested that the countless decisions of individual economic actors may be described in aggregate terms by theoretical formulae. Before leaving the household sector two such system decision rules should be underlined. They are the aggregate consumption expenditures decision:

$$C_i = cGNP_{i-1} \qquad (3.6a)$$

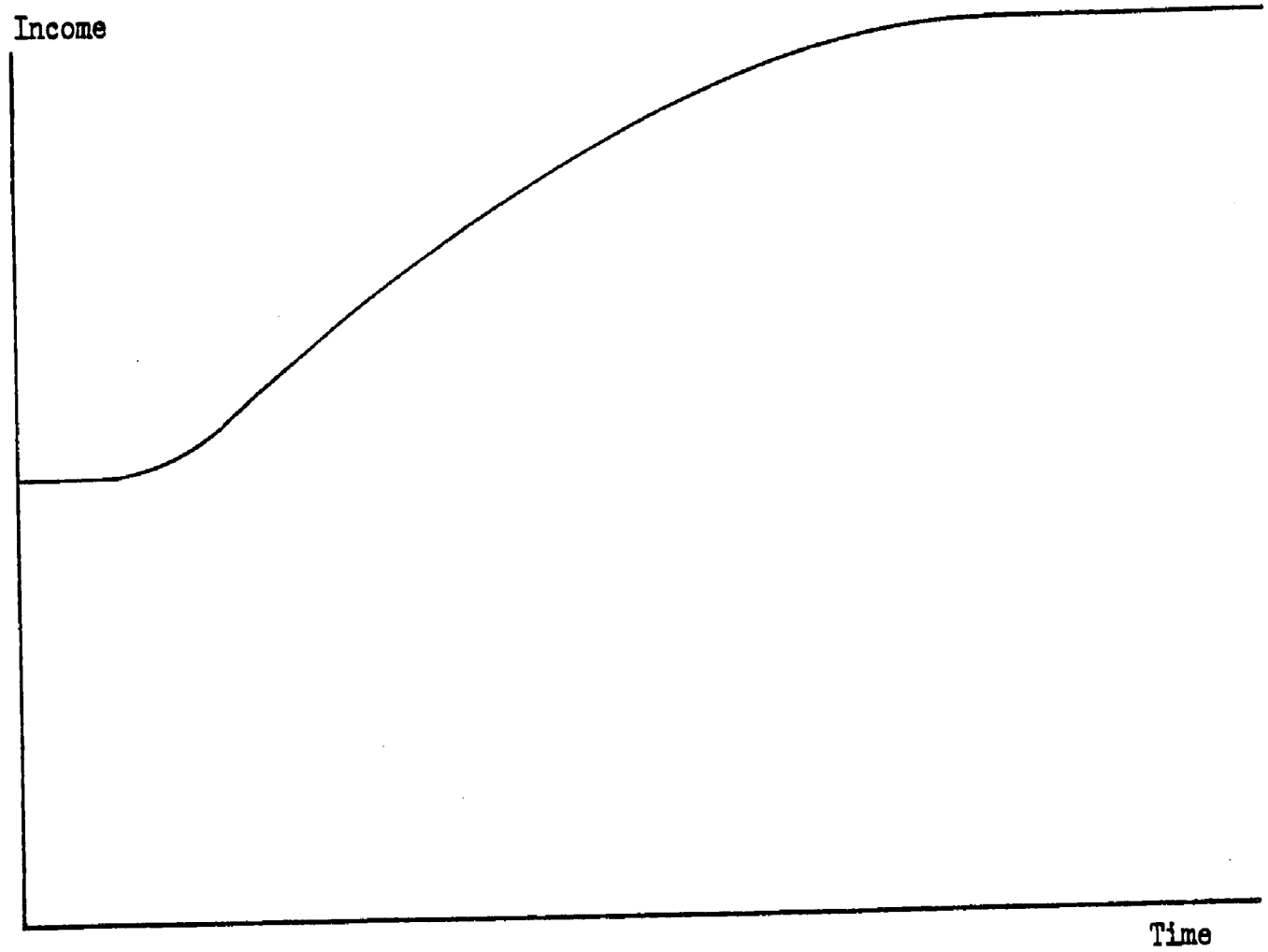
and the aggregate saving decision:

$$S_i = (1.00-c)GNP_{i-1}. \qquad (3.7)$$

each, it will be noted, is time-lagged.

Figure 3.3

Plot of Table 1 Data



II. The Business Sector: Investment and Employment

In the present section we shall examine two other aggregate decisions, this time in the business sector. They are decisions as to the level of investment and the level of employment. But before we get to these decisions, the way must be prepared.

It is assumed to begin that the production of the goods and services which make up Gross National Product is carried out with two productive factors: labor, and capital plant and equipment.[11] Let us assume further that these two productive factors are always utilized in constant, equal proportions. Thus with each unit of capital there must be combined one unit of labor. There can be no additions to the stock of capital without equal additions to the level of employment. And there can be no additions to the level of employment without additions to the stock of capital.

In effect, then, it is as though production were accomplished by "bundles" of productive capacity, each bundle being composed of labor and capital in a fixed, one-to-one ratio. Call each of these bundles a "productive capacity" unit (PC). One productive capacity unit consists in one unit, say, one man-hour of employed labor and one unit of capital. That is:

(3.11) $$1\ PC = (1\ \text{employed labor},\ 1\ \text{capital}).$$

---

[11] Inventories, stock holdings, and other kinds of capital are not taken into account in the model.

Thus, for example, if productive capacity is 50, labor is 50 and capital is 50.

Now, consider the following, technologically determined state of affairs. The maximum amount of output (Gross National Product) obtainable per unit of productive capacity (PC) is some number, a. That is:

$$GNP/PC = a. \tag{3.12}$$

Then, in aggregate terms:

$$GNP_{max_i} = aPC_i \tag{3.12a}$$

where GNP_{max_i} = maximum Gross National Product in period i,

PC_i = total productive capacity in period i,

a = the average productivity of capital and labor (PC bundles).

The expression (3.12a) is what economists call an aggregate "production function." It states the maximum Gross National Product obtainable from any given productive capacity figure. This is the total value of goods and services that the business sector is able to supply in period i. We may think of it, then, as aggregate supply.

On the other hand, we have the earlier expression:

$$GNP_i = C_i + I_i \tag{3.6}$$

Here Gross National Product is the sum of all expenditures in the economy-- the consumption expenditures by households and investment expenditures by business firms. These expenditures constitute the total effective demand for goods and services. Their sum (GNP_i) may be viewed as the aggregate demand for goods and services which is actually realized during period i.

Aggregate demand (GNP) and aggregate supply (GNP_{max}) clearly are independent of each other. The possibility thus arises that they may not be equal. What happens then? It depends upon which is larger, demand or supply. If aggregate demand exceeds supply-- ($GNP - GNP_{max}$) is positive-- business firms will be motivated to expand output. They can sell more than can be efficiently produced with existing capacity. They will thus add to their productive capacity by increasing their stock of capital and thus employed labor. Aggregate supply (GNP_{max}) will increase as a result. If, on the other hand, aggregate supply exceeds demand-- ($GNP - GNP_{max}$) is negative-- the opposite will happen. Business firms can efficiently make more than they can sell. They have excess productive capacity relative to demand. Rather than incur the costs of this excess capacity, they prefer to let it depreciate away. Aggregate supply (GNP_{max}) thus is reduced. Only when supply exactly equals demand ($GNP_{max} = GNP$) is there no change in productive capacity. Only then does an equilibrium condition exist.

Thus we see that changes in productive capacity depend upon the difference between aggregate demand and aggregate supply. In

order to see more clearly the nature of this dependence, we must look again at the technological relationship expressed in (3.12a):

$$GNP/PC = a.$$

By algebra:

$$PC = \frac{1}{a} GNP \tag{3.12b}$$

where $\frac{1}{a}$ = the "capital-labor coefficient"

The "capital-labor coefficient"-- the reciprocal of the average productivity of capital and labor-- tells us how many units of productive capacity are required per unit of output. With it we are able to determine, for any size discrepancy between aggregate demand and aggregate supply, by how much productive capacity must change (ΔPC) to remove the discrepancy-- that is, to bring demand and supply into equality. We simply use the following expression:

$$\Delta PC_i = \frac{1}{a} (GNP_i - GNP_{max_i}). \tag{3.13}$$

Equation (3.13) is one way of describing in aggregate terms how countless businessmen make their decisions to expand (or to contract) their firms' productive capacity. They add capital (invest) when the demand for their products is bouyant relative to their capacity to supply. With our assumption of constant, equal factor

proportions, this means that they create employment at the same time. When their ability to supply exceeds demand they allow existing capital to depreciate away with consequent decreases in employment opportunities.

This completes the basic logic of the theory of induced investment and employment that is part of our economic system. It is "induced" investment and employment because the consequent additions to (or deletions from) the stock of capital and employed labor are induced by changes in demand relative to supply.

There are, however, certain problems in this theory which require further attention. Consider equation (3.13). It says in effect that projects for expanding productive capacity are all completed in the same period, i, as that in which an excess of demand over supply emerged. This is a questionable assumption. A more realistic one is that only a portion, say, b, of the desired increase in productive capacity can be brought into operation in the same period in which the projects were initiated. The remaining portion, 1.00-b, is spread out over future time periods. If we accept this reasoning, (3.13) is ammended to read:

$$(3.14) \qquad \Delta PC_i = b\left[\frac{1}{a}(GNP_i - GNP_{max_i})\right]$$

where b = the investment lag factor and is equal to or less than 1.0.

But this is not all that is wrong with this theory. Since the aggregate demand (GNP_i) is the sum of all expenditures that went on throughout period i ($C_i + I_i$), it can only be determined at the end of period i. How, then, can this sum serve as a basis for investment decisions that were also made throughout the same period? Clearly it cannot. The actual value of aggregate demand during period i is not available until period i is past. Businessmen must base their decisions during period i upon their expectations of total demand in i.

A model of business expectations is seen in equation (3.15).

$$\overline{GNP}_i = GNP_{i-1} + b'(GNP_{i-1} - GNP_{i-2}) \tag{3.15}$$

where $\overline{GNP}_i$ = expected demand in period i.

b' = short term business expectations factor, and is less than or equal to 1.0.

According to this expression, businessmen base their estimate of demand in period i on: 1) the magnitude of actual demand in the previous period, i-1, and 2) an estimate of the change in demand that will be recorded between the previous period (i-1) and the present period (i). This estimate is simply the change in demand between periods i-2 and i-1 discounted by the short term business expectations factor.

Let us amend our theory of induced investment and employment to take what has just been said into account.

(3.16) $$\Delta PC_i = \frac{b}{a}(\overline{GNP}_i - GNP_{max_i})$$

Before we move on, let us take note of a different interpretation of this theory of induced investment and employment. Rearranging (3.16) we have:

$$\Delta PC_i = b\left[\frac{1}{a}(\overline{GNP}_i) - \frac{1}{a}(GNP_{max_i})\right].$$

Substituting from (3.12a):

(3.17) $$\Delta PC_i = b(PC^*_i - PC_i)$$

where PC* = the amount of productive capacity required to produce the estimated level demand for output-- or, "desired productive capacity."

Here the process of bringing supply and demand together is seen alternatively as the adjustment by the business community of actual productive capacity so that it equals desired productive capacity.

Induced investment is to be distinguished from "autonomous investment." Autonomous investment is more of a long-term phenomenon. It is autonomous in the sense that it is not connected with current demand and supply conditions. Historically, in the real world, it has coincided with such things as: the discovery and settlement of

new territory, technological innovation and invention, the discovery of natural resources, the degree of competition from within and without, capital replacement cycles, domestic and international political conditions, the attitude of government toward business, etc., etc. In short, autonomous investment is determined by the countless things in a capitalist society which can influence the long-term expectations of the business community as to the profitability of business ventures. Autonomous investment reflects the business climate of the times.

Being influenced by as many factors as it is, it is no wonder that autonomous investment varies in a manner that is difficult to predict. It is not altogether random, however. There are trends over varying periods of time. And, as was suggested, there are trends in autonomous investment which reflect the business community's perception of the business climate and government's role in shaping that climate. Since fixed factor proportions are assumed in our model, autonomous investment in new plant and equipment is accompanied by new employment opportunities— that is, by increases in the level of employed labor. The effect of autonomous investments, then, is to increase productive capacity.

We may now define total investment expenditures (I), part of the income-expenditure flow described in Section I of this chapter.

$$I_i = \Delta PC_i + \delta PC_i \tag{3.18}$$

where δPC = autonomous investment
ΔPC = induced investment

The actual adjustment of the economy's productive capacity to the level desired to meet current demand involves nothing more than the addition of total investment to the depreciated accumulation of productive capacity. If, as was indicated in the preceding discussion, the process of adjustment goes on continuously throughout the period, then at the end of any period, i:

$$PC_i = (1.00-d)PC_{i_{beg}} + I_i$$

where d = the per period rate of depreciation and obsolescence of productive capacity.

Since the beginning of period i coincides with the end of i-1:

(3.19) $$PC_i = (1.00-d)PC_{i-1} + I_i.$$

That is, the level of accumulated productive capacity at the end of any period, i, equals the depreciated level at which the previous period, i-1, ended plus total investment during i. If businessmen allow the rate of investment to fall below the rate of productive capacity loss from depreciation and obsolescence, "disinvestment" is said to occur (negative I). Since one productive capacity unit (PC) consists in one unit of capital and one unit of employed labor:

(3.20) $$K_i = PC_i$$

and

(3.21) $$Le_i = PC_i$$

where K = the accumulated stock of capital,

Le = the level of employed labor.

The paper people who inhabit our model political-economic system may now be introduced. It is simply assumed that there exists a total population, P. Population changes are described by the following expression:

$$P_i = P_{i-1} + r(P_{i-1})$$

(3.22) $$P_i = (1+r)P_{i-1}$$

where r = the rate of population increase.

Now, suppose that there exists at any given time in the economic system a maximum number of units of labor available for productive use. Call this the "potential labor" force (Lp). Changes in the potential labor force are described by

$$Lp_i = Lp_{i-1} + r(Lp_{i-1})$$

(3.23) $$Lp_i = (1+r)Lp_{i-1}$$

We assume for simplicity that the potential labor force increases at the same rate as population, and the size of the potential labor

force depends upon the size of total population. But labor units, it will be recalled, are man-hours, not men.

From (3.21) it is seen that the level of employed labor is determined by investment. We have just seen (3.23) that the potential labor force depends upon population. Since the two are independently determined, the possibility arises of a difference between them.

(3.24) $$Lu_i = Lp_i - Le_i$$

where Lu = unemployed labor.

Clearly, this equation is constrained by the fact that employed labor cannot exceed in size the potential labor force. That is:

$$Le_i \leq Lp_i$$

It follows that:

$$Lu_i \geq 0 \ .$$

This upper limit on employment, of course, defines a "full employment" condition. It is also an upper limit on productive capacity in general. For employed labor and capital are inextricably bound by our assumption of constant factor proportions. That is:

(3.25) $$PC_i \leq Lp_i$$

and

$$K_i \leq Lp_i$$

Summary of Business Sector

This completes the exposition of the model economic system. Let us now try to regain some perspective and view the economic system as a whole. In the first section of this chapter the characteristic behavior of Gross National Product was shown when the model contained no elaborated business sector-- that is, no theory of investment and employment decisions. We have now supplied such a theory. Let us see now whether it has affected the overall properties of the economic system.

Table 2 and Figure 3.4 summarize a numerical example computed from the expanded model.[12] It is immediately apparent, upon comparison with Table 1 and Figure 3.3 (pp. 38 and 43), that the characteristics of Gross National Product have indeed been altered. The disturbance of a steady state by the injection of a constant rate of autonomous investment sets off a series of oscillatory variations in Gross National Product. Far from achieving a new equilibrium, Gross National Product is seen to continue its cyclical path into the indefinite future. What causes this peculiar behavior? Essentially, it is the theory of induced investment and employment that was explicated above. In combination with the multiplier (Section I), induced investment profoundly alters the properties of our model.

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[12]For technical reasons the values of variables and parameters differ from those used in the first example.

Table 2

Numerical Example of Complete Economic System

($a = 0.5$, $b = 0.95$, $b' = 1.0$, $c = 0.8$)

Period	Consumption(C)	Savings(S)	Total Investment (I) ΔPC +	δPC	Total Expenditures (GNP)
1	100	0	0	10	100
2	100	0	0	10	100
3	100	0	0	11	100.5
4	100.4	0.1	0.95	11	101.45
5	101.16	0.29	1.8	11	102.78
6	102.22	0.56	2.53	11	104.4
7	103.52	0.88	3.08	11	106.22
8	104.98	1.24	3.46	11	108.15
9	106.52	1.63	3.67	11	110.07
10	108.06	2.01	3.65	11	111.89
11	109.51	2.38	3.46	11	113.52
12	110.82	2.7	3.1	11	114.9
13	111.92	2.98	2.62	11	115.96
14	112.77	3.19	2.01	11	116.67
15	113.34	3.33	1.35	11	117.01
16	113.61	3.4	0.65	11	116.98
17	113.58	3.4	-0.57	11	116.35
18	113.08	3.27	-1.2	11	115.54
19	112.43	3.11	-1.54	11	114.39

Table 2

(continued)

Period	Consumption(C)	Savings(S)	Total Investment (I) ΔPC + δPC		Total Expenditures (GNP)
20	111.51	2.88	-2.18	11	113.08
21	110.46	2.62	-2.49	11	111.68
22	109.34	2.34	-2.66	11	110.26
23	108.21	2.05	-2.7	11	108.9
24	107.12	1.78	-2.58	11	107.66
25	106.13	1.53	-2.36	11	106.6
26	105.28	1.32	-2.01	11	105.76
27	104.61	1.15	-1.6	11	105.18
28	104.14	1.04	-1.1	11	104.86
29	103.89	0.97	-0.61	11	104.82
30	103.86	0.96	-0.08	11	105.04
31	104.03	1.01	0.42	11	105.5
32	104.4	1.1	0.87	11	106.16
33	104.93	1.23	1.25	11	106.98
34	105.58	1.4	1.56	11	107.9
35	106.32	1.58	1.75	11	108.88
36	107.1	1.78	1.86	11	109.87
37	107.9	1.97	1.88	11	110.82
38	108.66	2.16	1.8	11	111.68
39	109.34	2.34	1.63	11	112.4
40	109.92	2.48	1.37	11	112.97

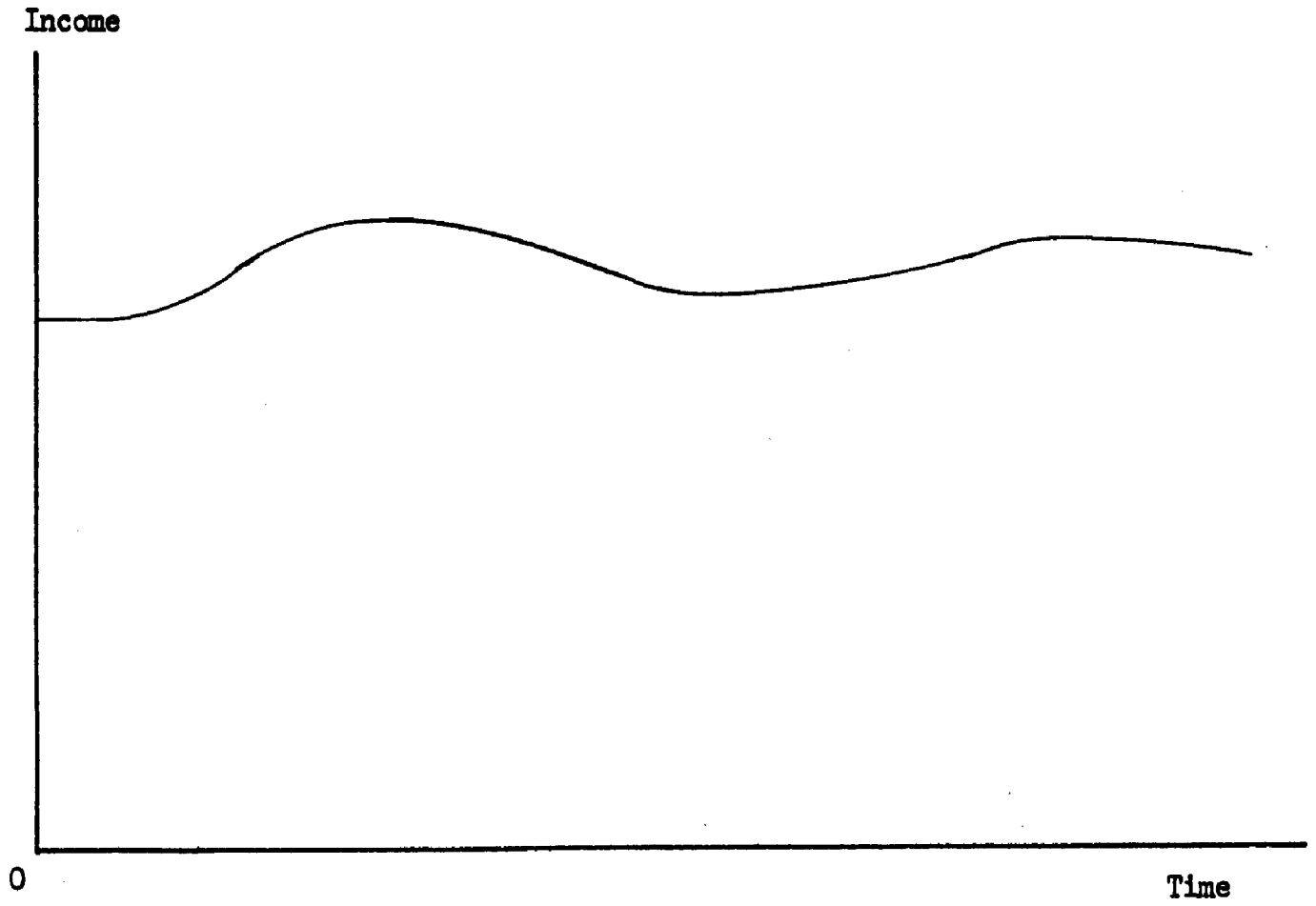
Table 2

(continued)

Period	Consumption(C)	Savings(S)	Total Investment (I) ΔPC + δPC		Total Expenditures (GNP)
41	110.38	2.59	1.08	11	113.36
42	110.69	2.67	0.74	11	113.56
43	110.85	2.71	0.38	11	113.57
44	110.86	2.71	0.04	11	113.41
45	110.73	2.68	-0.3	11	113.09
46	110.47	2.62	-0.61	11	112.63
47	110.1	2.53	-0.87	11	112.06
48	109.65	2.41	-1.08	11	111.42
49	109.14	2.28	-1.22	11	110.74
50	108.59	2.15	-1.29	11	110.06

Figure 3.4

Plot of Table 2 Data



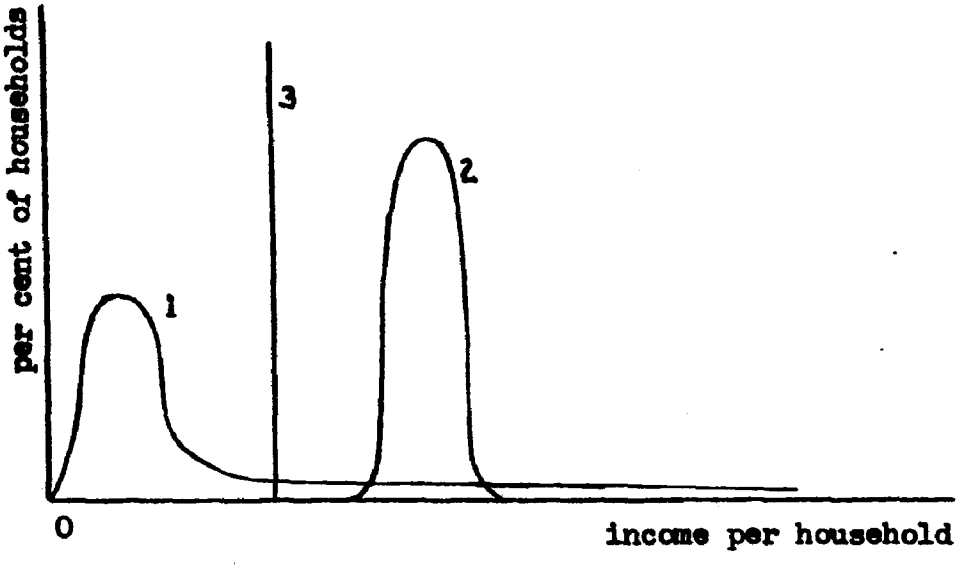
III. The Distribution of Income

The foregoing discussion was primarily concerned with changes in the size of national income (GNP) through time. But size, or magnitude, is only one aspect of income. It was suggested in chapter II that the distribution of income among income earning units is equally important. For, the way income is parcelled out among households will be seen to constitute an important determinant of political action.

