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WILLIAM E. FISHER

INTRODUCTION

KARL DEUTSCH has argued that since the mid-1950's the structural, or institutional, political integration of Western Europe has come to a halt. What Deutsch means by the halt of political integration in Western Europe is the ending of any trend toward the development or the expansion of the authority of supranational institutions to make major policy decisions. Political decisions will continue to be made by sovereign nation-states and not by any supranational European institutions.¹ Although institutional political integration is the central variable in his analysis, Deutsch reports no attempts to directly measure the decisionmaking capability of any Western European supranational institution. By accepting the validity of his sociocausal paradigm of political integration, which holds that political integration cannot occur until after a process of social assimilation creates a homogeneous transnational population, Deutsch contends that in order to describe the levels of political integration in Western Europe he need only examine data relating to the levels of social homogeneity which characterize that region.² To measure the extent of social assimilation in Western Europe Deutsch

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¹ Karl W. Deutsch, "Integration and Arms Control in the European Political Environment: A Summary Report," *American Political Science Review*, June 1966 (Vol. 60, No. 2), pp. 354-365; Karl W. Deutsch, *Arms Control and the Atlantic Alliance: Europe Faces Coming Policy Decisions* (New York: John Wiley & Sons, 1967), pp. 17-28, 68-81; Karl W. Deutsch, "A Comparison of French and German Elites in the European Political Environment," in Karl W. Deutsch and others, *France, Germany and the Western Alliance: A Study of Elite Attitudes on European Integration and World Politics* (New York: Charles Scribner's Sons, 1967), pp. 218-239, 298-302.

² The sociocausal paradigm of political integration is a verbal model implicitly developed by Deutsch in several of his earlier writings in which social variables are used to causally explain political integra-

examines the transaction flow rates of trade, mail, travel, migration, and student exchange data and studies the responses of mass and elite population samples to a complex series of survey questions. Deutsch's analysis of these varied data leads him to conclude that the levels of social assimilation in Western Europe have 1) remained constant for the past decade and 2) are too low to permit institutional political integration to occur.

Deutsch's conclusion that European integration has ended and his socio-causal paradigm of political integration have recently been criticized by Ronald Inglehart. Pursuing a line of argument first developed a decade ago by Ernst Haas, Inglehart warns that theoretically there exists no necessary relationship between social assimilation and political integration.³ Furthermore, Inglehart argues that until an empirical relationship is demonstrated between the two variables one cannot describe the patterns of political integration that characterize a region simply by examining indicators of social assimilation processes.⁴

The research presented here seeks to empirically study the relationship between political integration and social assimilation. We will attempt to evaluate the utility of the sociocausal paradigm by deducing propositions from the paradigm and examining the congruence between these propositions and events in Western Europe from 1953 to 1964.

The argument will be divided into three main parts. Part I will outline the central elements of the sociocausal paradigm. Part II will present a test of the paradigm, and Part III will briefly present some explanations of the findings.

tion processes. See Karl W. Deutsch, *Political Community at the International Level: Problems of Definition and Measurement* (Garden City, N.Y.: Doubleday & Company, 1954); Karl W. Deutsch, *Nationalism and Social Communication: An Inquiry Into the Foundations of Nationality* (Cambridge, Mass: M.I.T. Press, 1953); Karl W. Deutsch and others, *Political Community and the North Atlantic Area: International Organization in the Light of Historical Experience* (Princeton, N.J.: Princeton University Press, 1957); Karl W. Deutsch, *The Nerves of Government: Models of Political Communication and Control* (New York: Free Press, 1963); also see the several essays by Deutsch in Philip Jacob and James Toscano (ed.), *The Integration of Political Communities* (Philadelphia and New York: J. B. Lippincott Company, 1964). A further statement of the sociocausal paradigm is to be found in a doctoral thesis written at Yale University, New Haven, Connecticut, under the direction of Deutsch by Donald J. Puchala. See Donald J. Puchala, "International Political Community Formation in Western Europe: Progress and Prospects" (unpublished Ph.D. dissertation, Yale University, 1966). Also see Donald J. Puchala, "European Political Integration: Progress and Prospects," New Haven, Conn. (Yale University Political Science Research Library), 1966 (mimeographed); and Hayward Alker, Jr., and Donald J. Puchala, "Trends in Economic Partnership: The North Atlantic Area 1928-1963," in J. David Singer (ed.), *Quantitative International Politics: Insights and Evidence* (New York: Free Press, 1968).