The provisions made in our model economy for the distribution of income are quite simple. It is assumed that there is a family of possible income distributions varying in the degree of equality of income among households. Call the degree of income equality E. When E = 10, perfect equality prevails. When E = 0, maximum inequality exists. Figure 3.5 illustrates some possible members of this family.

Figure 3.5

Some Income Distributions



Distribution 1 says that by far the greater percentage of households receive relatively little income while a small percentage of households receive large income. The degree of income equality, E, is low. Distribution 2, on the other hand, describes a state of affairs where all households fall within a small range of income; the degree of income equality, E, is high. Perfect equality, E = 10, among income earning units would be a straight line at the mean level of income, as distribution 3. In these examples the relative position of the central tendencies of the distributions is of no importance. They are spread out only for clarity of exposition.

Many factors contribute to the degree of equality of the income distribution. Some of them flow from the characteristics of the model economy itself. The influence of inflationary and deflationary movements in Gross National Product are examples. While the model has no monetary system, the rate of change-- plus or minus-- in Gross National Product may be used as a rough measure of inflationary and/or deflationary trends. The level of unemployment is an explicit variable in the model and also affects the distribution of income. There are still other, more fundamental, factors which have to do with the nature of the social structure itself-- social stratification, castes, etc. Finally, the activities of government may greatly affect the income distribution. All of these factors will receive more systematic treatment in the next chapter (p.67 ff.).

Chapter IV

LINKS BETWEEN THE ECONOMIC AND POLITICAL SYSTEMS

It will be recalled from our earlier discussion (Chapter II) that the economic and political systems are related by their respective inputs and outputs. The principle outputs of the political system were seen to be policies and laws affecting the economic system. The principle outputs of the economic system are "interests" centering on the distribution of income. These interests provide the impetus for political action, which in turn influences the formation of policies and laws by government. Policies and laws, in their turn, affect the distribution of income. The previous chapter dealt with the economic processes which generate and distribute income (GNP). The following chapter will deal with the political processes which yield policies and laws. Here we shall discuss the relationships between the two systems, starting with political system outputs.

I. Political System Outputs: Fiscal Policies and Laws

Simply put, the fiscal policy alternatives of government are: 1) to spend, and 2) to tax. Let us incorporate these in our model.

(4.1) $$GNP_i = C_i + I_i + G_i$$

and

(4.2) $$C_i = c(GNP_{i-1} - T_i)$$

where G = total government expenditures

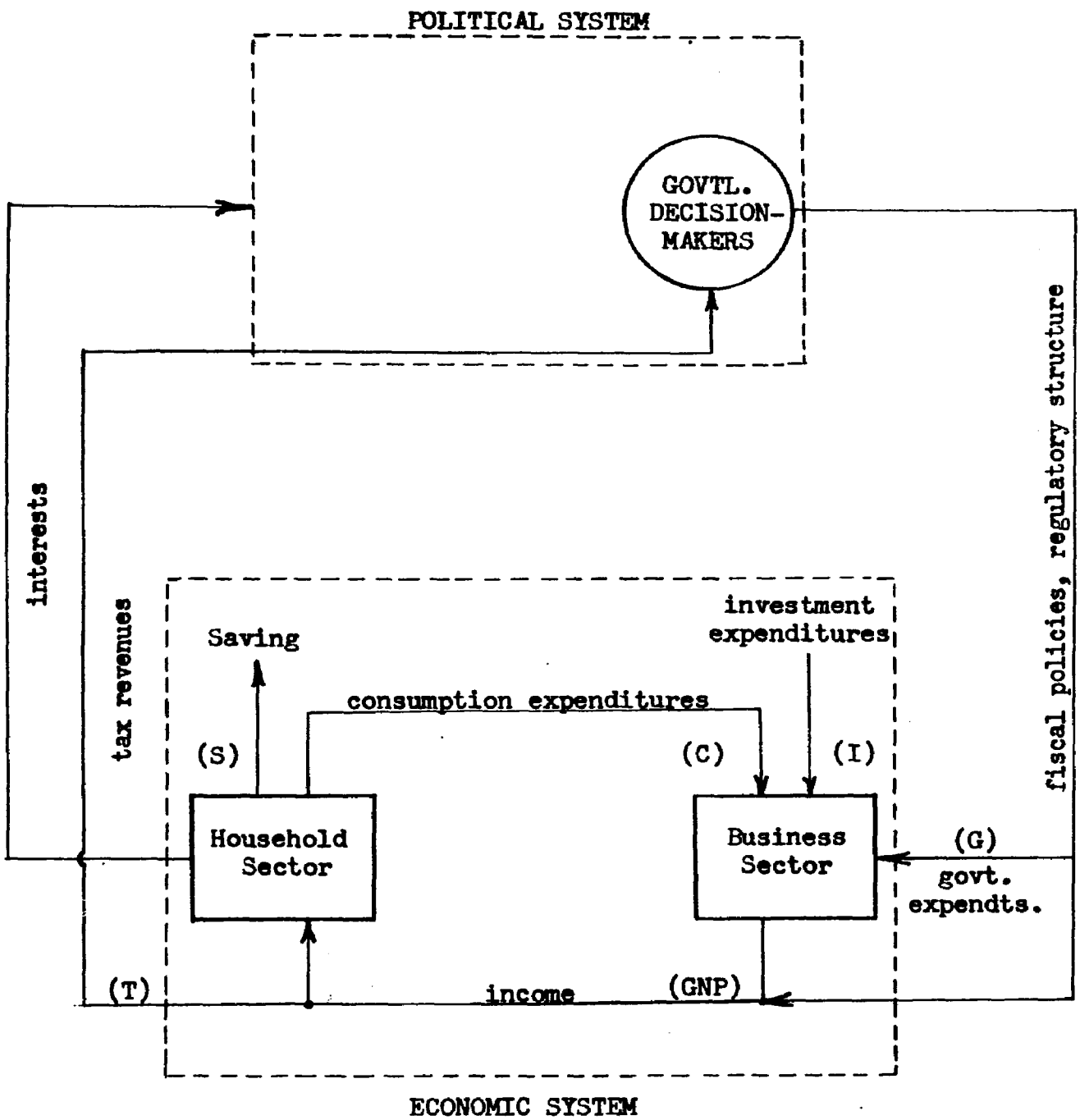
T = total government tax revenues.

Here, and Figure 4.1, tax revenues are seen as a "leak" from the income-expenditure flow (to government). The expression $(GNP_{i-1} - T_i)$ is the "disposable income" in period i from which consumption expenditures and saving are made. Government expenditures simply join with the other two kinds of expenditures-- consumption and investment-- in making up total expenditures-- that is, Gross National Product. At the beginning of each period government (the simulation participant) makes decisions as to the level of government spending and taxation.

In the simulated world as in the real world, these two fiscal policy options may be used by a government which seeks to smooth out cyclical fluctuations in Gross National Product as those seen in the previous chapter. Put differently, spending and taxation are two important tools in the hands of a government which seeks to maintain a steadily growing prosperity. The trick, of course, is to know how much to spend and when. It is not our intention here to discuss the problems of national income stabilization. But it is important to point out the general effects of government spending and taxation on the model economic system as it has been developed here.

Figure 4.1

Open Circular Flow with Political System Links



The first thing to be noted about government spending and taxation is that both have multiplier effects on income. The effects of government expenditures are positive, while taxation has negative effects. However, the expansionary impact of a given change in government spending is not completely off-set by the contractionary effect of an equal amount of taxes. That is, when government's budget is balanced ($G_i = T_i$) there is still a small net increase in income after both the positive and negative multipliers have worked themselves out. This occurs because, with a balanced budget, government spends 100 per cent of its income (tax revenues), whereas households would have spent less than 100 per cent of that same income had it not been taxed away.[13] As noted, the resulting expansion of income is relatively small.

On the other hand, when the governmental budget is not balanced the multiplier effects may be considerable. Deficit spending ($G_i > T_i$) produces income expansion. A tax surplus ($T_i > G_i$) contracts income. Thus, deficit spending and tax surpluses, in the proper amounts and at the proper time, constitute two powerful tools in the hands of a government which seeks to fill in the valleys and level off the peaks of the income cycle.

The question of balance or imbalance in the governmental budget leads to a further elaboration of the model. It is assumed

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[13]This assumes that the marginal propensity to consume is less than 100 per cent ($c < 1.00$).

that the periodic budget deficits or tax surpluses are increments or decrements to an accumulated governmental debt, that is,

$$D_i = D_{i-1} + \Delta D_i \tag{4.3}$$

and

$$\Delta D_i = G_i - T_i \tag{4.4}$$

where D = the accumulated governmental debt.

When there is debt there are interest payments. In the case of the government debt these can be quite significant. Therefore, let us incorporate these into our model. It is assumed that, in undertaking any debt, government promises to pay interest at a constant rate per period. In any given period the total interest due on the accumulated government debt is:

$$\bar{G}_{d_i} = e(D_i) \tag{4.4a}$$

where $\bar{G}_{d_i}$ = interest due on the accumulated governmental debt in period i,

e = the interest rate on accumulated government debt.

$\bar{G}_d$ is to be distinguished from the actual interest payments, G_d (cf. p. 28).

Until the notion of interest on an accumulated governmental debt was introduced, there was little in our model economic system to distinguish governmental deficit spending from investment

spending. Since both have expansionary impact on income by way of the multiplier, the major economic difference until now was that investment adds directly to productive capacity, while government spending does so only indirectly by way of the investment induced by the increased demand it stimulates. Now, however, it has been seen that government may engage in deficit spending only at the economic cost of paying interest on its accumulated debt. There are political costs too. But they must wait until the next chapter.

Thus far we have been discussing government spending and taxation in aggregate terms. Let us look now at the details which underlie these aggregates. Government spending in our model may take several forms. There are: 1) military spending (G_m), that is, spending on an overall military capability; 2) government subsidies to business (G_s); 3) interest payments on the accumulated debt (G_d); 4) spending on social welfare (G_w); and 5) education expenditures (G_e). As far as the economy as a whole is concerned, all of these have the same effect. They are components of total government expenditures (see "Governmental Decisions" sheet, p.28 above).

However, in terms of the distribution of income, discussed at the end of the previous chapter, these components of government spending have differential effects. The first three work toward creating greater inequalities of income. In the case of military spending this is true because, typically, it is disproportionately done with large firms which are owned by relatively few, wealthy individuals. The same is generally true for business subsidies.

Interest on the debt also tends to increase the inequality of income because the holders of debt-- and the receivers of interest-- are relatively few and wealthy. The beneficiaries of social welfare and education expenditures, on the other hand, are typically, the relatively large group of lower income earners. Thus these kinds of government expenditures tend to increase income equality.

Turning to government taxation (T), the breakdown is different. Rather than distinguish among different types of taxes, our model simply puts the tax structure as a whole on a continuum, one pole of which (+5) represents a "highly equalitarian" overall tax structure, and the other pole of which (-5) represents a "highly inequalitarian" tax structure (cf. p.28). The terms refer, of course, to the impact of the incidence of taxes upon the distribution of income.

At the end of the last chapter (pp.60-61) it was seen that the principal characteristic of the distribution of national income as far as our model is concerned is the degree of equality of that distribution. It was also seen that the degree of equality of the income distribution is affected by inflationary movements in gross income, by unemployment, and by the nature of the social structure. Finally, it has just been indicated in the preceding paragraphs that the nature of governmental fiscal policies-- spending and taxation-- also affect the income distribution. It will be helpful at this point to develop a more systematic statement of these relationships.

First, let us consider the matter of inflation. It has been suggested that large increments in Gross National Product can be taken roughly as indicative of inflationary tendencies. The greater are such tendencies, the lower is the degree of equality of the income distribution (E). That is:

E_i is inversely related to $\left(\frac{GNP_i - GNP_{i-1}}{GNP_i} \right)$.

Second, the greater is the proportion of the potential labor force (L_p) that is unemployed (L_u), the less equal is the distribution of income. That is:

E_i is inversely related to $\left(\frac{L_{p_i}}{L_{u_i}} \right)$.

Third, the greater is the portion of the Gross National Product that government spends on the military (G_m), on business subsidies (G_s), and for interest payments on the debt (G_d), the lower is the degree of equality of the income distribution. That is:

E_i is inversely related to $\left(\frac{G_{m_i} + G_{s_i} + G_{d_i}}{GNP_i} \right)$.

Fourth, the greater is the portion of Gross National Product that government spends on social welfare (G_w) and on education (G_e), the greater is the equality of the income distribution. That is:

E_i is positively related to $\left(\frac{G_{w_i} + G_{e_i}}{GNP_i} \right)$.

Fifth, the more equalitarian is the tax structure (TS), the more equal is the distribution of income. That is:

E_i is positively related to TS.

Sixth, the greater is the equalitarian nature of the overall social structure (SS), the greater is the degree of equality of the income distribution. That is:

E_i is positively related to SS,

where SS may range from -5 to +5 and is a given as far as the simulation participant is concerned.

One more factor must be taken into account before these elements can be combined. Fiscal policies are not the only means at the disposal of government for affecting the distribution of income. There are also non-fiscal measures: laws, administrative rules, adjudication, etc.-- the whole complex of economic, regulatory law and practice. As has been suggested in our diagrams, these also are economic system inputs. The number of possible regulatory measures which affect the distribution of income is large indeed. The list would include laws affecting labor-management relations, anti-trust regulations, laws regulating commerce and property, and countless others. For our purposes, it is assumed that all possible alternatives may be located on a continuum which reflects their influence on the distribution of income. At one pole of the continuum (+5) is located that complex of regulations, etc.-- that

"regulatory structure"$_{\Lambda}^{(RS)}$ -- which is most equalitarian in its effect on income. At the other pole (-5) is that "regulatory structure" which has the most inequalitarian effect on income.

E_i is positively related to RS.

Let us now consolidate what has been said.

$$(4.5) \qquad E_i = k_1(RS) + k_2(TS) + k_3(SS) + k_4\left(\frac{G_{w_i} + G_{e_i}}{GNP_i}\right) - k_5\left(\frac{G_{m_i} + G_{s_i} + G_{d_i}}{GNP_i}\right) - k_6\left(\frac{L_{p_i}}{L_{u_i}}\right) - k_7\left(\frac{GNP_i - GNP_{i-1}}{GNP_i}\right).$$

where k_1, k_2, k_3, k_4, k_5, k_6, and k_7 are weights which determine the relative contribution of each factor to the degree of income equality. These weights are given.

In sum, then, the tools of government policy-- spending, taxation, laws, regulations, etc.-- are seen to have effect at two levels. First, they may be used as means to counter fluctuations in the level of aggregate income (GNP). Secondly, whatever the level of aggregate income, combinations of particular policy tools may be used to alter the standard distribution of that income among income earning units in the households sector of the economy. These policy decisions are seen in Figure 4.1 to constitute the outputs of the political system, and, thus, inputs to the economic system.

II. Economic System Outputs: Interests

We turn now to the outputs of the economic system which serve as inputs to the political system. It has already been mentioned that the principal economic system outputs are "interests." It will be noted that a distinction is being made between the interests and the economic phenomena which give rise to them. Generally, the latter are economic events affecting or in some way connected with the distribution of income among those who contribute to production. In other words, the distribution of income serves as a basis for, but is distinct from, the economic system outputs. The outputs themselves are the interests of households in various economic affairs affecting their income.

The "interest" of the people in our model focuses on their share of Gross National Product. What are some specific economic affairs related to this? The first thing that comes to mind is taxes;[14] for, it is disposable income that counts (see equation 4.2). The nature and extent of the tax burden is a matter of interest to a great many. For some the rate of increase of income is of interest. For most the rate of decrease of income is of interest. Certainly for a great many persons the level of employment (and unemployment) is a matter of vital concern. For others the nature of the regulatory structure is important. How much the government

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[14]Although Figure 4.1 shows tax revenues also as an input to the political system, taxes were treated in the last section in the context of fiscal policy decisions.

spends, when, for what, and from whence the funds; all are matters affecting the incomes of many people. They are thus bases for politically relevant interests.

Does our model economy generate interests which do not revolve around income? It does, but not many. For, it is only a model economy, not a general model of society. It thus has few implications relating to other kinds of issues. However, it is possible to identify some non-income relevant interests that do emerge. For example, the level of military spending, although affecting many incomes, is of direct concern to many.

It should be clear from what has been said that various of these interests are shared by more or less clearly identifiable groups of people. But our model political-economic system includes no mechanism to account for their emergence. The groups are introduced by definition in terms of interests, the key economic system outputs. In the next chapter we shall identify some of these "interest groups" and examine their role in the political process.

Chapter V

THE POLITICAL SYSTEM

We have already seen how the political system as a whole fits into the general schema. The political system acts as a processor of interests concerning economic results and an issuer of laws and policies which may change those results. The political process which intervenes between these inputs and outputs of the system is the subject of the present chapter.

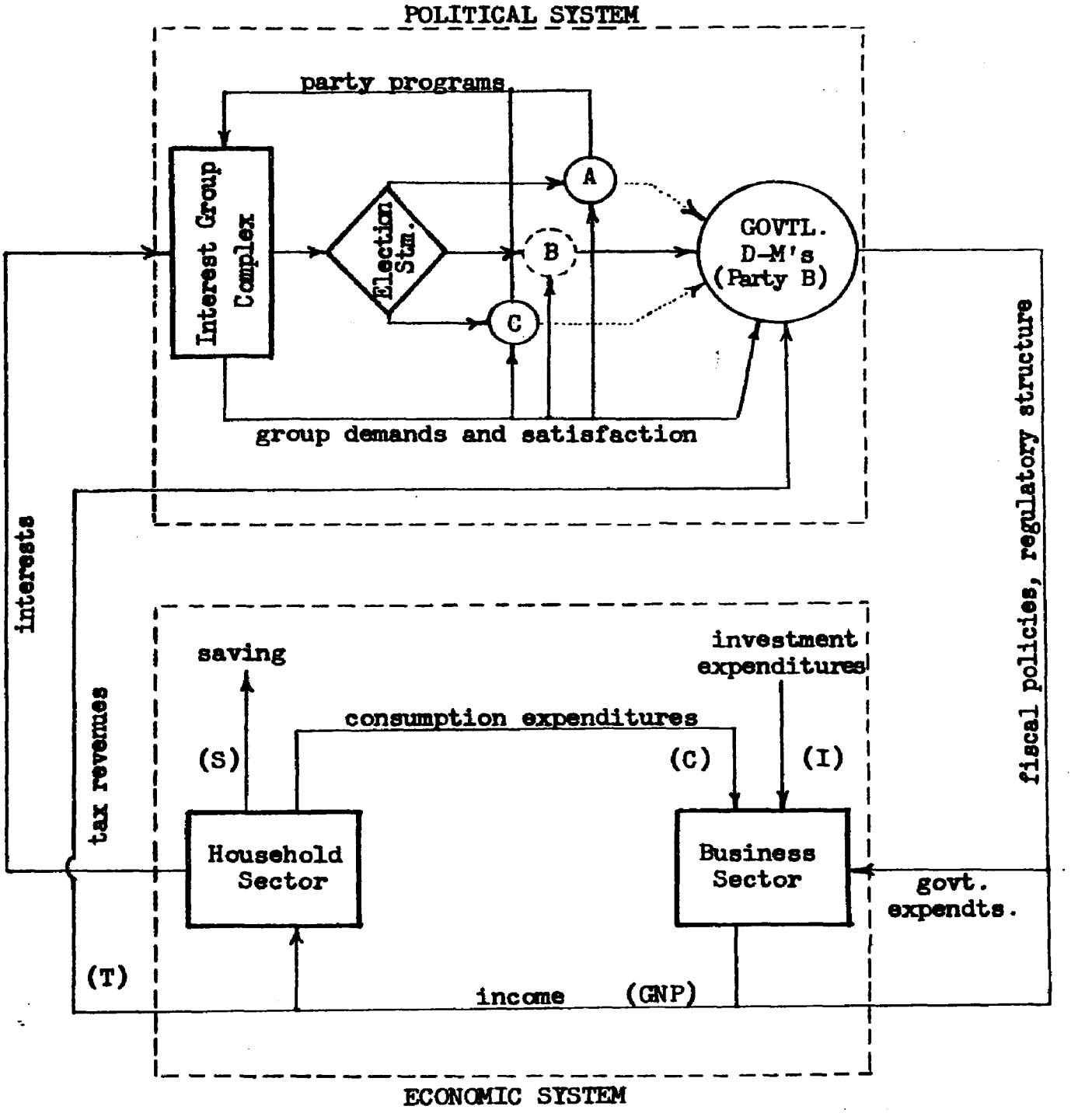
I. The Logic of the Political System

In our earlier diagrammatic descriptions of the model political-economic system the contents of the political system were omitted (except for the governmental decision-maker) while we focused first on the simulation as a whole and then on the economic system in particular. They may now be added to the basic diagram (Figure 5.1). Although all of the elements of the political system were anticipated in the overview of Chapter II, we shall now go over them in more systematic fashion.