³ Ronald Inglehart, "Trends and Nontrends in the Western Alliance: A Review," *Journal of Conflict Resolution*, March 1968 (Vol. 12, No. 1), pp. 120-128. Compare with Ernst B. Haas, "Persistent Themes in Atlantic and European Unity," *World Politics*, July 1958 (Vol. 10, No. 4), pp. 614-628; and Ernst B. Haas, "The Challenge of Regionalism," *International Organization*, Autumn 1958 (Vol. 12, No. 4), pp. 440-458.

⁴ Joseph Nye also forcefully presents this same argument in his excellent survey of current conceptualizations of integration processes, "Comparative Regional Integration: Concept and Measurement," in *International Organization*, Autumn 1968 (Vol. 22, No. 4), pp. 855-880.

PART I—THE SOCIOCAUSAL PARADIGM OF INTERNATIONAL POLITICAL
INTEGRATION⁵

The sociocausal paradigm views international political integration or community formation as a process, the end product of which is an integrated political community. Such a process, for example, can be said to have occurred in the United States during the period from 1770 to 1890 when a nation was formed from thirteen separate colonies and was held together even at the cost of a protracted and bloody civil war. The paradigm states that an integrated political community is characterized by the presence of three elements. First, an integrated political community must possess certain structural components. There must exist some form of supranational institutions which have the power to make binding and authoritative decisions for the community. In fact the supranational institutions should be at the center of the community's decisionmaking processes. National institutions can coexist with the supranational institutions, but the latter shall be preeminently competent, authoritative, and functionally diffuse within their jurisdictions. Not only should the supranational institutions have the power to allocate resources and rewards in the social, economic, and political sectors of the community, but the institutions must be recognized and accepted by the elite and the mass populations as the legitimate authoritative allocator for the community.⁶ To use David Easton's terminology the community institutions should receive both the covert and overt support of the populations which they govern.⁷

A second element of an integrated political community is the existence of certain political processes. Since the supranational institutions have the power to make binding decisions, the political elites of the community will now center their demands on the community institutions. Furthermore, the actors involved in presenting demands to the community institutions will not be the national governments of the member nations. Rather the actors will be transnational interest groups. Political parties will assume a transnational rather than a national base. A final characteristic of the political processes of the community is the absence of national violence or the threat of violence. National differences are settled by a bargaining process and not by resort to arms.⁸

⁵ The books and articles listed in footnotes 1 and 2 are the principal sources upon which this presentation of the sociocausal paradigm is based.

⁶ See Deutsch, *Political Community at the International Level*, pp. 33-45; Deutsch and others, *Political Community and the North Atlantic Area*, p. 5; Karl W. Deutsch, "Supranational Organizations in the 1960's," *Journal of Common Market Studies* (Vol. 1, No. 3), pp. 212-218; and Puchala, "International Political Community Formation in Western Europe," pp. 5-7. Compare with Philip Jacob and Henry Teune, "The Integrative Process: Guidelines for Analysis of the Basis of Political Community," in Jacob and Toscano (ed.), pp. 35-45.

⁷ David Easton, *A Systems Analysis of Political Life* (New York: John Wiley & Sons, 1965), pp. 159-161.

⁸ See Deutsch, *Political Community at the International Level*, pp. 42-45. Compare with Karl W. Deutsch, "Integration and the Social System: Implications of Functional Analysis," in Jacob and Toscano (ed.), pp. 179-208.

The third element of the integrated political community is the existence of a transnational society. This transnational society is a population in which there is a high probability of interaction, of exposure to common experience, of common social heritage, of similar preferences, and of similar expectations and aspirations. This society, which possesses a common sense of destiny, thus shares certain psychological feelings and orientations which allow the people of the society to give support to a common set of institutions and to a non-violent style of political decisionmaking.⁹

Having so defined an integrated political community, the sociocausal paradigm next relates certain changes that must take place in a given region as the process of international political community formation begins. The paradigm claims that the process of international political community formation can be characterized by changes in the patterns of relationships between five groups of variables. System dominance replaces subsystem dominance. National action aimed toward the goal of international stability replaces national action aimed toward the goal of national stability. Cooperative interaction supersedes competitive interaction while amity supersedes enmity as the tone of relations between nations. Finally, nonviolent methods supersede violent methods as a means of conflict resolution.¹⁰