In this elaborated view of the political system two sets of elements are distinguished by the boxes as against the circles. The

Figure 5.1

The Detailed Conceptual Schema of the Political-Economic System



"interest group complex" and the "election system"-- both depicted as boxes-- are conceptual elements. In the interest group complex are the various groups of (conceptual) people whose interests and states of satisfaction activate the political system. On the other hand, the small circles represent the actual simulation participants-- real people-- who take the roles of political parties. In this case Party B is seen to be in power-- to occupy the key political roles in the governmental decision-making system. Parties A and C are out of power, the system depicted being a three-party system. At some other point in time the figure might have shown Party A or Party C in power.

The articulation of these system elements is as follows. From the interest group complex emanate "group demands" and expressions of satisfaction (and/or dissatisfaction) with respect to economic states of affairs. These are communicated to the political parties and to government in an effort to achieve redress of outstanding grievances. The parties, in return, communicate their programs to the interest groups in an effort to enlist support. In the case of the parties out of power, A and C, these programs are promises of what they would do if they were to be voted into power. In the case of the party in the government, party B, interest groups receive not only program but fact. For, the party in power makes decisions as to fiscal policies and laws which constitute the principle outputs of the political system (Chapter IV). These affect the operation of the economic system and thus affect also

the interests of various of the members of the interest group complex. This flow of political activity, depicted by the outer "loop" within the political system in Figure 5.1, takes place once every time period. The presentation of "Party Programs" and the filing of "Governmental Decisions" (see pages 27 and 28) mark the beginning of the time period-- the expressions of group demands and satisfaction (and/or dissatisfaction) come toward the end of the period when the economic results are made known (see pages 17 and 23).

In contrast, the straight-through flow of political activity comes into operation not each period but only every so many periods, depending upon the specific nature of the election system. More than mere expressions of satisfaction and/or dissatisfaction are transmitted in this flow. Emanating from the interest group complex is actual election support for the various parties. Each of the interest groups, having weighed the programs of the parties out of power and the performance of the party in power over the several time periods since the last election, makes a choice as to the party it prefers to have in power and delivers what votes it can for that party. In the election system, on the basis of the votes for the various parties, a (system) decision is made as to which party will occupy the governmental decision-making roles for the next several periods. Governmental decision-making roles change hands among simulation participants as indicated by election outcomes.

This, then, is the overall logic of the political system. It will be noted that the principal, tangible outcome of the simulated political-economic system from the standpoint of the participant is the decision as to who will be in office. This power over office tenure is, in a sense, the ultimate sanction of the (conceptual) interest groups with respect to the (live) parties. The assumption, of course, is that the various parties will seek to gain and/or retain office. Other, instrumental goals may become operative depending, among other things, upon the nature of the interest group complex. We turn next to a closer examination of the interest group complex.

II. The Interest Group Complex

It was seen in the last chapter that most of the interest-inputs into the political system concern economic issues-- matters connected with income in particular. It was suggested there also that various of these interests are shared by more or less identifiable groups of people-- "interest groups." When we speak of being able to "identify" groups of people who share the same interests, however, we do not mean that the system population is searched for such groups. It is simply posited that some particular interest group, say, Group I, consists of all people whose common interest in a certain set of economic issues, say, issues 1, 2, 3, and 4, has given rise to common political activities.

We use the term "interest group" rather loosely, then. For, with a model economy as general as the present one, the issues generated are by and large too general to allow delineation of the kind of organized, special-interest groups to which the term is applied in, for example, the American political system. Most of the entities in our "interest group complex" are broad social categories or collectivities, rather than specific membership groups. Nonetheless, it will be convenient to refer to them all simply as "interest groups."

Let us begin by introducing the two most general interest groups in our model political system, the lower income group and the upper income group.[15] It should be understood, however, that, because of our method of definition, these groups are not coterminous with groups which would result from a dichotomy of the population in terms of income. In the latter case every one in the population would be in either one group or the other. In our usage this is not the case. For, each of these groups consists only of those people for whom certain issues (to be specified) give rise to common political goals and activities. Thus many people who might have low income might not base their political activities on that fact. For example, one can conceive of poor pacifists who vote not

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[15]It would be possible, of course, to have more income groups--a middle income group, for example. But in terms of the issues generated by our model such a group does not seem sufficiently distinct to warrant the additional complication.

the poor but the pacifist. They would not be members of the lower income group in our model political system.

Slightly different but with the same result is the case of a subgroup contained largely within one of these two general groupings. Take, for example, the people who own the capital stock of the economy. Typically, they are members of the upper income group. They share all of the interests of that group. They are, nonetheless, a separate group by virtue of the fact that they share in addition some interests uniquely relevant to their role in the economy. In terms of our definition it is the whole set of issues in which interest is shared that delineates an interest group. This is a gross simplification of the complex web of multiple and overlapping group membership with which we are familiar in the real world. But "a simplified political-economic system simulation" is not the place to tackle that thorny theoretical problem.

Perhaps the nature of these interest groups will be seen more clearly if we go about introducing them more systematically. In the outline that follows each group is numbered for easy reference and is given a commonsense name. Listed are the interests in terms of which each group is defined. First, the substance of an issue is noted. Then the relative importance of the issue to the group is indicated by a coefficient of importance, or weight (w). Finally, the group's position on the issue is described by a proposition relating events concerning the issue to the average level of

satisfaction among group members. With respect to the party in power, this is satisfaction regarding actual conditions in the economic system. With respect to the parties out of power, it is satisfaction regarding their economic programs. In either case quantitative (at least ordinal) measurement of group satisfaction is assumed. A seven point integer scale is used ranging from a minimum of -3 (extreme dissatisfaction) to +3. It was indicated before that zero satisfaction is interpreted as indifference.

A. Structure of the Interest Group Complex

GROUP I: Lower Income Group

Issue 2:[16] the percentage change in per capita income

Position: The greater is the percentage increase in per capita income, the greater is group satisfaction, and vice versa.

Issue 3: the degree of equality of income

Position: The greater is the degree of equality of income, the greater is group satisfaction.

Issue 4: the equalitarian-ness of the tax structure

Position: The more equalitarian is the tax structure, the greater is group satisfaction.

Issue 11: the level of government spending for social welfare

Position: The greater is government spending for social welfare, the greater is group satisfaction.

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[16]The issue numbers here correspond with the order in which the issues appear on the "Political Report" (page 23). Quantitative expression is given to the statements of position in the appendix.

Issue 12: the level of government spending for education

Position: The greater is government spending for education, the greater is group satisfaction.

Issue 14: the type of anti-recession fiscal policies[17]

Position: The greater is the progressiveness of governmental anti-recession fiscal policies,[18] the greater is group satisfaction.

Relative importance of issues to Group I: equally weighted (w=1)

GROUP II: Upper Income Group

Issue 2: the percentage change in per capita income

Position: The greater is the percentage increase in per capita income, the greater is group satisfaction, and vice versa.

Issue 3: the degree of equality of income

Position: The less is the degree of equality of income, the greater is group satisfaction.

Issue 4: the equalitarian-ness of the tax structure

Position: The more inequalitarian is the tax structure, the greater is group satisfaction.

Issue 14: the type of anti-recession fiscal policies[17]

Position: The greater is the regressiveness of governmental anti-recession fiscal policies,[18] the greater is group satisfaction.

Relative importance of issues to Group II: equally weighted (w=1)

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[17]This issue becomes salient when there is an economic slump as defined by the following conditions: a) the rate of growth of GNP is less than one per cent per period, and/or b) the rate of growth of GNP decreases.

[18]As used here, a "progressive" anti-recession policy includes tax cuts coupled with increased government spending on social welfare and education. A "regressive" anti-recession policy, in present usage, couples increases in military expenditures and business subsidies with tax cuts.

GROUP III: Labor[19]

Issues 2, 3, 4, 11, 12, and 14:

Position: sames as Lower Income Group (I)

Issue 5: the equalitarian-ness of the regulatory structure

Position: The more equalitarian is the regulatory structure, the greater is group satisfaction.

Issue 6: the level of unemployment

Position: The greater is the level of unemployment, the less is group satisfaction (greater dissatisfaction).

Relative importance of issues to Group III:

Issues 2, 3, 4, 5, 11, 12, and 14: equally weighted (w = 1)
Issue 6: heavily weighted (w = 4)

GROUP IV: Owners of Capital (and Management)[19]

Issues 2, 3, 4, and 14:

Position: same as Upper Income Group (II)

Issue 5: the equalitarian-ness of the regulatory structure

Position: The more inequalitarian is the regulatory structure, the greater is group satisfaction.

Relative importance of issues to Group IV:

Issues 2, 3, 4, and 14: equally weighted (w = 1)
Issue 5: heavily weighted (w = 4)

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[19]It will be noted that Groups III and IV are in actuality subgroups of Groups I and II respectively. As stated earlier, each is treated as a separate group in the model political system. The same thing will be encountered with subsequent groups.

GROUP V: Labor in Subsidized Industries

Issues 2, 3, 4, 5, 6, 11, 12, and 14:

Position: same as Labor (III)

Issue 9: the level of government subsidies for business

Position: The greater are government subsidies, the greater is group satisfaction.

Relative importance of issues to Group V:

Issues 2, 3, 4, 5, 11, 12, and 14: equally weighted (w = 1)
Issue 6: heavily weighted (w = 4)
Issue 9: heavily weighted (w = 3)

GROUP VI: Owners of Capital in Subsidized Industries

Issues 2, 3, 4, 5, and 14:

Position: same as Owners of Capital (IV)

Issue 9: the level of government subsidies for business

Position: The greater are government subsidies, the greater is group satisfaction.

Relative importance of issues to Group VI:

Issues 2, 3, 4, and 14: equally weighted (w = 1)
Issue 5: heavily weighted (w = 3)
Issue 9: heavily weighted (w = 4)

GROUP VII: Labor in Military Industries

Issues 2, 3, 4, 5, 6, 11, 12, and 14:

Position: same as Labor (III)

Issue 8: the level of government spending for military purposes

Position: The greater is military spending, the greater is group satisfaction.

Relative importance of issues to Group VII:

Issues 2, 3, 4, 5, 11, 12, and 14: equally weighted (w = 1)
Issue 6: heavily weighted (w = 4)
Issue 8: heavily weighted (w = 3)

GROUP VIII: Owners of Capital in Military Industries

Issues 2, 3, 4, 5, and 14:

Position: same as Owners of Capital (IV)

Issue 8: the level of government spending for military purposes

Position: The greater is military spending, the greater is group satisfaction.

Relative importance of issues to Group VIII:

Issues 2, 3, 4, and 14: equally weighted (w = 1)
Issue 5: heavily weighted (w = 3)
Issue 8: heavily weighted (w = 4)

GROUP IX: Laissez-faire Capitalists

Issues 2, 3, 4, and 5:

Position: same as Owners of Capital (IV)

Issue 7: total government spending and taxes

Position: The greater are government expenditures and taxes, the less is group satisfaction (greater dissatisfaction).

Relative importance of issues to Group IX:

Issues 2 and 3: equally weighted (w = 1)
Issues 4 and 5: equally heavily weighted (w = 3)
Issue 7: very heavily weighted (w = 5)

GROUP X: Welfare Statists

Issues 2, 3, 4, 11, 12, and 14:

Position: same as Lower Income Group (I)

Relative importance of issues to Group X:[20]

Issues 2, 12, and 14: equally weighted (w = 1)
Issues 3 and 4: equally moderately weighted (w = 2)
Issue 11: heavily weighted (4 = 4)

GROUP XI: Debtors

Issues 3, 4, 11, and 12:

Position: same as Lower Income Group (I)

Issue 1: the percentage change in Gross National Product[21]

Position: The greater is the percentage <u>increase</u> in GNP, the greater is group satisfaction.
The less is the percentage <u>increase</u> in GNP, the less is group satisfaction (greater dissatisfaction).

Relative importance of issues to Group XI:

Issues 3, 4, 11, and 12: equally weighted (w = 1)
Issue 1: heavily weighted (w = 4)

GROUP XII: Creditors

Issues 3 and 4:

Position: same as Upper Income Group (II)

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[20]A different distribution of importance-weights defines a different interest group.

[21]The reasoning here is that debtors benefit from inflation in that they repay debts in less valuable money. Since there are no prices in our model we must use an approximate indicator of inflation. Large increases in GNP are such an indicator.

Issue 1: the percentage change in Gross National Product[22]

Position: The greater is the percentage change in GNP (increase or decrease), the less is group satisfaction.

Issue 13: the size of the accumulated governmental debt

Position: The greater is the accumulated governmental debt, the greater is group satisfaction.

Relative importance of issues to Group XII:

Issues 3 and 4: equally weighted (w = 1)
Issues 1 and 13: equally heavily weighted (w = 3)

Issue 10: government spending for interest payments on the accumulated debt

Position: If interest payments are made in full, this is not an issue.
If interest payments are not made in full, group satisfaction is -3 and this is the sole issue considered by the group.

GROUP XIII: Pacifists

Issue 8: the level of government spending for military purposes

Position: The greater is military spending, the less is group satisfaction (greater dissatisfaction).

GROUP XIV: Militarists

Issue 8: the level of government spending for military purposes

Position: The greater is military spending, the greater is group satisfaction.

This completes the interest group complex.

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[22]For the same reason that debtors like large increases in GNP, creditors do not like them.

Nothing intrinsic to the model political-economic system dictates that there should be fourteen interest groups. These fourteen are illustrative of what can be done. An interesting political-economic system simulation could be run with fewer groups. Or, still others could be added. The number of possible combinations of issues-- thus the number of possible interest groups-- is quite large, even with the limited list of issues (page 23) that have been used to define these groups. Moreover, still more issues could be extracted from the model political-economic system. Not all such combinations would make credible interest groups. This set of fourteen does seem fairly realistic and is sufficiently rich to present the parties (simulation participants) with a diverse configuration of conflicting interests and possible sources of political support.

B. Outputs of the Interest Group Complex

One of the main outputs of this interest group complex consists in the expression of group demands and satisfaction to the parties and to government (Figure 5.1). The origins of these interest group expressions have now been seen. Each group is more or less satisfied (or dissatisfied) with each party's program or performance with regard to each issue in which it is interested. Each group has, as well, an overall level of satisfaction with each party. The latter is simply a mean of the individual issue satisfactions, each weighted for relative importance.

That is:

$$\overline{GS}^{G}_{P_i} = \frac{\sum w_j GS^{G}_{P_{j_i}}}{\sum w_j} \qquad (5.1)$$

where $\overline{GS}$ = mean group satisfaction over all salient issues

GS = group satisfaction on a particular issue

G = a particular interest group (by Roman numeral designation)

P = a particular political party (by letter designation)

j = a particular salient issue for the group

w = an issue weight

i = the time period

$GS^{G}_{P_j}$ reads as: "'group satisfaction' of GROUP G with PARTY P with respect to issue j."

Individual issue satisfaction and mean satisfaction figures are reported to the political parties each period of the simulation. They appear in the "Political Report" (page 23). The "group demands" mentioned in Figure 5.1 are expressed only figuratively. By their knowledge of the positions taken by the interest groups on the various issues and by regular reports of group satisfactions, the parties (simulation participants) are made aware of group demands.

The other output line from the interest group complex-- the one which enters the election system (Figure 5.1)-- has yet to be

discussed. These outputs occur only as often as there are elections, in contrast to the more frequent, periodic expression of group demands and satisfactions. Their substance is active election support by the various interest groups for their favorite political parties. As such, these interest group outputs are distinct from the former expressions, yet dependent upon them.

Three steps are involved in the process by which each interest group throws its support behind a party in an election. First, an expression is derived which summarizes the group's satisfaction with <u>each party across all salient issues</u> over <u>all periods</u> since the last election. This summary expression of satisfaction is a weighted mean over time of the group's mean satisfaction figures for each period (the latter means having been taken across issues). The weights reflect the fading effects of memory. Recent events and the group's feelings about them are recalled with clarity. Distant ones are not. The computation of this "mean of means" is as follows.

$$\overline{\overline{GS}}^{G}_{P_{i'}} = \frac{\sum_{i'-n}^{i'} m_i \overline{GS}^{G}_{P_i}}{\sum_{i'-n}^{i'} m_i} \qquad (5.2)$$

where $\overline{GS}$ = the mean (over time) of mean (across issues) group satisfaction, or "summary satisfaction"

i' = an election period (the election is assumed to take place at the end of an election period)

n = the number of periods between election periods (i.e., if there is an election every 4 periods, then $n = 3$)

m = a "memory-weight," where: $m_{i'} > m_{i'-1} > m_{i'-2} \ldots > m_{i'-n}$

The second step in determining electoral support is the choice as to which party an interest group will support. Each group gives its election support to the party with respect to which its "summary satisfaction" is greatest at the time of the election. It follows from the way the groups have been defined that there will usually be no division of a single group's support among parties. The one exception is when two parties register the same "summary satisfaction" with respect to a single interest group. Then the group is divided down the middle in its support for those parties.

The third aspect of electoral support is the matter of how intense will be the support a group throws behind the party of its choice, once that choice is made. This depends upon: 1) how high the absolute level of the group's "summary satisfaction" is with respect to its favorite party, and 2) the difference between the group's satisfaction with its favorite party and its satisfaction with the other two parties. For example, an interest group may prefer party A over parties B and C and yet dislike them all, the differences among them being very small in that group's eyes. In such a case the group would give only luke warm support to party A,

the lesser of evils. On the other hand another group may be very highly satisfied with party A and intensely dissatisfied with parties B and C, in which case it would throw its total energy behind party A. This set of relations lends itself to mathematical treatment very nicely.

$$(5.3)\quad ES^{G}_{f_{i'}} = \overline{\overline{GS}}^{G}_{f_{i'}} + \left(\overline{\overline{GS}}^{G}_{f_{i'}} - \overline{\overline{GS}}^{G}_{s_{i'}}\right) + \left(\overline{\overline{GS}}^{G}_{f_{i'}} - \overline{\overline{GS}}^{G}_{t_{i'}}\right)$$

where ES = election support

the subscript "f" indicates the party of the <u>first choice</u>

the subscript "s" indicates the party of the <u>second choice</u>

the subscript "t" indicates the party of the <u>third choice</u>

When computed for each group in the interest group complex at the end of the period (i'-1) prior to an election period (i'), equation (5.3) produces information which is summarized in the "Election Support Matrix" (page 25). These data are inputs for the election system. Each group more or less enthusiastically supports one of the parties. In case of a three party system, as illustrated here, election support varies between -3 and 15. It is zero in the case described above when the favorite is the lesser of two evils--that is, $\overline{\overline{GS}}^{G}_{f} = -2$, $\overline{\overline{GS}}^{G}_{s} = -3$, and $\overline{\overline{GS}}^{G}_{t} = -3$ are substituted in equation (5.3). Election support is 15 when the favorite party and the other two parties are at the extreme ends of the group

satisfaction scale-- that is, $\overline{\overline{GS}}^{G}_{f} = +3$, $\overline{\overline{GS}}^{G}_{s} = -3$, and $\overline{\overline{GS}}^{G}_{t} = -3$ are inserted into equation (5.3).

III. The Election System

The inputs for the election system (outputs from the interest group complex) have now been seen. Let us now turn to an examination of what comes out of the election system and of the process that intervenes between the inputs and outputs.

Since an election involves votes, the process of translating election support (ES) into votes is the first order of business. What is the nature of this translation process? By definition there is consensus among group members. Is the total vote for a given party, then, a simple summation of the memberships of the various groups that have chosen to vote for that party? The answer is no. More is involved than this.

Although they play no other role in our model, there are people in the political system who are not members of our interest groups. Many of them are what political scientists call "potential group members," that is, people who share the same interests as some group but do not partake in political activities based upon those interests. Clearly, here is fertile ground for proselytization by interest groups. It is possible for a group to be instrumental in delivering a number of votes for the party of its choice which exceeds the size of its own membership.

What determines the size of a group's total contribution of votes for the party of its choice? The degree of election support (ES) discussed in the last section is one determinant. In a sense election support is a measure of the amount of enthusiasm the group members have for their preferred party vis à vis the other parties. The greater is the enthusiasm for the preferred party, the greater is the effort to enlist votes for it.

But a group's total contribution to the vote for the party of its choice is also determined by more stable factors than current feelings of enthusiasm. It is entirely possible that two groups might support a party with equal intensity, yet one group could have significantly greater vote-delivering effectiveness than the other. The latter group is considered the more influential, or "powerful" of the two in the model political system. For, votes constitute the ultimate sanction a (conceptual) interest group can weild in its efforts to influence the policies and programs of the (real) simulation decision makers. The power of the various groups in the interest group complex is a given in the simulation. What has been said here and in the previous paragraph may be summarized in the following expression.

$$V_{P_{i'}} = f\left(\sum_{G(F_f)} v_G ES^G_{P_{i'}}\right)$$

where V_P = the total vote for a particular party, P

$\sum_{G(P_f)}$ reads: "summing over all groups which favor party P"

v_G = a power coefficient for a particular interest group, G

i' = an election period

Beyond the actual and potential members of interest groups there are still other people in the political system. There are people who vote on the basis of issues which have little or no relationship to the explicit model economic system. Some of these people habitually vote for a given party. Some vote along ethnic lines. Others vote for personalities, and so on. Each party can be sure of getting a certain number of votes from these non-system sources. Call this the "parametric vote." Being independent of model political-economic system events, the parametric vote is determined exogenously. It varies from election to election in a manner which the simulation participant will not be able precisely to predict. The "habitual-vote" portion of the variation is relatively stable, and so are some other portions. But there is, nonetheless, considerable random variation. Adding this element to the foregoing expression, we have the (aggregate) decision rule of the election system.

$$V_{P_{i'}} = \underline{V}_{P_{i'}} + \sum_{G(P_f)} v_G \, ES^G_{P_{i'}} \tag{5.4}$$

where $\underline{V}_P$ = the "parametric vote" for any particular party, P.