The central element of the paradigm is a relational statement which specifies the interaction of social and political variables during the process of international political community formation. The sociocausal paradigm contends that a process of *social assimilation* leads to or causes a process of *political development* to occur. In the paradigm social assimilation is conceptualized as a learning process during which peoples, in response to mutually rewarding transactions, adopt habits that they perceive as conducive to further rewarding transactions. As populations of different countries continue to conduct rewarding transactions with each other, the populations will develop feelings of mutual trust, confidence, and understanding. If the rewarding transactions continue long enough the populations will eventually share similar perceptions of international problems and will also agree on common solutions to these problems. When this stage of similarity among separate national populations has been reached, a transnational society can be said to exist. Political development, according to the paradigm, is a process by which nations cooperate to find solutions to commonly perceived functional problems that cannot be solved by the nations acting separately. In order that the perceived problems can be solved effectively some sort of supranational institution must be established and be given the power to make binding decisions.

⁹ Deutsch and others, *Political Community and the North Atlantic Area*, pp. 22-69; and Deutsch, *Nationalism and Social Communication*, pp. 60-126.

¹⁰ Deutsch and others, *Political Community and the North Atlantic Area*, pp. 5-9; and Puchala, "International Political Community Formation in Western Europe," pp. 12-15. Compare with Morton Kaplan, *System and Process in International Politics* (New York: John Wiley & Sons, 1957).

Furthermore, as political development continues, changes occur in the manner in which demands are thrust into the international political system. Supranational coalitions of functionally organized interest groups should appear which bring their demands directly to the supranational decisionmaking institutions. Eventually the autonomy of the national governments in allocating political, social, and economic resources is weakened.¹¹

It should be carefully noted that this paradigm is based on the hypothesis that social assimilation causes political development and therefore that social assimilation must exist before political development can start. According to the paradigm progress in international political development follows after progress in international social assimilation. This hypothesis can be called an assumption. The hypothesis is an assumption or assumptive hypothesis because while it does posit a relationship between two variables, the posited relationship is accepted a priori as valid and is not verified by empirical testing.¹² Since, however, the hypothesis does purport to describe behavior in the empirical world, the hypothesis must be confirmed by comparison with empirical data rather than by a priori theoretical reasoning if it is to be accepted as valid.

In applying the sociocausal paradigm to the study of events in Western Europe Deutsch and others attempt to measure the rates of growth of social assimilation in that region. Basically they measure social assimilation in three ways. First, they historically analyze the relations of the governments of European nations.¹³ Second, they examine the rates of various transaction flows among nations.¹⁴ Finally, they examine the attitudinal structure of public opinion in France and the Federal Republic of Germany (West Germany).¹⁵ Because of the paradigm's assumption concerning the relation between social assimilation and political development Deutsch and his colleagues feel that their statements about social assimilation growth rates allow them to predict the probable course of European political development. Deutsch's final conclusion is that rates of social assimilation have either halted or have declined so greatly that the probability of institutional political integration in Western Europe during the next 25 years is very low.¹⁶

¹¹ See Deutsch, *Nationalism and Social Communication*, pp. 60-126; Deutsch and others, *Political Community and the North Atlantic Area*, pp. 70-78, 117-154; Puchala, "International Political Community Formation in Western Europe," pp. 18-39; Karl W. Deutsch, "Social Mobilization and Political Development," *American Political Science Review*, June 1961 (Vol. 55, No. 2), pp. 497-502; Deutsch, "Communication Theory and Political Integration," in Jacob and Toscano (ed.), pp. 46-74; and Deutsch, *Political Community at the International Level*, pp. 33-45.

¹² Abraham Kaplan, *The Conduct of Inquiry: Methodology for Behavioral Science* (San Francisco, Calif: Chandler Publishing Company, 1964), pp. 88-89.

¹³ See Puchala, "International Political Community Formation in Western Europe," pp. 66-129.

¹⁴ Deutsch in Deutsch and others, *France, Germany and the Western Alliance*, pp. 218-239; Deutsch, *Arms Control and the Atlantic Alliance*, pp. 17-18; and Alker and Puchala in Singer (ed.), pp. 287-316.

¹⁵ Deutsch, *Arms Control and the Atlantic Alliance*, pp. 22-28, 44-67; and Deutsch and others, *France, Germany and the Western Alliance*.

¹⁶ See Deutsch, *American Political Science Review*, Vol. 60, No. 2, pp. 354-365; and Deutsch in Deutsch and others, *France, Germany and the Western Alliance*, pp. 298-302.

PART II—A TEST OF THE SOCIOCAUSAL PARADIGM

Propositions and Research Design

Let us now direct attention to the question left unanswered by the socio-causal paradigm: How valid is the assumption that increases in social assimilation will lead to increases in political development? The scholar who attempts to examine the validity of this assumption faces an immediate problem in designing appropriate testing procedures because the paradigm never precisely and unambiguously states the nature of the relationship between social assimilation and political development. The paradigm never states whether the relationship could formally be described by a linear, curvilinear, or step function; rather it describes the assumed relationship in a rather vague language which gives little indication of the specific type of model that should be constructed to test the assumption. At times the paradigm alludes to the relationship in terms of the concept of probability, but never is a formal mathematical statement of probability given; rather the paradigm is couched in imprecise verbal terms. The paradigm as it is actually stated resembles a deterministic rather than a probabilistic model.

Using the device of symbolic mathematical logic we can refashion the paradigm's central assumption into a form which lends itself to empirical testing. The paradigm's contention that increases in social assimilation lead to increases in political development resembles what mathematicians call a biconditional statement.¹⁷ Symbolically, a biconditional statement, written as $p \leftrightarrow q$, is read "q if and only if p." The biconditional statement asserts that if p is true, then q is true, and if p is false, then q is false. We shall let the variable social assimilation be denoted by the letter "S" and the variable political development be denoted by the letter "P." Symbolically then the assumption can be written as the biconditional statement $S \leftrightarrow P$. Verbally the statement $S \leftrightarrow P$ means when increases in social assimilation occur, then increases in political development will also occur or if no increases in social assimilation occur, then no increases in political development will occur. In order to determine the validity of this statement let us construct a truth table.¹⁸

¹⁷ For a concise, yet lucid, discussion of elementary symbolic logic see John Kemeny and others, *Finite Mathematical Structures* (Englewood Cliffs, N.J.: Prentice-Hall, 1959), pp. 1-50, especially pp. 9-11.

¹⁸ A truth table is a mathematical device which allows one to determine the truth or falsity of various logical statements. The statement whose truth or falsity we wish to test heads the far right-hand column of the table, while each separate variable that is used in the statement heads up each remaining column. In order to determine the ultimate truth value of the desired statement one either logically or empirically assigns truth or falsity values to the separate variables used in the total statement. The pattern of values assigned to the separate variables together with the connecting symbols used in the statement then determine the truth value of the total statement. It should be mentioned that different types of symbolic statements require different patterns of variable truth values in determining the truth value of the total statement.

TABLE 1: TRUTH TABLE FOR STATEMENT $S \leftrightarrow P$

		Truth Values of Separate Variables		Truth Value of Total Statement
		S	P	$S \leftrightarrow P$
<i>Logical Possibilities</i>	1	T	T	T
	2	T	F	F
	3	F	T	F
	4	F	F	T

This table can simply be read to say that for $S \leftrightarrow P$ to be true S and P must both be either true or false. If one is true while the other is false, then $S \leftrightarrow P$ is false. Returning to the empirical world, we recall that Deutsch finds that social assimilation is *not* increasing. Thus, we can assign the value of false to our variable S. Since S is false we now can confine our attention to rows 3 and 4 of the truth table. In order to determine the truth of $S \leftrightarrow P$ we must turn to the data from the empirical world to assign a truth value to P. If political development were found to be increasing we would assign P a value of true in which case row 3 would be the mathematical model which best describes the reality of the empirical world. We would conclude that $S \leftrightarrow P$ was false. If this is the case, the paradigm's assumption would be open to serious question. If our data from the empirical world allowed P to be valued as false, then $S \leftrightarrow P$ would be true. The paradigm's assumption would then be accepted as valid unless later evidence might prove otherwise.

The task that now remains is to examine the paradigm's conceptualization of international political development, construct an operational definition of the concept, and determine the growth patterns shown by the empirical data.

We recall that in the paradigm political development is a process by which nations cooperate to find solutions to commonly perceived functional problems that cannot be solved by each nation acting separately. In order for political development to occur there must arise a supranational institutional structure which is capable of making binding allocating decisions. Political development also involves a change in the structure of demand articulation. Supranational interest groups will bring demands directly to the supranational institutions rather than to the national governments. Thus, in the paradigm the two central elements of political development are: 1) the growth of a supranational institution's power to make binding decisions and 2) a change in the patterns of interest group articulation.