It is a simple matter from here to the determination of the winning party-- the output of the election system. To determine the total vote for each party equation (5.4) is solved. The party with the most votes is the winner. All of these election data are reported in the "Election Review" (page 26).

Some attention may now be paid to some other aspects of the election system. A very important one was just encountered when it was stated that the party with the most votes wins. It need not have been that way. It would be equally realistic to say that decision-making roles in government are allocated among the parties in proportion to their share of the vote. Or, certain roles could go outright to the party with the most votes, while other roles would be proportionally allocated. There are still other conceivable possibilities. The point is that the election system in the model contains, in addition to equation (5.4), a set of rules which specify what roles are up for election and what it takes to win them. We have assumed for simplicity that all roles go to the single party with a plurality of votes.

There is still another rule in the election system. It has been assumed that a regular election is held every $(n+1)^{th}$ period.[23]

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[23]It will be recalled that "n" is the number of periods between election periods (pp.90-91).

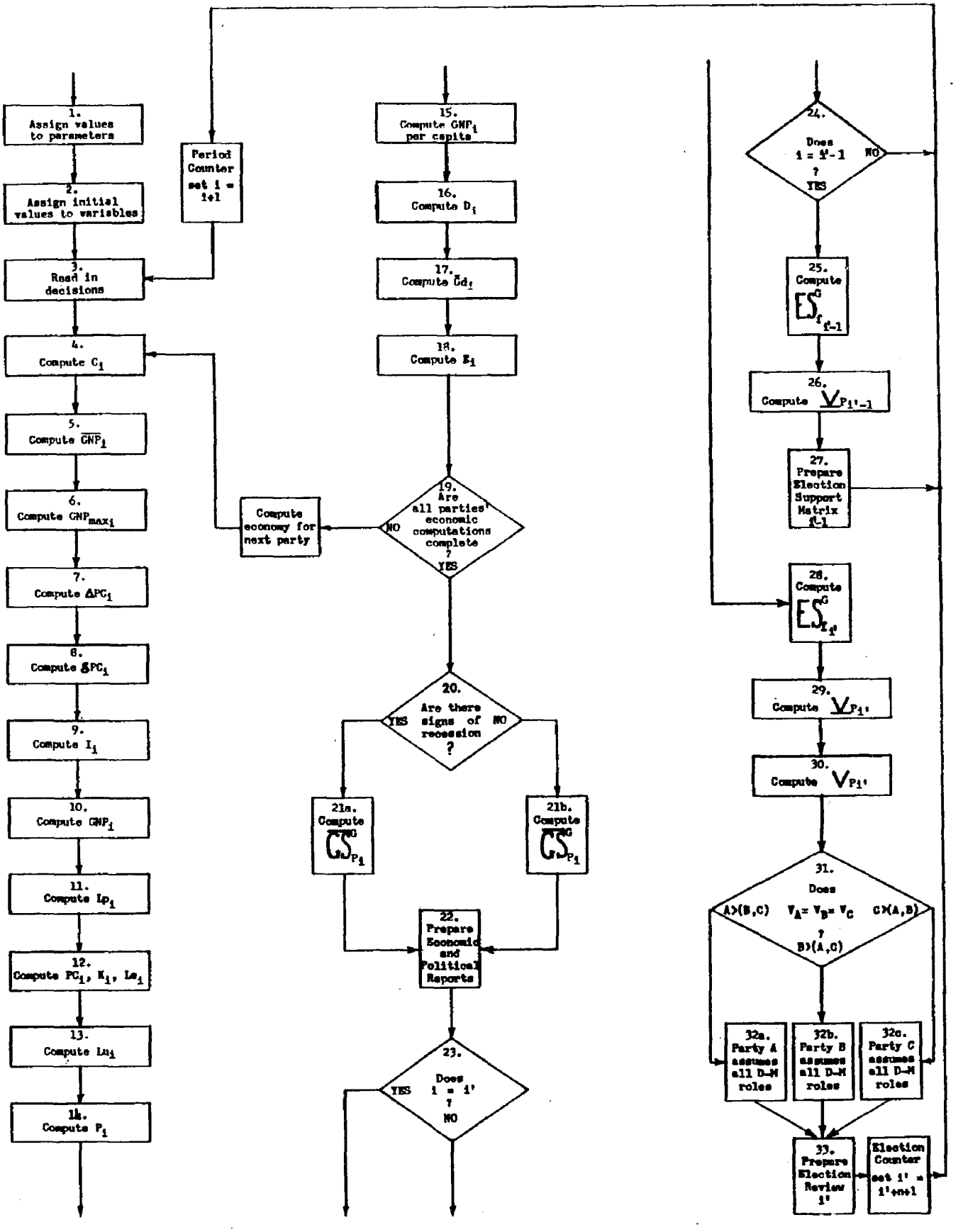
In any particular simulation the value of "n" must be specified. For example, the election system might call for four periods between elections (n = 4). Another possible rule would give the party in power discretion as to when the election will be called as long as it is called before some specified number of periods have passed.

Technically the election itself is a mathematical process which occurs at the end of the period in which it is scheduled.

This completes the model political system.

APPENDIX

COMPUTATION FLOW-DIAGRAM



DETAIL OF COMPUTATION FLOW-DIAGRAM
(Mathematical Summary of Model)

Comp. Step		Text Page References
1.	Assign values to parameters	
	a = 0.50 = average productivity of capital and labor, an adjustable constant (cf.p.157)	20, 45ff.
	b = 0.95 = investment lag factor, an adjustable constant (cf.p.157); $b \leq 1.0$	20-1,48-9
	b' = 1.00 = short term business expectations factor, an adjustable constant (cf. p.157); $b' \leq 1.0$	21, 49
	c = 0.80 = marginal propensity to consume, an adjustable constant (cf. p.157); $c \leq 1.0$	21, 33ff.
	d = 0.50 = rate of depreciation and obsolescense of productive capacity, an adjustable constant (suggested value); $d \geq 0$	52
	e = 0.03 = rate of interest on governmental debt, an adjustable constant (suggested value); $e \geq 0$	66
	i = 1 This sets the Period Counter to begin.	
	n = 3 = the number of periods between elections, an adjustable constant (suggested value); $n \geq 0$ (cf. p.157)	96-7
	i' = n+1 i' is an election period. This sets the Election Counter to begin.	
	r = 0.01 = rate of population increase per period, an adjustable constant (suggested value)	53
	S = ____ = that portion of autonomous investment which is determined exogenously by the simulator, an adjustable constant; $0 \leq S \leq 4$ (cf. step 8 and p. 158)	50ff.
	SS = ____ equalitarian-ness of the social structure, an adjustable constant; $-5 \leq SS \leq +5$ (cf. p.157)	

Comp. Step		Text Page References
1. Assign value to parameters (continued)		
$k_1 = 0.10$ $k_2 = 0.20$ $k_3 = 0.20$ $k_4 = 0.10$ $k_5 = 0.10$ $k_6 = 0.20$ $k_7 = 0.10$	weights of factors affecting the degree of equality of the income distribution; adjustable constants (suggested values); $k_i \geq 0$, $\sum k_i = 1.00$	68-71
$v_I =$ ____ $v_{II} =$ ____ $v_{III} =$ ____ $v_{IV} =$ ____ $v_V =$ ____ $v_{VI} =$ ____ $v_{VII} =$ ____ $v_{VIII} =$ ____ $v_{IX} =$ ____ $v_X =$ ____ $v_{XI} =$ ____ $v_{XII} =$ ____ $v_{XIII} =$ ____ $v_{XIV} =$ ____	power coefficients of interest groups, i.e., their ability to deliver votes; adjustable constants (cf. p.157) $v_G \geq 1.00$	25, 95

Comp. Step			Text Page References
1.	Assign values to parameters (continued)		
	H_A = ____ = habitual vote for Party A, an adjustable constant	$H_p \geq 0$ (cf.p.157)	95
	H_B = ____ = habitual vote for Party B, an adjustable constant		
	H_C = ____ = habitual vote for Party C, an adjustable constant		
2.	Assign initial values to variables (cf. p.158)		
	GNP_{i-3} = 100.00 = gross national product (i-3 = -2) (suggested value)		
	GNP_{i-2} = 100.00 = gross national product (i-2 = -1) (suggested value)		
	GNP_{i-1} = 100.50 = gross national product (i-1 = 0) (suggested value)		
	PC_{i-1} = 200.00 = productive capacity (suggested value) 1 PC = (1 K; 1 Le)		
	Le_{i-1} = 200.00 = employed labor " " Le $\leq$ Lp		
	K_{i-1} = 200.00 = stock of capital " "		
	Lp_{i-1} = 210.00 = potential labor force " " Lp = Le + Lu		
	Lu_{i-1} = 10.00 = unemployed labor " " Lu $\geq$ 0		
	P_{i-1} = 450.00 = total population " "		
	D_{i-1} = 50.00 = accumulated debt " "		
	TS_{i-2} = _____ = tax structure; $-5 \leq TS \leq +5$ (cf.p.158)		
	TS_{i-1} = _____ = " " " " " "		27, 61, 68ff.
	RS_{i-2} = _____ = regulatory str.; " RS " "		
	RS_{i-1} = _____ = " " " "		

Comp. Step	Text Page References
3. Read in decisions taken in period i	
Governmental Decisions (Party __, party in power)	28
G_i = _____ = total government expenditures	
G_{m_i} = _____ = military expenditures	
G_{s_i} = _____ = business subsidies	
G_{d_i} = _____ = interest on the government debt	
G_{w_i} = _____ = social welfare expenditures	
G_{e_i} = _____ = education expenditures	
T_i = _____ = total tax revenue	
TS_i = _____ = tax structure; $0 \leq \lvert TS_i - TS_{i-1} \rvert \leq 2$	
RS_i = _____ = regulatory structure; $0 \leq \lvert RS_i - RS_{i-1} \rvert \leq 2$	
Party Program (Party __, first party out of power)	29
G_i = _____	
G_{m_i} = _____	
G_{s_i} = _____	
G_{d_i} = _____	
G_{w_i} = _____	
G_{e_i} = _____	
T_i = _____	
TS_i = _____	
RS_i = _____	

Comp. Step		Text Page References
	Party Program (Party __, second party out of power)	29
	G_i = _____	
	G_{m_i} = _____	
	G_{s_i} = _____	
	G_{d_i} = _____	
	G_{w_i} = _____	
	G_{e_i} = _____	
	T_i = _____	
	TS_i = _____	
	RS_i = _____	
4.*	Compute $C_i = c(GNP_{i-1} - T_i) + 20$ ** where C = consumption expenditures, 20 = an arbitrary constant	eq. 4.2 p. 63
5.	Compute $\overline{GNP}_i = GNP_{i-1} + b'(GNP_{i-1} - GNP_{i-2})$ where $\overline{GNP}$ = expected demand for output	eq. 3.15 p. 49
6.	Compute $GNP_{max_i} = a(PC_{i-1})$ where GNP_{max} = maximum possible GNP = supply of output	eq. 3.12a p. 45
7.	Compute $\Delta PC_i = \frac{b}{a}(\overline{GNP}_i - GNP_{max_i})$ where ΔPC = induced investment	eq. 3.16 p. 50

*Steps 4 through 18 are computed for the decisions of one party at a time (cf. branch at step 19).

**Terms called but undefined in this step and all following steps will have been defined in preceding steps.

Comp. Step		Text Page References
8.	Compute $\delta PC_i = GNP_{i-1}\left[\frac{-1.25 - 0.375\left(\frac{RS_{i-1} + RS_{i-2} + \frac{TS_{i-1} + TS_{i-2}}{2}}{100}\right) + S + \epsilon_1}{}\right]$	p. 50ff.
	where δPC = autonomous investment	
	ϵ_1 = a portion of autonomous investment which is determined stochastically as follows.	
	Draw at random a single digit, N, from a table of random digits.	
	If N = 0, then $\epsilon_1 = 0$ If N = 1 to 2, then $\epsilon_1 = 1$ If N = 3 to 6, then $\epsilon_1 = 2$ If N = 7 to 8, then $\epsilon_1 = 3$ If N = 9, then $\epsilon_1 = 4$	
	-1.25, -0.375, 2, and 100 are constants (cf. p.158)	
9.	Compute $I_i = \Delta PC_i + \delta PC_i$	eq. 3.18 p. 51
	where I = total investment expenditures	
10.	Compute $GNP_i = C_i + I_i + G_i$	eq. 4.1 p. 63
	If $(I_i + G_i) < 0$, then $GNP_i = C_i$	
11.	Compute $Lp_i = (1 + r)Lp_{i-1}$	eq. 3.23 p. 53
12.	Compute $\left.\begin{matrix} PC_i \\ K_i \\ Le_i \end{matrix}\right\| = (1 - d)PC_{i-1}$	eq. 3.19 eq. 3.20 eq. 3.21 pp. 52-53
13.	Compute $Lu_1 = Lp_i - Le_i$	eq. 3.24 p. 54
14.	Compute $P_i = (1 + r)P_{i-1}$	eq. 3.22 p. 53

Comp. Step		Text Page References
15.	Compute GNP_i per capita $= \frac{GNP_i}{P_i}$	
16.	Compute $D_i = D_{i-1} + \Delta D_i$ where $\Delta D_i = G_i - T_i$	eq. 4.3 p. 66
17.	Compute $\bar{G}d_i = e(D_i)$ where $\bar{G}d_i$ = interest due on governmental debt in period i	eq. 4.4a p. 66
18.	Compute $E_i = k_1(RS) + k_2(TS) + k_3(SS) + 100k_4\left(\frac{G_{w_i}+G_{e_i}}{GNP_i}\right) - 50k_5\left(\frac{G_{m_i}+G_{s_i}+G_{d_i}}{GNP_i}\right) - 100k_6\left(\frac{Lu_i}{Lp_i}\right) - 100k_7\left(\frac{GNP_i-GNP_{i-1}}{GNP_i}\right)$ where E = degree of equality of the income distribution; 100, 50, 100, and 100 are constants.	eq. 4.5 p. 71
19.	Are All parties' economic computations complete?	
	YES: Do step 20.	
	NO: Do steps 4 through 18 for the next party.	
20.	Are there signs of recession?	82
	Test: Do both of the following conditions obtain?	
	a) $\left(\frac{GNP_{i-1} - GNP_{i-2}}{GNP_i}\right) \geq 0.01$	
	b) $(GNP_{i-1} - 2GNP_{i-2} + GNP_{i-3}) \geq 0$	
	NO: Do step 21a. / YES: Do step 21b. — A NO answer to the test question means a YES to the original question, and vice versa. (cf.p.159)	

COMP. Step		Text Page References
21a.	Compute $\overline{GS}^{G}_{P_i}$ for each group regarding each party.	eq. 5.1 p. 89
	$\overline{GS}^{G}_{P_i}$ = mean group satisfaction of a particular group, G, with respect to the decisions of a particular party, P	
	Use Mean Group Satisfaction Computation Matrix #2, pages 126ff.	
21b.	Compute $\overline{GS}^{G}_{P}$ for each group regarding each party.	
	Use Mean Group Satisfaction Computation Matrix #1, pages 111ff.	
22.	Prepare Economic and Political Reports for period i.	17, 23
	Economic Report: All parties get data generated by <u>governmental decisions</u> (cf.p.159).	
	Political Report: One report contains data for all parties.	
23.	Does i = i'?	
	where i' = an election period	
	YES: Do step 28.	
	NO: Do step 24.	
24.	Does i = i' - 1?	
	YES: Do step 25.	
	NO: Do period count and step 3.	

Comp. Step		Text Page References
25.	Compute $ES^G_{i'-1}$ for each group.	eq. 5.3 p. 92
	ES^G_f = election support of a particular group, G, for the party of its first choice, f.	
	Use Election Support Computation Matrix for period i'-1, pp. 141ff.	
26.	Compute $\underline{V}P_{i'-1} = H_P + \epsilon_2(H_P)$ for each party.	95
	$\underline{V}P$ = parametric vote for a particular party, P	
	ϵ_2 = a stochastic variable which is determined as follows.	
	Draw at random a double digit, N, from a table of random digits.	
	If N = 00 to 01, then ϵ_2 = -0.100 If N = 02 to 08, then ϵ_2 = -0.075 If N = 09 to 20, then ϵ_2 = -0.050 If N = 21 to 37, then ϵ_2 = -0.025 If N = 38 to 61, then ϵ_2 = 0.000 If N = 62 to 78, then ϵ_2 = 0.025 If N = 79 to 90, then ϵ_2 = 0.050 If N = 91 to 97, then ϵ_2 = 0.075 If N = 98 to 99, then ϵ_2 = 0.100	
27.	Prepare Election Support Matrix for period i'-1.	24
	Enter election support data (ES figures from step 25) for each group with respect to its favorite party. Enter parametric support data ($\underline{V}$ figures from step 26) for each party.	
	Do period count and step 3.	

Comp. Step		Text Page References
28.	Compute $ES^{G}_{f_{i'}}$ for each group. Use Election Support Computation Matrix for period i', pp. 149ff.	eq. 5.3 p. 92
29.	Compute $\underline{V}P_{i'}$ for each party. Use equation in step 26.	
30.	Compute $VP_{i'} = \underline{V}P_{i'} + \sum_{G(P_f)}^{i} v_G \, ES^{G}_{P_{i'}}$ for each party. $VP_{i'}$ = total vote for a particular party, P v_G = power coefficient for a particular interest group, G	eq. 5.4 p.95
31.	Does $V_A = V_B = V_C$? If $V_A > (V_B, V_C)$, do step 32a. If $V_B > (V_A, V_C)$, do step 32b. If $V_C > (V_A, V_B)$, do step 32c.	96,97
32a.	Party A assumes all decision making roles in government.	96,97
32b.	Party B assumes all decision making roles in government.	96,97
32c.	Party C assumes all decision making roles in government.	96,97

Comp. Step		Text Page References
33.	Prepare Election Review for period i'. Enter election support data (ES figures from step 28), parametric support data (V figures from step 29), and total vote data (V figures from step 30). Do election count, period count and step 3.	26

MEAN GROUP SATISFACTION COMPUTATION MATRIX #1

$$\overline{GS}^{G}_{P_i} = \frac{\sum w_j GS^{G}_{Pj_i}}{\sum w_j} \qquad \text{eq.5.1, p.89}$$

GS^{G}_{Pj} = group satisfaction of a particular group, G, with respect to a particular party, P, on a particular salient issue, j.

$GS^{G}_{P_j}$ "depends on" X_j.

X_j is the operational definition of a particular issue, j-- the independent variable-- and

the nature of the dependence is given in the body of the matrix.*

w_j = a weight reflecting the relative importance of a particular issue, j, to the group.

$\sum w_j = 1.00$

Use of the Matrix

1) For each group, each issue, and each party's decisions: a) compute X_j; b) locate the value of X_j in the X column of the matrix; and c) trace across to find the values of GS_j and wGS_j for the party in question. Circle the latter two numbers.

2) Then sum the circled items in the wGS columns for each group and each party. The sums are the mean group satisfaction figures.

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*These dependent-independent relationships are quantitative expressions for the interest group positions described on pages 81-87. They are meant to be suggestive of possibilities and may be changed to suit the simulator's needs.