Although the sociocausal paradigm never spells out the time sequence relation between the growth of supranational institutional decisionmaking and allocating authority and changes in patterns of interest articulation, it seems likely to hypothesize a time relation in which institutions first begin to increase their decisionmaking power, and only after a given period do interest

groups see that a change in the locus of decisionmaking power has resulted and begin to systematically change their method of presenting demands.¹⁹ If this hypothesized time relation is correct, one would expect that in the early stages of political development institutional decisionmaking behavior would show variation before interest group articulation patterns show change. Thus, we might best study political development in a newly formed political system by examining variables which relate to a supranational institution's ability to make binding decisions.

In order to measure a supranational institution's ability to make binding decisions we can examine a variable which we will call *institutional output performance*. Output performance refers to an institution's ability to make binding allocating decisions which are accepted as authoritative by the nations, organizations, groups, and institutions that are affected by the decisions.²⁰ If a supranational institution is to play a role in the process of political development, it must acquire, exercise, and increase a power to make decisions which allocate the values to be distributed in the different sectors of a society. In the initial stages of political development we would expect that a supranational institution would be able to make binding decisions in a narrow range of issue areas. As time passes the institution should be able to exercise a greater allocating authority in decision areas already under its control, and it should also begin to acquire the ability to make allocating decisions in new issue areas. During the first several years of the existence of a supranational institution the institution's output performance should be increasing if political development is occurring.²¹

Operationalization of Institutional Output Performance

Among the six Common Market countries there have existed since 1953 various supranational institutions which have had power to make binding allocating decisions. Specifically the institutions which until the July 1967 merger could make decisions that affected the six associated countries were the Council of Ministers and the High Authority of the European Coal and Steel Community (ECSC), the Council of Ministers and the Commission of the European Economic Community (EEC), and the Council of Ministers and the Commission of the European Atomic Energy Commission (Euratom).²² These institutional bodies had the power to take four basic types of

¹⁹ Compare with Haas, *International Organization*, Vol. 12, No. 4, pp. 440-458; and Haas, *World Politics*, Vol. 10, No. 4, pp. 626-628.

²⁰ Compare with Nye, *International Organization*, Vol. 22, No. 4, pp. 865-874.

²¹ For a slightly different discussion of output performance see Leon Lindberg, "Europe as a Political System: Measuring Political Integration" (unpublished draft, Center for International Affairs, Harvard University, Cambridge, Mass., 1967), pp. 73-81.

²² The Council of Ministers and the Commission of the European Communities which were created by the 1967 merger to replace the separate institutions of each organization are beyond the scope of the present study.

actions which served to allocate resources within the six countries. The Council and the High Authority of the Coal and Steel Community could each promulgate general decisions, individual decisions, recommendations, and opinions. Each type of decision carried binding force for those institutions or groups which came under the scope of the given decision.²³ While recommendations and opinions were not legally binding, they did indicate the feelings of the decisionmaking institution and were usually followed by the affected parties. The Councils of the EEC and Euratom could make regulations and decisions which were binding in roughly the same sense as the general and individual decisions of the Coal and Steel Community. The Commissions of the Economic and Atomic Energy Communities could also make regulations and decisions although these powers were of a somewhat smaller scope than the Councils' powers. Both the Councils and Commissions of the Economic and the Atomic Energy Communities could issue directives and recommendations similar in nature to the recommendations and opinions of the Coal and Steel Community.²⁴

As an indicator of the output performance of the European Communities we shall construct an index measure first suggested by Leon Lindberg.²⁵ First, one can turn to official Community documents which report the complete official actions taken by the Communities from 1953 to 1964.²⁶ One can then count, for the Council and the High Authority of the Coal and Steel Community and for the Councils and the Commissions of the two other Communities, on a yearly basis, the number of official actions taken. For the Coal and Steel Community our categories of actions are general decisions, individual decisions, recommendations, opinions, and other. For the EEC and Euratom the categories are regulations, decisions, directives, recommendations, and other.²⁷ Next, by assigning numerical weights to these categories and summing across categories for each year we can arrive at a numerical index of each Community's decision output for each year. We will call such a numerical score for each year an *output performance score*. By summing the three Communities' decision output scores for each year we can get a *total output performance score* which gives an indication of the total decision authority exercised by the European Communities as a whole in a given year. The following weighting system used here was chosen so as to reflect the relative

²³ Stuart A. Scheingold, *The Rule of Law in European Integration: The Path of the Schuman Plan* (New Haven, Conn: Yale University Press, 1965), pp. 42-48.

²⁴ Ernst Haas, *The Uniting of Europe: Political, Social, and Economic Forces 1950-1957* (Stanford, Calif: Stanford University Press, 1958), pp. 32-59; Finn B. Jensen and Ingo Walter, *The Common Market: Economic Integration in Europe* (Philadelphia: J. B. Lippincott Company, 1965), pp. 24-43.