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#1 Period_____

ISSUES	(X) Independent Variable	GROUP I					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2. % change in per capita income; $w_2 = 1/5$ $X = \left(\frac{GNP_i}{P_i} - \frac{GNP_{i-1}}{P_{i-1}}\right) \Big/ \frac{GNP_{i-1}}{P_{i-1}}$	.050 to +∞	3	0.6	3	0.6	3	0.6
	.030 to .049	2	0.4	2	0.4	2	0.4
	.010 to .029	1	0.2	1	0.2	1	0.2
	-.010 to +.009	0	0.0	0	0.0	0	0.0
	-.030 to -.011	-1	-0.2	-1	-0.2	-1	-0.2
	-.050 to -.031	-2	-0.4	-2	-0.4	-2	-0.4
	-∞ to -.051	-3	-0.6	-3	-0.6	-3	-0.6
3. degree of income equality; $w_3 = 1/5$ $X = E_i$	8, 9, & 10	3	0.6	3	0.6	3	0.6
	7	2	0.4	2	0.4	2	0.4
	6	1	0.2	1	0.2	1	0.2
	5	0	0.0	0	0.0	0	0.0
	4	-1	-0.2	-1	-0.2	-1	-0.2
	3	-2	-0.4	-2	-0.4	-2	-0.4
	0, 1, & 2	-3	-0.6	-3	-0.6	-3	-0.6
4. equalitarian-ness of tax structure; $w_4 = 1/5$ X = Tax Structure (TS)	5	3	0.6	3	0.6	3	0.6
	3 & 4	2	0.4	2	0.4	2	0.4
	1 & 2	1	0.2	1	0.2	1	0.2
	0	0	0.0	0	0.0	0	0.0
	-1 & -2	-1	-0.2	-1	-0.2	-1	-0.2
	-3 & -4	-2	-0.4	-2	-0.4	-2	-0.4
	5	-3	-0.6	-3	-0.6	-3	-0.6
11. government spending for social welfare; $w_{11} = 1/5$ $X = G_{w_i}/GNP_i$	.060 - ∞	3	0.6	3	0.6	3	0.6
	.050 - .059	2	0.4	2	0.4	2	0.4
	.040 - .049	1	0.2	1	0.2	1	0.2
	.030 - .039	0	0.0	0	0.0	0	0.0
	.020 - .029	-1	-0.2	-1	-0.2	-1	-0.2
	.010 - .019	-2	-0.4	-2	-0.4	-2	-0.4
	.000 - .009	-3	-0.6	-3	-0.6	-3	-0.6
12. government spending for education; $w_{12} = 1/5$ $X = G_{e_i}/GNP_i$	.060 - ∞	3	0.6	3	0.6	3	0.6
	.050 - .059	2	0.4	2	0.4	2	0.4
	.040 - .049	1	0.2	1	0.2	1	0.2
	.030 - .039	0	0.0	0	0.0	0	0.0
	.020 - .029	-1	-0.2	-1	-0.2	-1	-0.2
	.010 - .019	-2	-0.4	-2	-0.4	-2	-0.4
	.000 - .009	-3	-0.6	-3	-0.6	-3	-0.6
Mean Group Satisfaction (Σ)		$\overline{GS}^I_A$ =		$\overline{GS}^I_B$ =		$\overline{GS}^I_C$ =	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#1 Period_____

ISSUES	(X) Independent Variable	GROUP II					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2. % change in per capita income; $w_2 = 1/3$	.050 to ∞	3	1.0	3	1.0	3	1.0
	.030 to .049	2	0.7	2	0.7	2	0.7
	.010 to .029	1	0.3	1	0.3	1	0.3
$X = \left(\frac{GNP_i}{P_i} - \frac{GNP_{i-1}}{P_{i-1}}\right) \Big/ \frac{GNP_{i-1}}{P_{i-1}}$	-.010 to +.009	0	0.0	0	0.0	0	0.0
	-.030 to -.011	-1	-0.3	-1	-0.3	-1	-0.3
	-.050 to -.031	-2	-0.7	-2	-0.7	-2	-0.7
	$-\infty$ to -.051	-3	-1.0	-3	-1.0	-3	-1.0
3. degree of income equality; $w_3 = 1/3$	0, 1, & 2	3	1.0	3	1.0	3	1.0
	3	2	0.7	2	0.7	2	0.7
	4	1	0.3	1	0.3	1	0.3
	5	0	0.0	0	0.0	0	0.0
$X = E_i$	6	-1	-0.3	-1	-0.3	-1	-0.3
	7	-2	-0.7	-2	-0.7	-2	-0.7
	8, 9, & 10	-3	-1.0	-3	-1.0	-3	-1.0
4. equalitarian-ness of tax structure; $w_4 = 1/3$	-5	3	1.0	3	1.0	3	1.0
	-4 & -3	2	0.7	2	0.7	2	0.7
	-2 & -1	1	0.3	1	0.3	1	0.3
	0	0	0.0	0	0.0	0	0.0
X = Tax Structure (TS)	1 & 2	-1	-0.3	-1	-0.3	-1	-0.3
	3 & 4	-2	-0.7	-2	-0.7	-2	-0.7
	5	-3	-1.0	-3	-1.0	-3	-1.0
Mean Group Satisfaction (Σ)		$\overline{GS}_A^{II} =$		$\overline{GS}_B^{II} =$		$\overline{GS}_C^{II} =$	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#1 Period_____

ISSUES	(X) Independent Variable	GROUP III					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2, 3, 4, 11 & 12; $\Sigma w = 5/10$ ($w_2=w_3=w_4=w_{11}=w_{12}=1/10$) $X = \overline{GS}^{I}_{p}$	3	3	1.5	3	1.5	3	1.5
	2	2	1.0	2	1.0	2	1.0
	1	1	0.5	1	0.5	1	0.5
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.5	-1	-0.5	-1	-0.5
	-2	-2	-1.0	-2	-1.0	-2	-1.0
	-3	-3	-1.5	-3	-1.5	-3	-1.5
5. equalitarian-ness of regulatory structure; $w_5 = 1/10$	5	3	0.3	3	0.3	3	0.3
	3 & 4	2	0.2	2	0.2	2	0.2
	1 & 2	1	0.1	1	0.1	1	0.1
	0	0	0.0	0	0.0	0	0.0
	-1 & -2	-1	-0.1	-1	-0.1	-1	-0.1
X = Regulatory Structure (RS)	-3 & -4	-2	-0.2	-2	-0.2	-2	-0.2
	-5	-3	-0.3	-3	-0.3	-3	-0.3
6. level of unemployment; $w_6 = 4/10$	.000 - .009	3	1.2	3	1.2	3	1.2
	.010 - .019	2	0.8	2	0.8	2	0.8
	.020 - .029	1	0.4	1	0.4	1	0.4
	.030 - .039	0	0.0	0	0.0	0	0.0
$X = Lu_i/Lp_i$	.040 - .049	-1	-0.4	-1	-0.4	-1	-0.4
	.050 - .059	-2	-0.8	-2	-0.8	-2	-0.8
	.060 - 1.00	-3	-1.2	-3	-1.2	-3	-1.2
Mean Group Satisfaction (Σ)		$\overline{GS}^{III}_{A}$=		$\overline{GS}^{III}_{B}$=		$\overline{GS}^{III}_{C}$=	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#1 Period_____

ISSUES	(X) Independent Variable	GROUP IV					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2, 3, 4; $\Sigma w = 3/7$	3	3	1.3	3	1.3	3	1.3
	2	2	0.8	2	0.8	2	0.8
$(w_2 = w_3 = w_4 = 1/7)$	1	1	0.4	1	0.4	1	0.4
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.4	-1	-0.4	-1	-0.4
$X = \overline{GS}^{II}_{+}$	-2	-2	-0.8	-2	-0.8	-2	-0.8
	-3	-3	-1.3	-3	-1.3	-3	-1.3
5. equalitarian-ness of regulatory structure; $w_5 = 4/7$	-5	3	1.7	3	1.7	3	1.7
	-4 & -3	2	1.1	2	1.1	2	1.1
	-2 & -1	1	0.6	1	0.6	1	0.6
	0	0	0.0	0	0.0	0	0.0
	1 & 2	-1	-0.6	-1	-0.6	-1	-0.6
X = Regulatory Structure (RS)	3 & 4	-2	-1.1	-2	-1.1	-2	-1.1
	5	-3	-1.7	-3	-1.7	-3	-1.7
Mean Group Satisfaction (Σ)		$\overline{GS}^{IV}_{A=}$		$\overline{GS}^{IV}_{B=}$		$\overline{GS}^{IV}_{C=}$	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#1 Period_____

ISSUES	(X) Independent Variable	GROUP V					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2, 3, 4, 5, 6, 11, & 12 $\Sigma w = 10/13$ $(w_2 = w_3 = w_4 = w_5 = w_{11} = w_{12} = \frac{1}{13})$ $X = \overline{GS}^{III}_{p}$ $(w_6 = 4/13)$	3	3	2.2	3	2.2	3	2.2
	2	2	1.5	2	1.5	2	1.5
	1	1	0.8	1	0.8	1	0.8
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.8	-1	-0.8	-1	-0.8
	-2	-2	-1.5	-2	-1.5	-2	-1.5
	-3	-3	-2.2	-3	-2.2	-3	-2.2
9. government spending for business subsidies, $w_9 = 3/13$ $X = G_{si}/GNP_i$	.060 - ∞	3	0.7	3	0.7	3	0.7
	.050 - .059	2	0.5	2	0.5	2	0.5
	.040 - .049	1	0.2	1	0.2	1	0.2
	.030 - .039	0	0.0	0	0.0	0	0.0
	.020 - .029	-1	-0.2	-1	-0.2	-1	-0.2
	.010 - .019	-2	-0.5	-2	-0.5	-2	-0.5
	.000 - .009	-3	-0.7	-3	-0.7	-3	-0.7
Mean Group Satisfaction (Σ)		$\overline{GS}^{V}_{A}$=		$\overline{GS}^{V}_{B}$=		$\overline{GS}^{V}_{C}$=	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#1 Period_____

ISSUES	(X) Independent Variable	GROUP VI					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2, 3, 4, & 5; $\Sigma w = 6/10$ ($w_2 = w_3 = w_4 = 1/10$) ($w_5 = 3/10$) $X = \overline{GS}^{IV}_{p}$	3	3	1.8	3	1.8	3	1.8
	2	2	1.2	2	1.2	2	1.2
	1	1	0.6	1	0.6	1	0.6
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.6	-1	-0.6	-1	-0.6
	-2	-2	-1.2	-2	-1.2	-2	-1.2
	-3	-3	-1.8	-3	-1.8	-3	-1.8
9. government spending for business subsidies, $w_9 = 4/10$ $X = GS^{V}_{p,9}$	3	3	1.2	3	1.2	3	1.2
	2	2	0.8	2	0.8	2	0.8
	1	1	0.4	1	0.4	1	0.4
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.4	-1	-0.4	-1	-0.4
	-2	-2	-0.8	-2	-0.8	-2	-0.8
	-3	-3	-1.2	-3	-1.2	-3	-1.2
Mean Group Satisfaction (Σ)		$\overline{GS}^{VI}_{A}$=		$\overline{GS}^{VI}_{B}$=		$\overline{GS}^{VI}_{C}$=	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#1 Period_____

ISSUES	(X) Independent Variable	GROUP VII					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2, 3, 4, 5, 6, 11,& 12; $\Sigma w = 10/13$ ($w_2 = w_3 = w_4 = w_5 = w_{11} = w_{12} = \frac{1}{13}$) ($w_6 = 4/13$) $X = \overline{GS}^{III}_{p}$	3	3	2.2	3	2.2	3	2.2
	2	2	1.5	2	1.5	2	1.5
	1	1	0.8	1	0.8	1	0.8
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.8	-1	-0.8	-1	-0.8
	-2	-2	-1.5	-2	-1.5	-2	-1.5
	-3	-3	-2.2	-3	-2.2	-3	-2.2
8. government spending for military purposes; $w_8 = 3/13$ $X = G_{m_i}/GNP_i$	.060 - ∞	3	0.7	3	0.7	3	0.7
	.050 - .059	2	0.5	2	0.5	2	0.5
	.040 - .049	1	0.2	1	0.2	1	0.2
	.030 - .039	0	0.0	0	0.0	0	0.0
	.020 - .029	-1	-0.2	-1	-0.2	-1	-0.2
	.010 - .019	-2	-0.5	-2	-0.5	-2	-0.5
	.000 - .009	-3	-0.7	-3	-0.7	-3	-0.7
Mean Group Satisfaction (Σ)		$\overline{GS}^{VII}_{A}$ =		$\overline{GS}^{VII}_{B}$ =		$\overline{GS}^{VII}_{C}$ =	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#1 Period_____

ISSUES	(X) Independent Variable	GROUP VIII					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2, 3, 4, & 5; $\Sigma w = 6/10$ ($w_2 = w_3 = w_4 = 1/10$) ($w_5 = 3/10$) $X = \overline{GS}^{IV}_{p}$	3	3	1.8	3	1.8	3	1.8
	2	2	1.2	2	1.2	2	1.2
	1	1	0.6	1	0.6	1	0.6
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.6	-1	-0.6	-1	-0.6
	-2	-2	-1.2	-2	-1.2	-2	-1.2
	-3	-3	-1.8	-3	-1.8	-3	-1.8
8. government spending for military purposes; $w_8 = 4/10$ $X = GS^{VII}_{p,8}$	3	3	1.2	3	1.2	3	1.2
	2	2	0.8	2	0.8	2	0.8
	1	1	0.4	1	0.4	1	0.4
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.4	-1	-0.4	-1	-0.4
	-2	-2	-0.8	-2	-0.8	-2	-0.8
	-3	-3	-1.2	-3	-1.2	-3	-1.2
Mean Group Satisfaction (Σ)		$\overline{GS}^{VIII}_{A}$ =		$\overline{GS}^{VIII}_{B}$ =		$\overline{GS}^{VIII}_{C}$ =	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#1 Period_____

ISSUES	(X) Independent Variable	GROUP IX					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2. % change in per capita income; $w_2 = 1/13$	3	3	0.24	3	0.24	3	0.24
	2	2	0.16	2	0.16	2	0.16
	1	1	0.08	1	0.08	1	0.08
	0	0	0.00	0	0.00	0	0.00
	-1	-1	-0.08	-1	-0.08	-1	-0.08
$X = GS^{II}_{p,2}$	-2	-2	-0.16	-2	-0.16	-2	-0.16
	-3	-3	-0.24	-3	-0.24	-3	-0.24
3. degree of income equality; $w_3 = 1/13$	0, 1, & 2	3	0.24	3	0.24	3	0.24
	3	2	0.16	2	0.16	2	0.16
	4	1	0.08	1	0.08	1	0.08
	5	0	0.00	0	0.00	0	0.00
	6	-1	-0.08	-1	-0.08	-1	-0.08
$X = E_i$	7	-2	-0.16	-2	-0.16	-2	-0.16
	8, 9, & 10	-3	-0.24	-3	-0.24	-3	-0.24
4. equalitarian-ness of tax structure; $w_4 = 3/13$	-5	3	0.7	3	0.7	3	0.7
	-4 & -3	2	0.5	2	0.5	2	0.5
	-2 & -1	1	0.2	1	0.2	1	0.2
	0	0	0.0	0	0.0	0	0.0
X = Tax Structure (TS)	1 & 2	-1	-0.2	-1	-0.2	-1	-0.2
	3 & 4	-2	-0.5	-2	-0.5	-2	-0.5
	5	-3	-0.7	-3	-0.7	-3	-0.7
5. equalitarian-ness of regulatory structure; $w_5 = 3/13$	-5	3	0.7	3	0.7	3	0.7
	-4 & -3	2	0.5	2	0.5	2	0.5
	-2 & -1	1	0.2	1	0.2	1	0.2
	0	0	0.0	0	0.0	0	0.0
X = Regulatory Structure (RS)	1 & 2	-1	-0.2	-1	-0.2	-1	-0.2
	3 & 4	-2	-0.5	-2	-0.5	-2	-0.5
	5	-3	-0.7	-3	-0.7	-3	-0.9
7. total government spending and taxes; $w_7 = 5/13$	.000 - .004	3	1.0	3	1.0	3	1.0
	.005 - .009	2	0.7	2	0.7	2	0.7
	.010 - .014	1	0.4	1	0.4	1	0.4
	.015 - .019	0	0.0	0	0.0	0	0.0
$X = \frac{G_i + \lvert G_i - T_i \rvert}{GNP_i}$	.020 - .024	-1	-0.4	-1	-0.4	-1	-0.4
	.025 - .029	-2	-0.7	-2	-0.7	-2	-0.7
	.030 - ∞	-3	-1.0	-3	-1.0	-3	-1.0
Mean Group Satisfaction (Σ)		$\overline{GS}^{IX}_{A=}$		$\overline{GS}^{IX}_{B=}$		$\overline{GS}^{IX}_{C=}$	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#1 Period_____

ISSUES	(X) Independent Variable	GROUP X					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2. % change in per capita income; $w_2 = 1/10$ $X = GS^{I}_{p,2}$	3	3	0.3	3	0.3	3	0.3
	2	2	0.2	2	0.2	2	0.2
	1	1	0.1	1	0.1	1	0.1
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.1	-1	-0.1	-1	-0.1
	-2	-2	-0.2	-2	-0.2	-2	-0.2
	-3	-3	-0.3	-3	-0.3	-3	-0.3
3. degree of income equality; $w_3 = 2/10$ $X = E_i$	8, 9, & 10	3	0.6	3	0.6	3	0.6
	7	2	0.4	2	0.4	2	0.4
	6	1	0.2	1	0.2	1	0.2
	5	0	0.0	0	0.0	0	0.0
	4	-1	-0.2	-1	-0.2	-1	-0.2
	3	-2	-0.4	-2	-0.4	-2	-0.4
	0, 1, & 2	-3	-0.6	-3	-0.6	-3	-0.6
4. equalitarian-ness of tax structure; $w_4 = 2/10$ X = Tax Structure (TS)	5	3	0.6	3	0.6	3	0.6
	3 & 4	2	0.4	2	0.4	2	0.4
	1 & 2	1	0.2	1	0.2	1	0.2
	0	0	0.0	0	0.0	0	0.0
	-1 & -2	-1	-0.2	-1	-0.2	-1	-0.2
	-3 & -4	-2	-0.4	-2	-0.4	-2	-0.4
	-5	-3	-0.6	-3	-0.6	-3	-0.6
11. government spending for social welfare; $w_{11} = 4/10$ $X = GS^{I}_{p,11}$	3	3	1.2	3	1.2	3	1.2
	2	2	0.8	2	0.8	2	0.8
	1	1	0.4	1	0.4	1	0.4
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.4	-1	-0.4	-1	-0.4
	-2	-2	-0.8	-2	-0.8	-2	-0.8
	-3	-3	-1.2	-3	-1.2	-3	-1.2
12. government spending for education; $w_{12} = 1/10$ $X = GS^{I}_{p,12}$	3	3	0.3	3	0.3	3	0.3
	2	2	0.2	2	0.2	2	0.2
	1	1	0.1	1	0.1	1	0.1
	0	0	0.0	0	0.0	C	0.0
	-1	-1	-0.1	-1	-0.1	-1	-0.1
	-2	-2	-0.2	-2	-0.2	-2	-0.2
	-3	-3	-0.3	-3	-0.3	-3	-0.3
Mean Group Satisfaction (Σ)		$\overline{GS}^{X}_{A}$		$\overline{GS}^{X}_{B}$		$\overline{GS}^{X}_{C}$	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#1 Period_____

ISSUES	(X) Independent Variable	GROUP XI					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
1. % change in GNP; $w_1 = 4/8$ $X = \frac{GNP_i - GNP_{i-1}}{GNP_{i-1}}$	.060 - ∞	3	1.5	3	1.5	3	1.5
	.050 - .059	2	1.0	2	1.0	2	1.0
	.040 - .049	1	0.5	1	0.5	1	0.5
	.030 - .039	0	0.0	0	0.0	0	0.0
	.020 - .029	-1	-0.5	-1	-0.5	-1	-0.5
	.010 - .019	-2	-1.0	-1	-1.0	-1	-1.0
	-∞ - .009	-3	-1.5	-3	-1.5	-3	-1.5
3. degree of income equality; $w_3 = 1/8$ $X = E_i$	8, 9, & 10	3	0.4	3	0.4	3	0.4
	7	2	0.2	2	0.2	2	0.2
	6	1	0.1	1	0.1	1	0.1
	5	0	0.0	0	0.0	0	0.0
	4	-1	-0.1	-1	-0.1	-1	-0.1
	3	-2	-0.2	-2	-0.2	-2	-0.2
	0, 1, & 2	-3	-0.4	-3	-0.4	-3	-0.4
4. equalitarian-ness of tax structure; $w_4 = 1/8$ X = Tax Structure (TS)	5	3	0.4	3	0.4	3	0.4
	3 & 4	2	0.2	2	0.2	2	0.2
	1 & 2	1	0.1	1	0.1	1	0.1
	0	0	0.0	0	0.0	0	0.0
	-1 & -2	-1	-0.1	-1	-0.1	-1	-0.1
	-3 & -4	-2	-0.2	-2	-0.2	-2	-0.2
	-5	-3	-0.4	-3	-0.4	-3	-0.4
11. government spending for social welfare; $w_{11} = 1/8$ $X = GS^{I}_{p,11}$	3	3	0.4	3	0.4	3	0.4
	2	2	0.2	2	0.2	2	0.2
	1	1	0.1	1	0.1	1	0.1
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.1	-1	-0.1	-1	-0.1
	-2	-2	-0.2	-2	-0.2	-2	-0.2
	-3	-3	-0.4	-3	-0.4	-3	-0.4
12. government spending for education; $w_{12} = 1/8$ $X = GS^{I}_{p,12}$	3	3	0.4	3	0.4	3	0.4
	2	2	0.2	2	0.2	2	0.2
	1	1	0.1	1	0.1	1	0.1
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.1	-1	-0.1	-1	-0.1
	-2	-2	-0.2	-2	-0.2	-2	-0.2
	-3	-3	-0.4	-3	-0.4	-3	-0.4
Mean Group Satisfaction (Σ)		$\overline{GS}^{XI}_{A=}$		$\overline{GS}^{XI}_{B=}$		$\overline{GS}^{XI}_{C=}$	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#1 Period_____

ISSUES	(X) Independent Variable	GROUP XII					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
10. interest payments on debt. Is $G_{d_i} \geq \bar{G}_{d_i}$? Yes: Compute $\overline{GS}_p^{XII}$ on issues 1, 3, 4, & 13 below. No: Set $\overline{GS}_p^{XII} = -3$.							
1. % change in GNP; $w_1 = 3/8$ $X = \frac{\lvert GNP_i - GNP_{i-1} \rvert}{GNP_{i-1}}$	.000 - .009	3	1.1	3	1.1	3	1.1
	.010 - .019	2	0.8	2	0.8	2	0.8
	.020 - .029	1	0.4	1	0.4	1	0.4
	.030 - .039	0	0.0	0	0.0	0	0.0
	.040 - .049	-1	-0.4	-1	-0.4	-1	-0.4
	.050 - .059	-2	-0.8	-2	-0.8	-2	-0.8
	.060 - ∞	-3	-1.1	-3	-1.1	-3	-1.1
3. degree of income equality; $w_3 = 1/8$ $X = E_i$	0, 1, & 2	3	0.4	3	0.4	3	0.4
	3	2	0.2	2	0.2	2	0.2
	4	1	0.1	1	0.1	1	0.1
	5	0	0.0	0	0.0	0	0.0
	6	-1	-0.1	-1	-0.1	-1	-0.1
	7	-2	-0.2	-2	-0.2	-2	-0.2
	8, 9, & 10	-3	-0.4	-3	-0.4	-3	-0.4
4. equalitarian-ness of tax structure; $w_4 = 1/8$ X = Tax Structure (TS)	-5	3	0.4	3	0.4	3	0.4
	-4 & -3	2	0.2	2	0.2	2	0.2
	-2 & -1	1	0.1	1	0.1	1	0.1
	0	0	0.0	0	0.0	0	0.0
	1 & 2	-1	-0.1	-1	-0.1	-1	-0.1
	3 & 4	-2	-0.2	-2	-0.2	-2	-0.2
	5	-3	-0.4	-3	-0.4	-3	-0.4
13. size of the accumulated governmental debt; $w_{13} = 3/8$ $X = D_i/GNP_i$	.060 - ∞	3	1.1	3	1.1	3	1.1
	.050 - .059	2	0.8	2	0.8	2	0.8
	.040 - .049	1	0.4	1	0.4	1	0.4
	.030 - .039	0	0.0	0	0.0	0	0.0
	.020 - .029	-1	-0.4	-1	-0.4	-1	-0.4
	.010 - .019	-2	-0.8	-2	-0.8	-2	-0.8
	.000 - .009	-3	-1.1	-3	-1.1	-3	-1.1
Mean Group Satisfaction (Σ)		$\overline{GS}_A^{XII}$ =		$\overline{GS}_B^{XII}$ =		$\overline{GS}_C^{XII}$ =	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#1 Period_____

ISSUES	(X) Independent Variable	GROUP XIII					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
8. government spending for military purposes; $X = G_{m_i}/GNP_i$	0	3		3		3	
	0 - .009	0		0		0	
	.010 - ∞	-3		-3		-3	
Mean Group Satisfaction (Σ)		$\overline{GS}^{XIII}_{A}$ =		$\overline{GS}^{XIII}_{B}$ =		$\overline{GS}^{XIII}_{C}$ =	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#1 Period_____

ISSUES	(X) Independent Variable	GROUP XIV					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
8. government spending for military purposes X = $GS^{VII}_{P,8}$	3 2 1 0 -1 -2 -3	3 2 1 0 -1 -2 -3		3 2 1 0 -1 -2 -3		3 2 1 0 -1 -2 -3	
Mean Group Satisfaction (Σ)		$\overline{GS}^{XIV}_{A=}$		$\overline{GS}^{XIV}_{B=}$		$\overline{GS}^{XIV}_{C=}$	

MEAN GROUP SATISFACTION COMPUTATION MATRIX #2 *

$$\overline{GS}^{G}_{P_j} = \frac{\sum w_j GS^{G}_{Pj_i}}{\sum w_j} \qquad \text{eq. 5.1, p.89}$$

$GS^{G}_{P_j}$ = group satisfaction of a particular group, G, with respect to a particular party, P, on a particular salient issue, j.

$GS^{G}_{P_j}$ "depends on" X_j.

X_j is the operational definition of a particular issue, j-- the independent variable-- and

the nature of the dependence is given in the body of the matrix.**

w_j = a weight reflecting the relative importance of a particular issue, j, to the group.

$\sum w_j = 1.00$

Use of the Matrix

1) For each group, each issue, and each party's decisions: a) compute X_j; b) locate the value of X_j in the X column of the matrix; and c) trace across to find the values of GS_j and wGS_j for the party in question. Circle the latter two numbers.

2) Then sum the circled items in the wGS columns for each group and each party. The sums are the mean group satisfaction figures.

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*Matrix #2 differs from Matrix #1 only in that it contains issue 14, the type of anti-recession fiscal policies, which is salient to certain of the interest groups when the economy is heading into a recession (cf. p.82 and step 20 above).

**These dependent-independent relationships are quantitative expressions for the interest group positions described on pages 81-87. They are meant to be suggestive of possibilities and may be changed to suit the simulator's needs.

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#2 Period_____

ISSUES	(X) Independent Variable	GROUP I					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2. % change in per capita income; $w_2 = 1/6$ $X = \left(\frac{GNP_i}{P_i} - \frac{GNP_{i-1}}{P_{i-1}}\right) \Big/ \frac{GNP_{i-1}}{P_{i-1}}$	.050 to + ∞	3	0.5	3	0.5	3	0.5
	.030 to .049	2	0.3	2	0.3	2	0.3
	.010 to .029	1	0.2	1	0.2	1	0.2
	-.010 to +.009	0	0.0	0	0.0	0	0.0
	-.030 to -.011	-1	-0.2	-1	-0.2	-1	-0.2
	-.050 to -.031	-2	-0.3	-2	-0.3	-2	-0.3
	-. ∞ to -.051	-3	-0.5	-3	-0.5	-3	-0.5
3. degree of income equality; $w_3 = 1/6$ $X = E_i$	8, 9, & 10	3	0.5	3	0.5	3	0.5
	7	2	0.3	2	0.3	2	0.3
	6	1	0.2	1	0.2	1	0.2
	5	0	0.0	0	0.0	0	0.0
	4	-1	-0.2	-1	-0.2	-1	-0.2
	3	-2	-0.3	-2	-0.3	-2	-0.3
	0, 1, & 2	-3	-0.5	-3	-0.5	-3	-0.5
4. equalitarian-ness of tax structure; $w_4 = 1/6$ X = Tax Structure (TS)	5	3	0.5	3	0.5	3	0.5
	3 & 4	2	0.3	2	0.3	2	0.3
	1 & 2	1	0.2	1	0.2	1	0.2
	0	0	0.0	0	0.0	0	0.0
	-1 & -2	-1	-0.2	-1	-0.2	-1	-0.2
	-3 & -4	-2	-0.3	-2	-0.3	-2	-0.3
	-5	-3	-0.5	-3	-0.5	-3	-0.5
11. government spending for social welfare; $w_{11} = 1/6$ $X = G_{w_i}/GNP_i$	.060 - ∞	3	0.5	3	0.5	3	0.5
	.050 - .059	2	0.3	2	0.3	2	0.3
	.040 - .049	1	0.2	1	0.2	1	0.2
	.030 - .039	0	0.0	0	0.0	0	0.0
	.020 - .029	-1	-0.2	-1	-0.2	-1	-0.2
	.010 - .019	-2	-0.3	-2	-0.3	-2	-0.3
	.000 - .009	-3	-0.5	-3	-0.5	-3	-0.5
12. government spending for education; $w_{11} = 1/6$ $X = G_{e_i}/GNP_i$	.060 - ∞	3	0.5	3	0.5	3	0.5
	.050 - .059	2	0.3	2	0.3	2	0.3
	.040 - .049	1	0.2	1	0.2	1	0.2
	.030 - .039	0	0.0	0	0.0	0	0.0
	.020 - .029	-1	-0.2	-1	-0.2	-1	-0.2
	.010 - .019	-2	-0.3	-2	-0.3	-2	-0.3
	.000 - .009	-3	-0.5	-3	-0.5	-3	-0.5
14. anti-recession fiscal policies; $w_{14} = 1/6$ $X = \frac{(T_{i-1} - T_i)}{T_{i-1}} + \frac{(G_{w_i} + G_{e_i}) - (G_{w_{i-1}} + G_{e_{i-1}})}{(G_{w_{i-1}} + G_{e_{i-1}})}$	20.0 - ∞	3	0.5	3	0.5	3	0.5
	16.0 - 19.9	2	0.3	2	0.3	2	0.3
	12.0 - 15.9	1	0.2	1	0.2	1	0.2
	8.0 - 11.9	0	0.0	0	0.0	0	0.0
	4.0 - 7.9	-1	-0.2	-1	-0.2	-1	-0.2
	0.0 - 3.9	-2	-0.3	-2	-0.3	-2	-0.3
	- ∞ to -.01	-3	-0.5	-3	-0.5	-3	-0.5
Mean Group Satisfaction (Σ)		$\overline{GS}^I_A$ =		$\overline{GS}^I_B$ =		$\overline{GS}^I_C$ =	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#2 Period_____

ISSUES	(X) Independent Variable	GROUP II					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2. % change in per capita income; $w_2 = 1/4$ $X = \left(\frac{GNP_i}{P_i} - \frac{GNP_{i-1}}{P_{i-1}}\right) \Big/ \frac{GNP_{i-1}}{P_{i-1}}$	.050 to + ∞	3	0.8	3	0.8	3	0.8
	.030 to .049	2	0.5	2	0.5	2	0.5
	.010 to .029	1	0.2	1	0.2	1	0.2
	-.010 to +.009	0	0.0	0	0.0	0	0.0
	-.030 to -.011	-1	-0.2	-1	-0.2	-1	-0.2
	-.050 to -.031	-2	-0.5	-2	-0.5	-2	-0.5
	- ∞ to -.051	-3	-0.8	-3	-0.8	-3	-0.8
3. degree of income equality; $w_3 = 1/4$ $X = E_i$	0, 1, & 2	3	0.8	3	0.8	3	0.8
	3	2	0.5	2	0.5	2	0.5
	4	1	0.2	1	0.2	1	0.2
	5	0	0.0	0	0.0	0	0.0
	6	-1	-0.2	-1	-0.2	-1	-0.2
	7	-2	-0.5	-2	-0.5	-2	-0.5
	8, 9, & 10	-3	-0.8	-3	-0.8	-3	-0.8
4. equalitarian-ness of tax structure; $w_4 = 1/4$ X = Tax Structure (TS)	-5	3	0.8	3	0.8	3	0.8
	-4 & -3	2	0.5	2	0.5	2	0.5
	-2 & -1	1	0.2	1	0.2	1	0.2
	0	0	0.0	0	0.0	0	0.0
	1 & 2	-1	-0.2	-1	-0.2	-1	-0.2
	3 & 4	-2	-0.5	-2	-0.5	-2	-0.5
	5	-3	-0.8	-3	-0.8	-3	-0.8
14. anti-recession fiscal policies; $w_{14} = 1/4$ $X = \frac{(T_{i-1} - T_i)}{T_{i-1}} + \frac{(G_{m_i} + G_{s_i}) - (G_{m_{i-1}} + G_{s_{i-1}})}{(G_{m_{i-1}} + G_{s_{i-1}})}$	20.0 - ∞	3	0.8	3	0.8	3	0.8
	16.0 - 19.9	2	0.5	2	0.5	2	0.5
	12.0 - 15.9	1	0.2	1	0.2	1	0.2
	8.0 - 11.9	0	0.0	0	0.0	0	0.0
	4.0 - 7.9	-1	-0.2	-1	-0.2	-1	-0.2
	0.0 - 3.9	-2	-0.5	-2	-0.5	-2	-0.5
	- ∞ - -.01	-3	-0.8	-3	-0.8	-3	-0.8
Mean Group Satisfaction (Σ)		$\overline{GS}_A^{II} =$		$\overline{GS}_B^{II} =$		$\overline{GS}_C^{II} =$	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#2 Period_____

ISSUES	(X) Independent Variable	GROUP III					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2, 3, 4, 11, 12 & 14; $\Sigma w = 6/11$ ($w_2 = w_3 = w_4 = w_{11} = w_{12} = w_{14} = 1/11$) $X = \overline{GS}^{I}_{p}$	3	3	1.6	3	1.6	3	1.6
	2	2	1.1	2	1.1	2	1.1
	1	1	0.5	1	0.5	1	0.5
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.5	-1	-0.5	-1	-0.5
	-2	-2	-1.1	-2	-1.1	-2	-1.1
	-3	-3	-1.6	-3	-1.6	-3	-1.6
5. equalitarian-ness of regulatory structure; $w_5 = 1/11$ X = Regulatory Structure (RS)	5	3	0.3	3	0.3	3	0.3
	3 & 4	2	0.2	2	0.2	2	0.2
	1 & 2	1	0.1	1	0.1	1	0.1
	0	0	0.0	0	0.0	0	0.0
	-1 & -2	-1	-0.1	-1	-0.1	-1	-0.1
	-3 & -4	-2	-0.2	-2	-0.2	-2	-0.2
	-5	-3	-0.3	-3	-0.3	-3	-0.3
6. level of unemployment; $w_6 = 4/11$ $X = Lu_i/Lp_i$	.000 - .009	3	1.1	3	1.1	3	1.1
	.010 - .019	2	0.7	2	0.7	2	0.7
	.020 - .029	1	0.4	1	0.4	1	0.4
	.030 - .039	0	0.0	0	0.0	0	0.0
	.040 - .049	-1	-0.4	-1	-0.4	-1	-0.4
	.050 - .059	-2	-0.7	-2	-0.7	-2	-0.7
	.060 - 1.00	-3	-1.1	-3	-1.1	-3	-1.1
Mean Group Satisfaction (Σ)		$\overline{GS}^{III}_{A}$=		$\overline{GS}^{III}_{B}$=		$\overline{GS}^{III}_{C}$=	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#2 Period_____

ISSUES	(X) Independent Variable	GROUP IV					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2, 3, 4, & 14; $\Sigma w = 4/8$ ($w_2 = w_3 = w_4 = w_{14} = 1/8$) $X = \overline{GS}^{IV}_{p}$	3	3	1.5	3	1.5	3	1.5
	2	2	1.0	2	1.0	2	1.0
	1	1	0.5	1	0.5	1	0.5
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.5	-1	-0.5	-1	-0.5
	-2	-2	-1.0	-2	-1.0	-2	-1.0
	-3	-3	-1.5	-3	-1.5	-3	-1.5
5. equalitarian-ness of regulatory structure; $w_5 = 4/8$ X = Regulatory Structure (RS)	-5	3	1.5	3	1.5	3	1.5
	-4 & -3	2	1.0	2	1.0	2	1.0
	-2 & -1	1	0.5	1	0.5	1	0.5
	0	0	0.0	0	0.0	0	0.0
	1 & 2	-1	-0.5	-1	-0.5	-1	-0.5
	3 & 4	-2	-1.0	-2	-1.0	-2	-1.0
	5	-3	-1.5	-3	-1.5	-3	-1.5
Mean Group Satisfaction (Σ)		$\overline{GS}^{IV}_{A} =$		$\overline{GS}^{IV}_{B} =$		$\overline{GS}^{IV}_{C} =$	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#2 Period_____

ISSUES	(X) Independent Variable	GROUP V					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2, 3, 4, 5, 6, 11, 12 & 14; $\Sigma w = 11/14$ ($w_2=w_3=w_4=w_5=w_{11}=w_{12}=w_{14}=1/14$) ($w_6=4/14$) $X = \overline{GS}^{m}_{p}$	3	3	2.3	3	2.3	3	2.3
	2	2	1.5	2	1.5	2	1.5
	1	1	0.8	1	0.8	1	0.8
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.8	-1	-0.8	-1	-0.8
	-2	-2	-1.5	-2	-1.5	-2	-1.5
	-3	-3	-2.3	-3	-2.3	-3	-2.3
9. government spending for business subsidies; $w_9 = 3/14$ $X = G_{s_i}/GNP_i$	.060 - ∞	3	0.6	3	0.6	3	0.6
	.050 - .059	2	0.4	2	0.4	2	0.4
	.040 - .049	1	0.2	1	0.2	1	0.2
	.030 - .039	0	0.0	0	0.0	0	0.0
	.020 - .029	-1	-0.2	-1	-0.2	-1	-0.2
	.010 - .019	-2	-0.4	-2	-0.4	-2	-0.4
	.000 - .009	-3	-0.6	-3	-0.6	-3	-0.6
Mean Group Satisfaction (Σ)		$\overline{GS}^{V}_{A}$=		$\overline{GS}^{V}_{B}$=		$\overline{GS}^{V}_{C}$=	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#2 Period_____

ISSUES	(X) Independent Variable	GROUP VI					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2, 3, 4, 5, & 14; $\Sigma w = 7/11$ ($w_2 = w_3 = w_4 = w_{14} = 1/11$) ($w_5 = 3/11$) $X = \overline{GS}^{IV}_{p}$	3	3	1.9	3	1.9	3	1.9
	2	2	1.3	2	1.3	2	1.3
	1	1	0.6	1	0.6	1	0.6
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.6	-1	-0.6	-1	-0.6
	-2	-2	-1.3	-2	-1.3	-2	-1.3
	-3	-3	-1.9	-3	-1.9	-3	-1.9
9. government spending for business subsidies; $w_9 = 4/11$ $X = GS^{V}_{p,9}$	3	3	1.1	3	1.1	3	1.1
	2	2	0.7	2	0.7	2	0.7
	1	1	0.4	1	0.4	1	0.4
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.4	-1	-0.4	-1	-0.4
	-2	-2	-0.7	-2	-0.7	-2	-0.7
	-3	-3	-1.1	-3	-1.1	-3	-1.1
Mean Group Satisfaction (Σ)		$\overline{GS}^{VI}_{A}$=		$\overline{GS}^{VI}_{B}$=		$\overline{GS}^{VI}_{C}$=	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#2 Period_____

ISSUES	(X) Independent Variable	GROUP VII					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2, 3, 4, 5, 6, 11, 12 & 14; $\Sigma w = 11/14$ ($w_2=w_3=w_4=w_5=w_{11}=w_{12}=w_{14}= 1/14$) ($w_6= 4/14$) $X = \overline{GS}_p^{m}$	3	3	2.3	3	2.3	3	2.3
	2	2	1.5	2	1.5	2	1.5
	1	1	0.8	1	0.8	1	0.8
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.8	-1	-0.8	-1	-0.8
	-2	-2	-1.5	-2	-1.5	-2	-1.5
	-3	-3	-2.3	-3	-2.3	-3	-2.3
8. government spending for military purposes; $w_8 = 3/14$ $X = G_{m_i}/GNP_i$	.060 - ∞	3	0.6	3	0.6	3	0.6
	.050 - .059	2	0.4	2	0.4	2	0.4
	.040 - .049	1	0.2	1	0.2	1	0.2
	.030 - .039	0	0.0	0	0.0	0	0.0
	.020 - .029	-1	-0.2	-1	-0.2	-1	-0.2
	.010 - .019	-2	-0.4	-2	-0.4	-2	-0.4
	.000 - .009	-3	-0.6	-3	-0.6	-3	-0.6
Mean Group Satisfaction (Σ)		$\overline{GS}_A^{VII}$ =		$\overline{GS}_B^{VII}$ =		$\overline{GS}_C^{VII}$ =	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#2 Period_____

ISSUES	(X) Independent Variable	GROUP VIII					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2, 3, 4, 5, & 14; $\Sigma w = 7/11$ ($w_2 = w_3 = w_4 = w_{14} = 1/11$) ($w_5 = 3/11$) $X = \overline{GS}^{IV}_{p}$	3	3	1.9	3	1.9	3	1.9
	2	2	1.3	2	1.3	2	1.3
	1	1	0.6	1	0.6	1	0.6
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.6	-1	-0.6	-1	-0.6
	-2	-2	-1.3	-2	-1.3	-2	-1.3
	-3	-3	-1.9	-3	-1.9	-3	-1.9
8. government spending for military purposes; $w_8 = 4/11$ $X = GS^{VII}_{p,8}$	3	3	1.1	3	1.1	3	1.1
	2	2	0.7	2	0.7	2	0.7
	1	1	0.4	1	0.4	1	0.4
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.4	-1	-0.4	-1	-0.4
	-2	-2	-0.7	-2	-0.7	-2	-0.7
	-3	-3	-1.1	-3	-1.1	-3	-1.1
Mean Group Satisfaction (Σ)		$\overline{GS}^{VIII}_{A} =$		$\overline{GS}^{VIII}_{B} =$		$\overline{GS}^{VIII}_{C} =$	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#2 Period_____

ISSUES	(X) Independent Variable	GROUP IX					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2. % change in per capita income; $w_2 = 1/13$ $X = GS^{\pi}_{p,2}$	3	3	0.24	3	0.24	3	0.24
	2	2	0.16	2	0.16	2	0.16
	1	1	0.08	1	0.08	1	0.08
	0	0	0.00	0	0.00	0	0.00
	-1	-1	-0.08	-1	-0.08	-1	-0.08
	-2	-2	-0.16	-2	-0.16	-2	-0.16
	-3	-3	-0.24	-3	-0.24	-3	-0.24
3. degree of income equality; $w_3 = 1/13$ $X = E_i$	0, 1, & 2	3	0.24	3	0.24	3	0.24
	3	2	0.16	2	0.16	2	0.16
	4	1	0.08	1	0.08	1	0.08
	5	0	0.00	0	0.00	0	0.00
	6	-1	-0.08	-1	-0.08	-1	-0.08
	7	-2	-0.16	-2	-0.16	-2	-0.16
	8, 9, & 10	-3	-0.24	-3	-0.24	-3	-0.24
4. equalitarian-ness of tax structure; $w_4 = 3/13$ X = Tax Structure (TS)	-5	3	0.7	3	0.7	3	0.7
	-4 & -3	2	0.5	2	0.5	2	0.5
	-2 & -1	1	0.2	1	0.2	1	0.2
	0	0	0.0	0	0.0	0	0.0
	1 & 2	-1	-0.2	-1	-0.2	-1	-0.2
	3 & 4	-2	-0.5	-2	-0.5	-2	-0.5
	5	-3	-0.7	-3	-0.7	-3	-0.7
5. equalitarian-ness of regulatory structure; $w_5 = 3/13$ X = Regulatory Structure (RS)	-5	3	0.7	3	0.7	3	0.7
	-4 & -3	2	0.5	2	0.5	2	0.5
	-2 & -1	1	0.2	1	0.2	1	0.2
	0	0	0.0	0	0.0	0	0.0
	1 & 2	-1	-0.2	-1	-0.2	-1	-0.2
	3 & 4	-2	-0.5	-2	-0.5	-2	-0.5
	5	-3	-0.7	-3	-0.7	-3	-0.7
7. total government spending & taxes; $w_7 = 5/13$ $X = \frac{G_i + \lvert G_i - T_i \rvert}{GNP_i}$	.000 - .004	3	1.0	3	1.0	3	1.0
	.005 - .009	2	0.7	2	0.7	2	0.7
	.010 - .014	1	0.4	1	0.4	1	0.4
	.015 - .019	0	0.0	0	0.0	0	0.0
	.020 - .024	-1	-0.4	-1	-0.4	-1	-0.4
	.025 - .029	-2	-0.7	-2	-0.7	-2	-0.7
	.030 - ∞	-3	-1.0	-3	-1.0	-3	-1.0
Mean Group Satisfaction (Σ)		$\overline{GS}^{IX}_{A}$ =		$\overline{GS}^{IX}_{B}$ =		$\overline{GS}^{IX}_{C}$ =	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#2 Period_____

ISSUES	(X) Independent Variable	GROUP X					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
2. % change in per capita income; $w_2 = 1/11$ $X = GS^{I}_{p,2}$	3	3	0.3	3	0.3	3	0.3
	2	2	0.2	2	0.2	2	0.2
	1	1	0.1	1	0.1	1	0.1
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.1	-1	-0.1	-1	-0.1
	-2	-2	-0.2	-2	-0.2	-2	-0.2
	-3	-3	-0.3	-3	-0.3	-3	-0.3
3. degree of income equality; $w_3 = 2/11$ $X = E_i$	8, 9, & 10	3	0.5	3	0.5	3	0.5
	7	2	0.4	2	0.4	2	0.4
	6	1	0.2	1	0.2	1	0.2
	5	0	0.0	0	0.0	0	0.0
	4	-1	-0.2	-1	-0.2	-1	-0.2
	3	-2	-0.4	-2	-0.4	-2	-0.4
	0, 1, & 2	-3	-0.5	-3	-0.5	-3	-0.5
4. equalitarian-ness of tax structure; $w_4 = 2/11$ X = Tax Structure (TS)	5	3	0.5	3	0.5	3	0.5
	3 & 4	2	0.4	2	0.4	2	0.4
	1 & 2	1	0.2	1	0.2	1	0.2
	0	0	0.0	0	0.0	0	0.0
	-1 & -2	-1	-0.2	-1	-0.2	-1	-0.2
	-3 & -4	-2	-0.4	-2	-0.4	-2	-0.4
	-5	-3	-0.5	-3	-0.5	-3	-0.5
11. government spending for social welfare; $w_{11} = 4/11$ $X = GS^{I}_{p,11}$	3	3	1.1	3	1.1	3	1.1
	2	2	0.7	2	0.7	2	0.7
	1	1	0.4	1	0.4	1	0.4
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.4	-1	-0.4	-1	-0.4
	-2	-2	-0.7	-2	-0.7	-2	-0.7
	-3	-3	-1.1	-3	-1.1	-3	-1.1
12. government spending for education; $w_{12} = 1/11$ $X = GS^{I}_{p,12}$	3	3	0.3	3	0.3	3	0.3
	2	2	0.2	2	0.2	2	0.2
	1	1	0.1	1	0.1	1	0.1
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.1	-1	-0.1	-1	-0.1
	-2	-2	-0.2	-2	-0.2	-2	-0.2
	-3	-3	-0.3	-3	-0.3	-3	-0.3
14. anti-recession fiscal policies; $w_{14} = 1/11$ $X = GS^{I}_{p,14}$	3	3	0.3	3	0.3	3	0.3
	2	2	0.2	2	0.2	2	0.2
	1	1	0.1	1	0.1	1	0.1
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.1	-1	-0.1	-1	-0.1
	-2	-2	-0.2	-2	-0.2	-2	-0.2
	-3	-3	-0.3	-3	-0.3	-3	-0.3
Mean Group Satisfaction (Σ)		$\overline{GS}^{X}_{A}$ =		$\overline{GS}^{X}_{B}$ =		$\overline{GS}^{X}_{C}$ =	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#2 Period_____

ISSUES	(X) Independent Variable	GROUP XI					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
1. % change in GNP; $w_1 = 4/8$	.060 - ∞	3	1.5	3	1.5	3	1.5
	.050 - .059	2	1.0	2	1.0	2	1.0
	.040 - .049	1	0.5	1	0.5	1	0.5
$X = \frac{GNP_i - GNP_{i-1}}{GNP_{i-1}}$	.030 - .039	0	0.0	0	0.0	0	0.0
	.020 - .029	-1	-0.5	-1	-0.5	-1	-0.5
	.010 - .019	-2	-1.0	-2	-1.0	-2	-1.0
	- .009	-3	-1.5	-3	-1.5	-3	-1.5
3. degree of income equality; $w_3 = 1/8$	8, 9, & 10	3	0.4	3	0.4	3	0.4
	7	2	0.2	2	0.2	2	0.2
	6	1	0.1	1	0.1	1	0.1
	5	0	0.0	0	0.0	0	0.0
$X = E_i$	4	-1	-0.1	-1	-0.1	-1	-0.1
	3	-2	-0.2	-2	-0.2	-2	-0.2
	0, 1, & 2	-3	-0.4	-3	-0.4	-3	-0.4
4. equalitarian-ness of tax structure; $w_4 = 1/8$	5	3	0.4	3	0.4	3	0.4
	3 & 4	2	0.2	2	0.2	2	0.2
	1 & 2	1	0.1	1	0.1	1	0.1
	0	0	0.0	0	0.0	0	0.0
X = Tax Structure (TS)	-1 & -2	-1	-0.1	-1	-0.1	-1	-0.1
	-3 & -4	-2	-0.2	-2	-0.2	-2	-0.2
	5	-3	-0.4	-3	-0.4	-3	-0.4
11. government spending for social welfare; $w_{11} = 1/8$	3	3	0.4	3	0.4	3	0.4
	2	2	0.2	2	0.2	2	0.2
	1	1	0.1	1	0.1	1	0.1
	0	0	0.0	0	0.0	0	0.0
	-1	-1	-0.1	-1	-0.1	-1	-0.1
$X = GS^I_{p,11}$	-2	-2	-0.2	-2	-0.2	-2	-0.2
	-3	-3	-0.4	-3	-0.4	-3	-0.4
12. government spending for education; $w_{12} = 1/8$	3	3	0.4	3	0.4	3	0.4
	2	2	0.2	2	0.2	2	0.2
	1	1	0.1	1	0.1	1	0.1
	0	0	0.0	0	0.0	0	0.0
$X = GS^I_{p,12}$	-1	-1	-0.1	-1	-0.1	-1	-0.1
	-2	-2	-0.2	-2	-0.2	-2	-0.2
	-3	-3	-0.4	-3	-0.4	-3	-0.4
Mean Group Satisfaction (Σ)		$\overline{GS}^{XI}_A =$		$\overline{GS}^{XI}_B =$		$\overline{GS}^{XI}_C =$	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#2 Period

Issues	(X) Independent Variable	GROUP XII					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
10. interest payments on debt. Is $G_{di} \geq \bar{G}_{di}$? Yes: Compute $\overline{GS}_p^{XII}$ on issues 1, 3, 4, & 13 below. No: Set $\overline{GS}_p^{XII} = -3$.							
1. % change in GNP; $w_1 = 3/8$ $X = \frac{\lvert GNP_i - GNP_{i-1} \rvert}{GNP_{i-1}}$	.000 - .009	3	1.1	3	1.1	3	1.1
	.010 - .019	2	0.8	2	0.8	2	0.8
	.020 - .029	1	0.4	1	0.4	1	0.4
	.030 - .039	0	0.0	0	0.0	0	0.0
	.040 - .049	-1	-0.4	-1	-0.4	-1	-0.4
	.050 - .059	-2	-0.8	-2	-0.8	-2	-0.8
	.060 - ∞	-3	-1.1	-3	-1.1	-3	-1.1
3. degree of income equality; $w_3 = 1/8$ $X = E_i$	0, 1, & 2	3	0.4	3	0.4	3	0.4
	3	2	0.2	2	0.2	2	0.2
	4	1	0.1	1	0.1	1	0.1
	5	0	0.0	0	0.0	0	0.0
	6	-1	-0.1	-1	-0.1	-1	-0.1
	7	-2	-0.2	-2	-0.2	-2	-0.2
	8, 9, & 10	-3	-0.4	-3	-0.4	-3	-0.4
4. equalitarian-ness of tax structure; $w_4 = 1/8$ X = Tax Structure (TS)	-5	3	0.4	3	0.4	3	0.4
	-4 & -3	2	0.2	2	0.2	2	0.2
	-2 & -1	1	0.1	1	0.1	1	0.1
	0	0	0.0	0	0.0	0	0.0
	1 & 2	-1	-0.1	-1	-0.1	-1	-0.1
	3 & 4	-2	-0.2	-2	-0.2	-2	-0.2
	5	-3	-0.4	-3	-0.4	-3	-0.4
13. size of the accumulated governmental debt; $w_{13} = 3/8$ $X = D_i/GNP_i$	.060 - ∞	3	1.1	3	1.1	3	1.1
	.050 - .059	2	0.8	2	0.8	2	0.8
	.040 - .049	1	0.4	1	0.4	1	0.4
	.030 - .039	0	0.0	0	0.0	0	0.0
	.020 - .029	-1	-0.4	-1	-0.4	-1	-0.4
	.010 - .019	-2	-0.8	-2	-0.8	-2	-0.8
	.000 - .009	-3	-1.1	-3	-1.1	-3	-1.1
Mean Group Satisfaction (Σ)		$\overline{GS}_A^{XII}$ =		$\overline{GS}_B^{XII}$ =		$\overline{GS}_C^{XII}$ =	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#2 Period_____

ISSUES	(X) Independent Variable	GROUP XIII					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
8. government spending for military purposes $X = G_{m_i}/GNP_i$	0	3		3		3	
	0 - .009	0		0		0	
	.010 - ∞	-3		-3		-3	
Mean Group Satisfaction (Σ)		$\overline{GS}_A^{XIII}$ =		$\overline{GS}_B^{XIII}$ =		$\overline{GS}_C^{XIII}$ =	

MEAN GROUP SATISFACTION COMPUTATION MATRIX

#2 Period_____

ISSUES	(X) Independent Variable	GROUP XIV					
		Party A		Party B		Party C	
		GS	wGS	GS	wGS	GS	wGS
8. government spending for military purposes $X = GS^{XIII}_{p,8}$	3 2 1 0 -1 -2 -3	3 2 1 0 -1 -2 -3		3 2 1 0 -1 -2 -3		3 2 1 0 -1 -2 -3	
Mean Group Satisfaction (Σ)		$\overline{GS}^{XIV}_{A=}$		$\overline{GS}^{XIV}_{B=}$		$\overline{GS}^{XIV}_{C=}$	

ELECTION SUPPORT COMPUTATION MATRIX FOR PERIOD i'-1

$$ES^{G}_{f_{i'-1}} = \overline{\overline{GS}}^{G}_{f_{i'-1}} + \left(\overline{\overline{GS}}^{G}_{s_{i'-1}} - \overline{\overline{GS}}^{G}_{f_{i'-1}}\right) + \left(\overline{\overline{GS}}^{G}_{t_{i'-1}} - \overline{\overline{GS}}^{G}_{s_{i'-1}}\right) \quad \text{eq.5.3 p.92}$$

f = the party of a group's first choice = that party for which the group's "summary satisfaction," $\overline{GS}$ is highest

s = the party of the group's second choice

t = the party of the group's third choice

If a group's $\overline{GS}$s for two different parties are equal, arbitrarily treat one party as "f" and the other party as "s." Divide the resulting ES between them.

$$\overline{\overline{GS}}^{G}_{P_{i'-1}} = \frac{\sum_{i'-n}^{i'-1} m_i \overline{GS}^{G}_{P_i}}{\sum_{i'-n}^{i'-1} m_i} \qquad \text{eq. 5.2, p.90f.}$$

$\overline{\overline{GS}}^{G}_{P}$ = mean (over time) of mean (across issues) group satisfaction, or "summary satisfaction"

m_i = a "memory weight" reflecting the relative importance in the mean of means of a particular $\overline{GS}_i$.

$m_{i'} > m_{i'-1} > m_{i'-2} \cdots\cdots > m_{i'-n}$; $\sum m_i = 1.00$

n = 3 = the number of periods between election periods.

Use of the Matrix

1) For each group transfer the $\overline{GS}$ figures for all parties and periods up to i'-1 to the present matrix. Circle the appropriate numbers in the $\overline{GS}$ columns for the appropriate periods.

2) Trace across to find the values of $m\overline{GS}$.

3) Then sum the circled $m\overline{GS}$ figures for each group and party. The sums are the mean of mean group satisfaction figures.

4) Determine for each group which party is its first choice, which its second choice, and which its third choice.

5) Finally, for each group solve equation 5.3 using the $\overline{\overline{GS}}$ values thus obtained.

ELECTION SUPPORT COMPUTATION MATRIX

Period i'-1

Period	m weight	GROUP I						GROUP II					
		Party A		Party B		Party C		Party A		Party B		Party C	
		$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$
i'-3	1/6	3	0.5	3	0.5	3	0.5	3	0.5	3	0.5	3	0.5
		2	0.3	2	0.3	2	0.3	2	0.3	2	0.3	2	0.3
		1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2
		-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3
		-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5
i'-2	2/6	3	1.0	3	1.0	3	1.0	3	1.0	3	1.0	3	1.0
		2	0.7	2	0.7	2	0.7	2	0.7	2	0.7	2	0.7
		1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3
		-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7
		-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0
i'-1	3/6	3	1.5	3	1.5	3	1.5	3	1.5	3	1.5	3	1.5
		2	1.0	2	1.0	2	1.0	2	1.0	2	1.0	2	1.0
		1	0.5	1	0.5	1	0.5	1	0.5	1	0.5	1	0.5
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5
		-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0
		-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5
i'													
Σ		$\overline{\overline{GS}}^{I}_{A}$=		$\overline{\overline{GS}}^{I}_{B}$=		$\overline{\overline{GS}}^{I}_{C}$=		$\overline{\overline{GS}}^{II}_{A}$=		$\overline{\overline{GS}}^{II}_{B}$=		$\overline{\overline{GS}}^{II}_{C}$=	
(5.3)		$ES^{I}_{f} = \overline{\overline{GS}}^{I}_{f} + (\overline{\overline{GS}}^{I}_{f} - \overline{\overline{GS}}^{I}_{s}) + (\overline{\overline{GS}}^{I}_{f} - \overline{\overline{GS}}^{I}_{t})$						$ES^{II}_{f} = \overline{\overline{GS}}^{II}_{f} + (\overline{\overline{GS}}^{II}_{f} - \overline{\overline{GS}}^{II}_{s}) + (\overline{\overline{GS}}^{II}_{f} - \overline{\overline{GS}}^{II}_{t})$					

ELECTION SUPPORT COMPUTATION MATRIX

Period i'-1

Period	≡ Weight	GROUP III						GROUP IV					
		Party A		Party B		Party C		Party A		Party B		Party C	
		$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$
i'-3	1/6	3	0.5	3	0.5	3	0.5	3	0.5	3	0.5	3	0.5
		2	0.3	2	0.3	2	0.3	2	0.3	2	0.3	2	0.3
		1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2
		-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3
		-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5
i'-2	2/6	3	1.0	3	1.0	3	1.0	3	1.0	3	1.0	3	1.0
		2	0.7	2	0.7	2	0.7	2	0.7	2	0.7	2	0.7
		1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3
		-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7
		-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0
i'-1	3/6	3	1.5	3	1.5	3	1.5	3	1.5	3	1.5	3	1.5
		2	1.0	2	1.0	2	1.0	2	1.0	2	1.0	2	1.0
		1	0.5	1	0.5	1	0.5	1	0.5	1	0.5	1	0.5
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5
		-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0
		-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5
i'													
Σ		$\overline{\overline{GS}}^{III}_A =$		$\overline{\overline{GS}}^{III}_B =$		$\overline{\overline{GS}}^{III}_C =$		$\overline{\overline{GS}}^{IV}_A =$		$\overline{\overline{GS}}^{IV}_B =$		$\overline{\overline{GS}}^{IV}_C =$	
(5.3)		$ES^{III}_f = \overline{\overline{GS}}^{III}_f + (\overline{\overline{GS}}^{III}_f - \overline{\overline{GS}}^{III}_s) + (\overline{\overline{GS}}^{III}_f - \overline{\overline{GS}}^{III}_t)$						$ES^{IV}_f = \overline{\overline{GS}}^{IV}_f + (\overline{\overline{GS}}^{IV}_f - \overline{\overline{GS}}^{IV}_s) + (\overline{\overline{GS}}^{IV}_f - \overline{\overline{GS}}^{IV}_t)$					

ELECTION SUPPORT COMPUTATION MATRIX

Period i'-1

Period	m weight	GROUP V						GROUP VI					
		Party A		Party B		Party C		Party A		Party B		Party C	
		$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$
i'-3	1/6	3	0.5	3	0.5	3	0.5	3	0.5	3	0.5	3	0.5
		2	0.3	2	0.3	2	0.3	2	0.3	2	0.3	2	0.3
		1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2
		-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3
		-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5
i'-2	2/6	3	1.0	3	1.0	3	1.0	3	1.0	3	1.0	3	1.0
		2	0.7	2	0.7	2	0.7	2	0.7	2	0.7	2	0.7
		1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3
		-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7
		-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0
i'-1	3/6	3	1.5	3	1.5	3	1.5	3	1.5	3	1.5	3	1.5
		2	1.0	2	1.0	2	1.0	2	1.0	2	1.0	2	1.0
		1	0.5	1	0.5	1	0.5	1	0.5	1	0.5	1	0.5
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5
		-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0
		-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5
i'													
Σ		$\overline{\overline{GS}}^{V}_{A}$ =		$\overline{\overline{GS}}^{V}_{B}$ =		$\overline{\overline{GS}}^{V}_{C}$ =		$\overline{\overline{GS}}^{VI}_{A}$ =		$\overline{\overline{GS}}^{VI}_{B}$ =		$\overline{\overline{GS}}^{VI}_{C}$ =	
(5.3)		$ES^{V}_{f} = \overline{\overline{GS}}^{V}_{f} + (\overline{\overline{GS}}^{V}_{f} - \overline{\overline{GS}}^{V}_{s}) + (\overline{\overline{GS}}^{V}_{f} - \overline{\overline{GS}}^{V}_{t})$						$ES^{VI}_{f} = \overline{\overline{GS}}^{VI}_{f} + (\overline{\overline{GS}}^{VI}_{f} - \overline{\overline{GS}}^{VI}_{s}) + (\overline{\overline{GS}}^{VI}_{f} - \overline{\overline{GS}}^{VI}_{t})$					

ELECTION SUPPORT COMPUTATION MATRIX

Period i'-1

Period	m weight	GROUP VII						GROUP VIII					
		Party A		Party B		Party C		Party A		Party B		Party C	
		$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$
i'-3	1/6	3	0.5	3	0.5	3	0.5	3	0.5	3	0.5	3	0.5
		2	0.3	2	0.3	2	0.3	2	0.3	2	0.3	2	0.3
		1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2
		-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3
		-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5
i'-2	2/6	3	1.0	3	1.0	3	1.0	3	1.0	3	1.0	3	1.0
		2	0.7	2	0.7	2	0.7	2	0.7	2	0.7	2	0.7
		1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3
		-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7
		-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0
i'-1	3/6	3	1.5	3	1.5	3	1.5	3	1.5	3	1.5	3	1.5
		2	1.0	2	1.0	2	1.0	2	1.0	2	1.0	2	1.0
		1	0.5	1	0.5	1	0.5	1	0.5	1	0.5	1	0.5
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5
		-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0
		-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5
i'													
Σ		$\overline{\overline{GS}}_A^{VII}$ =		$\overline{\overline{GS}}_B^{VII}$ =		$\overline{\overline{GS}}_C^{VII}$ =		$\overline{\overline{GS}}_A^{VIII}$ =		$\overline{\overline{GS}}_B^{VIII}$ =		$\overline{\overline{GS}}_C^{VIII}$ =	
(5.3)		$ES_f^{VII} = \overline{\overline{GS}}_f^{VII} + (\overline{\overline{GS}}_f^{VII} - \overline{GS}_s^{VII}) + (GS_f^{VII} - GS_t^{VII})$						$ES_f^{VIII} = \overline{\overline{GS}}_f^{VIII} + (\overline{\overline{GS}}_f^{VIII} - GS_s^{VIII}) + (\overline{\overline{GS}}_f^{VIII} - \overline{GS}_t^{VIII})$					

ELECTION SUPPORT COMPUTATION MATRIX

Period i'-1

Period	Weight	GROUP IX						GROUP X					
		Party A		Party B		Party C		Party A		Party B		Party C	
		$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$
i'-3	1/6	3	0.5	3	0.5	3	0.5	3	0.5	3	0.5	3	0.5
		2	0.3	2	0.3	2	0.3	2	0.3	2	0.3	2	0.3
		1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2
		-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3
		-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5
i'-2	2/6	3	1.0	3	1.0	3	1.0	3	1.0	3	1.0	3	1.0
		2	0.7	2	0.7	2	0.7	2	0.7	2	0.7	2	0.7
		1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3
		-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7
		-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0
i'-1	3/6	3	1.5	3	1.5	3	1.5	3	1.5	3	1.5	3	1.5
		2	1.0	2	1.0	2	1.0	2	1.0	2	1.0	2	1.0
		1	0.5	1	0.5	1	0.5	1	0.5	1	0.5	1	0.5
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5
		-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0
		-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5
i'													
Σ		$\overline{\overline{GS}}^{IX}_{A}$ =		$\overline{\overline{GS}}^{IX}_{B}$ =		$\overline{\overline{GS}}^{IX}_{C}$ =		$\overline{\overline{GS}}^{X}_{A}$ =		$\overline{\overline{GS}}^{X}_{B}$ =		$\overline{\overline{GS}}^{X}_{C}$ =	
(5.3)		$ES^{IX}_{f} = \overline{\overline{GS}}^{IX}_{f} + (\overline{\overline{GS}}^{IX}_{f} - \overline{\overline{GS}}^{IX}_{s}) + (\overline{\overline{GS}}^{IX}_{f} - \overline{\overline{GS}}^{IX}_{t})$						$ES^{X}_{f} = \overline{\overline{GS}}^{X}_{f} + (\overline{\overline{GS}}^{X}_{f} - \overline{\overline{GS}}^{X}_{s}) + (\overline{\overline{GS}}^{X}_{f} - \overline{\overline{GS}}^{X}_{t})$					

ELECTION SUPPORT COMPUTATION MATRIX

Period i'-1

Period	m weight	GROUP XI						GROUP XII					
		Party A		Party B		Party C		Party A		Party B		Party C	
		$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$
i'-3	1/6	3	0.5	3	0.5	3	0.5	3	0.5	3	0.5	3	0.5
		2	0.3	2	0.3	2	0.3	2	0.3	2	0.3	2	0.3
		1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2
		-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3
		-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5
i'-2	2/6	3	1.0	3	1.0	3	1.0	3	1.0	3	1.0	3	1.0
		2	0.7	2	0.7	2	0.7	2	0.7	2	0.7	2	0.7
		1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3
		-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7
		-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0
i'-1	3/6	3	1.5	3	1.5	3	1.5	3	1.5	3	1.5	3	1.5
		2	1.0	2	1.0	2	1.0	2	1.0	2	1.0	2	1.0
		1	0.5	1	0.5	1	0.5	1	0.5	1	0.5	1	0.5
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5
		-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0
		-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5
i'													
Σ		$\overline{\overline{GS}}^{XI}_{A}$ =		$\overline{\overline{GS}}^{XI}_{B}$ =		$\overline{\overline{GS}}^{XI}_{C}$ =		$\overline{\overline{GS}}^{XII}_{A}$ =		$\overline{\overline{GS}}^{XII}_{B}$ =		$\overline{\overline{GS}}^{XII}_{C}$ =	
(5.3)		$ES^{XI}_{f} = \overline{\overline{GS}}^{XI}_{f} + (\overline{\overline{GS}}^{XI}_{f} - \overline{\overline{GS}}^{XI}_{s}) + (\overline{\overline{GS}}^{XI}_{f} - \overline{\overline{GS}}^{XI}_{t})$						$ES^{XII}_{f} = \overline{\overline{GS}}^{XII}_{f} + (\overline{\overline{GS}}^{XII}_{f} - \overline{\overline{GS}}^{XII}_{s}) + (\overline{\overline{GS}}^{XII}_{f} - \overline{\overline{GS}}^{XII}_{t})$					

ELECTION SUPPORT COMPUTATION MATRIX

Period i'-1

Period	m weight	GROUP XIII						GROUP XIV					
		Party A		Party B		Party C		Party A		Party B		Party C	
		$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$
i'-3	1/6	3	0.5	3	0.5	3	0.5	3	0.5	3	0.5	3	0.5
		2	0.3	2	0.3	2	0.3	2	0.3	2	0.3	2	0.3
		1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2
		-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3	-2	-0.3
		-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5	-3	-0.5
i'-2	2/6	3	1.0	3	1.0	3	1.0	3	1.0	3	1.0	3	1.0
		2	0.7	2	0.7	2	0.7	2	0.7	2	0.7	2	0.7
		1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3
		-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7	-2	-0.7
		-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0	-3	-1.0
i'-1	3/6	3	1.5	3	1.5	3	1.5	3	1.5	3	1.5	3	1.5
		2	1.0	2	1.0	2	1.0	2	1.0	2	11.0	2	1.0
		1	0.5	1	0.5	1	0.5	1	0.5	1	0.5	1	0.5
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5	-1	-0.5
		-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0	-2	-1.0
		-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5	-3	-1.5
i'													
Σ		$\overline{\overline{GS}}_A^{XIII}$ =		$\overline{\overline{GS}}_B^{XIII}$ =		$\overline{\overline{GS}}_C^{XIII}$ =		$\overline{\overline{GS}}_A^{XIV}$ =		$\overline{\overline{GS}}_B^{XIV}$ =		$\overline{\overline{GS}}_C^{XIV}$ =	
(5.3)		$ES_f^{XIII} = \overline{\overline{GS}}_f^{XIII} + (\overline{\overline{GS}}_f^{XIII} - \overline{\overline{GS}}_s^{XIII}) + (\overline{\overline{GS}}_f^{XIII} - \overline{\overline{GS}}_t^{XIII})$						$ES_f^{XIV} = \overline{\overline{GS}}_+^{XIV} + (\overline{\overline{GS}}_f^{XIV} - \overline{\overline{GS}}_s^{XIV}) + (\overline{\overline{GS}}_f^{XIV} - \overline{\overline{GS}}_t^{XIV})$					

ELECTION SUPPORT COMPUTATION MATRIX FOR PERIOD i'

$$ES^{G}_{f_{i'}} = \overline{\overline{GS}}^{G}_{f_{i'}} + \left(\overline{\overline{GS}}^{G}_{f_{i'}} - \overline{\overline{GS}}^{G}_{s_{i'}}\right) + \left(\overline{\overline{GS}}^{G}_{f_{i'}} - \overline{\overline{GS}}^{G}_{t_{i'}}\right) \qquad \text{eq.5.3 p.92}$$

f = the party of a group's first choice - that party for which the group's "summary satisfaction," $\overline{GS}$, is highest

s = the party of the group's second choice

t = the party of the group's third choice

If a group's $\overline{GS}$s for two different parties are equal, arbitrarily treat one party as "f" and the other party as "s." Divide the resulting ES between them.

$$\overline{\overline{GS}}^{G}_{P_{i'}} = \frac{\sum_{i'-n}^{i'} m_i \overline{GS}^{G}_{P_i}}{\sum_{i'-n}^{i'} m_i} \qquad \text{eq. 5.2, p.90f.}$$

$\overline{\overline{GS}}^{G}_{P_{i'}}$ = mean (over time) of mean (across issues) group satisfaction, or "summary satisfaction"

m_i = a "memory weight" reflecting the relative importance in the mean of means of a particular $\overline{GS}_i$

$m_{i'} > m_{i'-1} > m_{i'-2} \cdots\cdots > m_{i'-n}$; $\quad \sum m_i = 1.00$

n = 3 = the number of periods between election periods

Use of the Matrix

1) For each group transfer the $\overline{GS}$ figures for all parties and periods up to i' to the present matrix. Circle the appropriate numbers in the $\overline{GS}$ columns for the appropriate periods.

2) Trace across to find the values of $m\overline{GS}$.

3) Then sum the circled $m\overline{GS}$ figures for each group and party. The sums are the mean of mean group satisfaction figures.

4) Determine for each group which party is its first choice, which its second choice, and which its third choice.

5) Finally, for each group solve (5.3) using the $\overline{GS}$ values thus obtained.

ELECTION SUPPORT COMPUTATION MATRIX

Period i'

Period	m weight	GROUP I						GROUP II					
		Party A		Party B		Party C		Party A		Party B		Party C	
		$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$
i'-3	1/10	3	0.3	3	0.3	3	0.3	3	0.3	3	0.3	3	0.3
		2	0.2	2	0.2	2	0.2	2	0.2	2	0.2	2	0.2
		1	0.1	1	0.1	1	0.1	1	0.1	1	0.1	1	0.1
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1
		-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2
		-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3
i'-2	2/10	3	0.6	3	0.6	3	0.6	3	0.6	3	0.6	3	0.6
		2	0.4	2	0.4	2	0.4	2	0.4	2	0.4	2	0.4
		1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2
		-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4
		-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6
i'-1	3/10	3	0.9	3	0.9	3	0.9	3	0.9	3	0.9	3	0.9
		2	0.6	2	0.6	2	0.6	2	0.6	2	0.6	2	0.6
		1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3
		-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6
		-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9
i'	4/10	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2
		2	0.8	2	0.8	2	0.8	2	0.8	2	0.8	2	0.8
		1	0.4	1	0.4	1	0.4	1	0.4	1	0.4	1	0.4
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4
		-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8
		-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2
Σ		$\overline{\overline{GS}}^{I}_{A}$=		$\overline{\overline{GS}}^{I}_{B}$=		$\overline{\overline{GS}}^{I}_{C}$=		$\overline{\overline{GS}}^{II}_{A}$=		$\overline{\overline{GS}}^{II}_{B}$=		$\overline{\overline{GS}}^{II}_{C}$=	
(5.3)		ES^{I}_{f}= $\overline{\overline{GS}}^{I}_{f}$+ $(\overline{\overline{GS}}^{I}_{f}-\overline{\overline{GS}}^{I}_{s})$+ $(\overline{\overline{GS}}^{I}_{f}-\overline{\overline{GS}}^{I}_{c})$						ES^{II}_{f}= $\overline{\overline{GS}}^{II}_{f}$+ $(\overline{\overline{GS}}^{II}_{f}-\overline{\overline{GS}}^{II}_{s})$+ $(\overline{\overline{GS}}^{II}_{f}-\overline{\overline{GS}}^{II}_{s})$					

ELECTION SUPPORT COMPUTATION MATRIX

Period i'

Period	Weight	GROUP III						GROUP IV					
		Party A		Party B		Party C		Party A		Party B		Party C	
		$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$
i'-3	1/10	3	0.3	3	0.3	3	0.3	3	0.3	3	0.3	3	0.3
		2	0.2	2	0.2	2	0.2	2	0.2	2	0.2	2	0.2
		1	0.1	1	0.1	1	0.1	1	0.1	1	0.1	1	0.1
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1
		-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2
		-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3
i'-2	2/10	3	0.6	3	0.6	3	0.6	3	0.6	3	0.6	3	0.6
		2	0.4	2	0.4	2	0.4	2	0.4	2	0.4	2	0.4
		1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2
		-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4
		-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6
i'-1	3/10	3	0.9	3	0.9	3	0.9	3	0.9	3	0.9	3	0.9
		2	0.6	2	0.6	2	0.6	2	0.6	2	0.6	2	0.6
		1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3
		-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6
		-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9
i'	4/10	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2
		2	0.8	2	0.8	2	0.8	2	0.8	2	0.8	2	0.8
		1	0.4	1	0.4	1	0.4	1	0.4	1	0.4	1	0.4
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4
		-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8
		-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2
Σ		$\overline{\overline{GS}}_A^{III}$ =		$\overline{\overline{GS}}_B^{III}$ =		$\overline{\overline{GS}}_C^{III}$ =		$\overline{\overline{GS}}_A^{IV}$ =		$\overline{\overline{GS}}_B^{IV}$ =		$\overline{\overline{GS}}_C^{IV}$ =	
(5.3)		$ES_f^{III} = \overline{\overline{GS}}_f^{III} + (\overline{\overline{GS}}_f^{III} - \overline{\overline{GS}}_s^{III}) + (\overline{\overline{GS}}_f^{III} - \overline{\overline{GS}}_t^{III})$						$ES_f^{IV} = \overline{\overline{GS}}_f^{IV} + (\overline{\overline{GS}}_f^{IV} - \overline{\overline{GS}}_s^{IV}) + (\overline{\overline{GS}}_f^{IV} - \overline{\overline{GS}}_t^{IV})$					

ELECTION SUPPORT COMPUTATION MATRIX

Period i'

Period	m weight	GROUP V						GROUP VI					
		Party A		Party B		Party C		Party A		Party B		Party C	
		$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$
i'-3	1/10	3	0.3	3	0.3	3	0.3	3	0.3	3	0.3	3	0.3
		2	0.2	2	0.2	2	0.2	2	0.2	2	0.2	2	0.2
		1	0.1	1	0.1	1	0.1	1	0.1	1	0.1	1	0.1
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1
		-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2
		-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3
i'-2	2/10	3	0.6	3	0.6	3	0.6	3	0.6	3	0.6	3	0.6
		2	0.4	2	0.4	2	0.4	2	0.4	2	0.4	2	0.4
		1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2
		-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4
		-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6
i'-1	3/10	3	0.9	3	0.9	3	0.9	3	0.9	3	0.9	3	0.9
		2	0.6	2	0.6	2	0.6	2	0.6	2	0.6	2	0.6
		1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3
		-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6
		-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9
i'	4/10	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2
		2	0.8	2	0.8	2	0.8	2	0.8	2	0.8	2	0.8
		1	0.4	1	0.4	1	0.4	1	0.4	1	0.4	1	0.4
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4
		-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8
		-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2
$\sum$		$\overline{\overline{GS}}^{V}_{A}$=		$\overline{\overline{GS}}^{V}_{B}$=		$\overline{\overline{GS}}^{V}_{C}$=		$\overline{\overline{GS}}^{VI}_{A}$=		$\overline{\overline{GS}}^{VI}_{B}$=		$\overline{\overline{GS}}^{VI}_{C}$=	
(5.3)		$ES^{V}_{f} = \overline{\overline{GS}}^{V}_{f} + (\overline{\overline{GS}}^{V}_{f} - \overline{\overline{GS}}^{V}_{s}) + (\overline{\overline{GS}}^{V}_{f} - \overline{\overline{GS}}^{V}_{t})$						$ES^{VI}_{f} = \overline{\overline{GS}}^{VI}_{f} + (\overline{\overline{GS}}^{VI}_{f} - \overline{\overline{GS}}^{VI}_{s}) + (\overline{\overline{GS}}^{VI}_{f} - \overline{\overline{GS}}^{VI}_{t})$					

ELECTION SUPPORT COMPUTATION MATRIX

Period i'

Period	Weight	GROUP VII						GROUP VIII					
		Party A		Party B		Party C		Party A		Party B		Party C	
		$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$
i'-3	1/10	3	0.3	3	0.3	3	0.3	3	0.3	3	0.3	3	0.3
		2	0.2	2	0.2	2	0.2	2	0.2	2	0.2	2	0.2
		1	0.1	1	0.1	1	0.1	1	0.1	1	0.1	1	0.1
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1
		-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2
		-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3
i'-2	2/10	3	0.6	3	0.6	3	0.6	3	0.6	3	0.6	3	0.6
		2	0.4	2	0.4	2	0.4	2	0.4	2	0.4	2	0.4
		1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2
		-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4
		-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6
i'-1	3/10	3	0.9	3	0.9	3	0.9	3	0.9	3	0.9	3	0.9
		2	0.6	2	0 6	2	0.6	2	0.6	2	0.6	2	0.6
		1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3
		-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6
		-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9
i'	4/10	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2
		2	0.8	2	0.8	2	0.8	2	0.8	2	0.8	2	0.8
		1	0.4	1	0.4	1	0.4	1	0.4	1	0.4	1	0.4
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4
		-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8
		-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2
Σ		$\overline{\overline{GS}}_A^{VII}$ =		$\overline{\overline{GS}}_B^{VII}$ =		$\overline{\overline{GS}}_C^{VII}$ =		$\overline{\overline{GS}}_A^{VIII}$ =		$\overline{\overline{GS}}_B^{VIII}$ =		$\overline{\overline{GS}}_C^{VIII}$ =	
(5.3)		$ES_f^{VII} = \overline{GS}_f^{VII} + (\overline{\overline{GS}}_f^{VII} - \overline{\overline{GS}}_s^{VII}) + (\overline{\overline{GS}}_f^{VII} - GS_t^{VII})$						$ES_f^{VIII} = \overline{GS}_f^{VIII} + (\overline{\overline{GS}}_f^{VIII} - \overline{\overline{GS}}_e^{VIII}) + (\overline{\overline{GS}}_f^{OTH} - GS_t^{TH})$					

ELECTION SUPPORT COMPUTATION MATRIX

Period i'

Period	m weight	GROUP IX						GROUP X					
		Party A		Party B		Party C		Party A		Party B		Party C	
		$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$
i'-3	1/10	3	0.3	3	0.3	3	0.3	3	0.3	3	0.3	3	0.3
		2	0.2	2	0.2	2	0.2	2	0.2	2	0.2	2	0.2
		1	0.1	1	0.1	1	0.1	1	0.1	1	0.1	1	0.1
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1
		-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2
		-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3
i'-2	2/10	3	0.6	3	0.6	3	0.6	3	0.6	3	0.6	3	0.6
		2	0.4	2	0.4	2	0.4	2	0.4	2	0.4	2	0.4
		1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2
		-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4
		-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6
i'-1	3/10	3	0.9	3	0.9	3	0.9	3	0.9	3	0.9	3	0.9
		2	0.6	2	0.6	2	0.6	2	0.6	2	0.6	2	0.6
		1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3
		-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6
		-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9
i'	4/10	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2
		2	0.8	2	0.8	2	0.8	2	0.8	2	0.8	2	0.8
		1	0.4	1	0.4	1	0.4	1	0.4	1	0.4	1	0.4
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4
		-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8
		-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2
Σ		$\overline{\overline{GS}}^{IX}_{A=}$		$\overline{\overline{GS}}^{IX}_{B=}$		$\overline{\overline{GS}}^{IX}_{C=}$		$\overline{\overline{GS}}^{X}_{A=}$		$\overline{\overline{GS}}^{X}_{B=}$		$\overline{\overline{GS}}^{X}_{C=}$	
(5.3)		$ES^{IX}_{f=}\ \overline{\overline{GS}}^{IX}_{f}+(\overline{\overline{GS}}^{IX}_{f}-\overline{\overline{GS}}^{IX}_{s})+(\overline{\overline{GS}}^{IX}_{f}-\overline{\overline{GS}}^{IX}_{t})$						$ES^{X}_{f=}\ \overline{\overline{GS}}^{X}_{f}+(\overline{\overline{GS}}^{X}_{f}-\overline{\overline{GS}}^{X}_{s})+(\overline{\overline{GS}}^{X}_{f}-\overline{\overline{GS}}^{X}_{t})$					

ELECTION SUPPORT COMPUTATION MATRIX

Period i'

Period	m weight	GROUP XI						GROUP XII					
		Party A		Party B		Party C		Party A		Party B		Party C	
		$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$
i'-3	1/10	3	0.3	3	0.3	3	0.3	3	0.3	3	0.3	3	0.3
		2	0.2	2	0.2	2	0.2	2	0.2	2	0.2	2	0.2
		1	0.1	1	0.1	1	0.1	1	0.1	1	0.1	1	0.1
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1
		-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2
		-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3
i'-2	2/10	3	0.6	3	0.6	3	0.6	3	0.6	3	0.6	3	0.6
		2	0.4	2	0.4	2	0.4	2	0.4	2	0.4	2	0.4
		1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2
		-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4
		-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6
i'-1	3/10	3	0.9	3	0.9	3	0.9	3	0.9	3	0.9	3	0.9
		2	0.6	2	0.6	2	0.6	2	0.6	2	0.6	2	0.6
		1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3
		-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6
		-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9
i'	4/10	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2
		2	0.8	2	0.8	2	0.8	2	0.8	2	0.8	2	0.8
		1	0.4	1	0.4	1	0.4	1	0.4	1	0.4	1	0.4
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4
		-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8
		-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2
$\sum$		$\overline{\overline{GS}}_A^{XI}$ =		$\overline{\overline{GS}}_B^{XI}$ =		$\overline{\overline{GS}}_C^{XI}$ =		$\overline{\overline{GS}}_A^{XII}$ =		$\overline{\overline{GS}}_B^{XII}$ =		$\overline{\overline{GS}}_C^{XII}$ =	
(5.3)		$ES_t^{XI} = \overline{\overline{GS}}_f^{XI} + (\overline{\overline{GS}}_f^{XI} - \overline{\overline{GS}}_s^{XI}) + (\overline{\overline{GS}}_f^{XI} - \overline{\overline{GS}}_t^{XI})$						$ES_f^{XII} = \overline{\overline{GS}}_f^{XII} + (\overline{\overline{GS}}_f^{XII} - \overline{\overline{GS}}_s^{XII}) + (\overline{\overline{GS}}_f^{XII} - \overline{\overline{GS}}_t^{XII})$					

ELECTION SUPPORT COMPUTATION MATRIX

Period i'

Period	weight	GROUP XIII						GROUP XIV					
		Party A		Party B		Party C		Party A		Party B		Party C	
		$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$	$\overline{GS}$	$m\overline{GS}$
i'-3	1/10	3	0.3	3	0.3	3	0.3	3	0.3	3	0.3	3	0.3
		2	0.2	2	0.2	2	0.2	2	0.2	2	0.2	2	0.2
		1	0.1	1	0.1	1	0.1	1	0.1	1	0.1	1	0.1
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1	-1	-0.1
		-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2	-2	-0.2
		-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3	-3	-0.3
i'-2	2/10	3	0.6	3	0.6	3	0.6	3	0.6	3	0.6	3	0.6
		2	0.4	2	0.4	2	0.4	2	0.4	2	0.4	2	0.4
		1	0.2	1	0.2	1	0.2	1	0.2	1	0.2	1	0.2
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2	-1	-0.2
		-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4	-2	-0.4
		-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6	-3	-0.6
i'-1	3/10	3	0.9	3	0.9	3	0.9	3	0.9	3	0.9	3	0.9
		2	0.6	2	0.6	2	0.6	2	0.6	2	0.6	2	0.6
		1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3	-1	-0.3
		-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6	-2	-0.6
		-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9	-3	-0.9
i'	4/10	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2
		2	0.8	2	0.8	2	0.8	2	0.8	2	0.8	2	0.8
		1	0.4	1	0.4	1	0.4	1	0.4	1	0.4	1	0.4
		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
		-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4	-1	-0.4
		-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8	-2	-0.8
		-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2	-3	-1.2
Σ		$\overline{\overline{GS}}_A^{XIII}$		$\overline{\overline{GS}}_B^{XIII}$		$\overline{\overline{GS}}_C^{XIII}$		$\overline{\overline{GS}}_A^{XIV}$		$\overline{\overline{GS}}_B^{XIV}$		$\overline{\overline{GS}}_C^{XIV}$	
(5.3)		$ES_f^{XIII} = \overline{\overline{GS}}_f^{XIII} + (\overline{\overline{GS}}_f^{XIII} - \overline{\overline{GS}}_s^{XIII}) + (\overline{\overline{GS}}_f^{XIII} - \overline{\overline{GS}}_t^{XIII})$						$ES_f^{XIV} = \overline{\overline{GS}}_f^{XIV} + (\overline{\overline{GS}}_f^{XIV} - \overline{\overline{GS}}_s^{XIV}) + (\overline{\overline{GS}}_f^{XIV} - \overline{\overline{GS}}_t^{XIV})$					

NOTES TO SIMULATORS

a, b, b', and c (computation step 1)

The values assigned to a, b, b', and c have been shown to produce cyclical fluctuations in GNP in the absense of governmental fiscal activities (pp. 56 ff.). For other such parameter values the model economic system must be solved analytically.

n (computation step 1)

Different values of n require recomputation of the Election Support Computation Matrices (pp. 141 ff. and 149 ff.) with different memory weights (see also pp. 90-1).

SS (computation step 1)

"Social structure" (SS) is one of seven terms which influence the degree of equality of the income distribution. Its weight ($k_3 = 0.20$) is relatively heavy. The simulator may set the social structure figure to suit his purposes in the characterization of the political-economic system.

H_A, H_B, H_C (computation step 1)

In setting the "habitual vote" distribution, the simulator should be aware of the opportunity to characterize the political system that lies in the relative proportions in the system as a whole of habitual, or "party-oriented" voters *vis à vis* "issue-oriented" voters. Once the power coefficients of the interest groups have been set, these proportions may be roughly determined as follows.

1) Compute, over all interest groups (I to XIV):

$$\sum_{G=I}^{XIV} v_C(ES^G_{max})$$

where ES^G_{max} = the maximum amount of election support any interest group, G, can give

= 15 in the present three-party system.

ES^G_{max} = -3 + 6(number of parties), generally.

This is the maximum total number of "issue-oriented" votes.

2) Compute: $H_A + H_B + H_C$

This is the total number of "party-oriented" votes.

3) Compute: $0.10H_A + 0.10H_B + 0.10H_C$

This is the maximum total number of "unpredictable" votes (cf. computation step 26 and page 95.).

Variables (computation step 2)

Most of the suggested values for the variables come from the numerical example in the text (pp. 56 ff.). Others may be used. The relative size of the numbers is the most important thing. For example, the potential labor force (Lp) should realistically be somewhere between 30 and 70 per cent of the total population, depending upon the kind of system that is desired (cf. The Statistical Yearbook for such data). Similarly, an accumulated national debt is suggested which equals one half the current GNP.

The variables for which no values have been suggested, TS and RS, are important means by which the simulator may characterize the model political system. They have been explained in the text (pp. 27, 61, 68 ff.).

PC (computation step 8)

The form of the autonomous investment function may be seen more readily if it is expressed as a proportion.

$$\frac{\delta PC}{GNP} = \frac{A + B_1(RS,TS) + B_2S + B_3\epsilon_1}{100}$$

The terms $A = -1.25$, $B_1 = -0.375$, $B_2 = 1.0$, and $B_3 = 1.0$ are set so that the endogenous term (a two-period average of RS and TS) accounts for 50 per cent of the variance in δPC, and the exogenous terms, S and ϵ_1, each account for 25 per cent of that variance. These proportions may be changed to suit the needs of the simulator.

The term S is designed as the simulator's handle on the all important total investment function (step 9, and eq. 3.18 on p.51). It may be used to influence the movement of GNP.

"Recession?" (computation step 20)

GNP_{i-1} is used here instead of GNP_i because the parties will not yet have had the opportunity to react to so recent a decrease in GNP as might be reflected in GNP_i. It would thus be inappropriate to validate their anti-recession fiscal policies (via branching to step 21a) until the following period.

Test question "a" reads: Is the rate of change in GNP greater than 1 per cent? This rate is equal to the suggested rate of population increase, r. Variations here are possible.

Test question "b" reads: Is the change in the rate of change of GNP zero or positive?

Only if both conditions, a and b, obtain is there no recession.

Economic Report (computation step 22)

The decisions of the parties out of power do not go into effect in the economic system. They constitute party programs and have only political effects. Thus, each period the parties out of power use as the basis for their decisions the economic data generated by the governing party's decisions in the previous period.

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