²⁵ Lindberg, pp. 73-81.

²⁶ Parlement Européen, *Annuaire: 1964-1965* (Luxembourg: Secrétariat Général, Direction Générale de la Documentation Parlementaire et de l'Information, June 1965), pp. 621-747; Parlement Européen, *Annuaire: 1963-1964* (Luxembourg: Secrétariat Général, Direction Générale de la Documentation Parlementaire et de l'Information, June 1965), Vol. II, pp. 263-388.

²⁷ These categories were suggested to me in several discussions with Professor Leon Lindberg.

authority and scope of the different types of actions that could be taken by the institutions mentioned previously. General and individual decisions of the Council and the High Authority of the Coal and Steel Community and regulations and decisions of the Councils of the Economic Community and the Atomic Energy Community were scored three. Regulations and decisions of the Commissions of the latter two Communities were scored two. All other actions taken by either body of any Community were scored one.²⁸ By applying appropriate mathematical techniques, which will presently be discussed, to this data one can attempt to measure the growth rate of the variable.²⁹

Plan of Analysis

In order to meaningfully interpret the data which will be presented we will adopt the following analytical procedures. Since the most important piece of information which we wish to know about output performance is its overall growth trend over time, we have sought to collect on a yearly basis for as long a period as possible the yearly values of this variable. From these sequences of values over time we will conduct a time series analysis to determine the variable's growth patterns.³⁰ The time series analysis will yield answers to the two questions that are necessary to fully describe a variable's growth pattern: 1) What is the secular trend or overall tendency of the sequence of variable values—is the sequence increasing, decreasing, or remaining constant? and 2) what is the actual rate of increase or decrease? In answering these questions we will make use of several standard statistical and mathematical techniques.

Given a set of measurements on a particular variable over time, we can obtain a preliminary indication of that variable's secular trend by simply arranging the data in chronological order and inspecting the resultant table of values. We may also make a determination of a variable's secular trend by graphing methods. We construct a graph by letting the X-axis represent the time dimension and the Y-axis represent the variable under study, plotting the joint pairs of variable values, and connecting the plotted points with straight lines. While the methods of inspection and graphing can often pro-

²⁸ This weighting system was devised after I held several discussions with Professor Lindberg. There exists no compelling theoretical basis for using the exact weights which were finally chosen. Clearly, more work must be focused upon devising a theoretical framework which can guide a researcher in his attempts to quantitatively analyze patterns of output performance growth.

²⁹ Because the output performance index is simply a weighted sum of a Community's authoritative actions it is generally not possible to attach a precise interpretation to each possible index value. Clearly many different patterns of actions exist which would combine to produce identical index scores. The value of the index for political research lies not in the degree of precision of meaning that can be attached to a given score but rather in the opportunity it affords for making preliminary systematic and quantitative comparisons.

³⁰ The time series methods which I use are based upon discussions in the following statistics texts, Taro Yamane, *Statistics, An Introductory Analysis* (2nd ed.; New York: Harper and Row, 1967), and Frederick Croxton, Dudley Cowden, and Sidney Klein, *Applied General Statistics* (3rd ed.; Englewood Cliffs, N.J.: Prentice-Hall, 1967).

vide us with a reasonable qualitative indication of a variable's secular trend, they do not afford a precise statement of the trend nor do they allow a specification of the actual rate of the variable's growth. We can, however, acquire a more precise description of a variable's overall secular trend and specific growth structure by using correlation and regression techniques to fit equations to our data. Once equations have been fitted, we may apply the methods of the differential calculus to obtain formal statements of the direction and magnitude of a variable's growth rate.³¹

We will use a simple least squares linear regression model to estimate the secular trend of our data. A linear model is generally an appropriate device to ascertain whether the overall tendency of a sequence of data over a short period in time is marked by increase or decrease. The graph of the raw data and the correlation statistics of the regression equation will be used to determine how closely the linear model fits the data. The sign and magnitude of the derivative of the linear regression equation will serve as an indicator of the direction and magnitude of the rate change in the variable over time.

In addition to finding models which describe the secular trend of a variable we are also interested in seeking models which will reflect the full detail of the actual growth structure of the data. The necessity for constructing more complex growth models becomes apparent when the data manifests a pattern of increase or decrease at a differential rather than a constant rate or when the data shows a mixed pattern of both increase and decrease. Several methods could be used to construct these more complex models. We could, for example, use curvilinear regression techniques.³² We will, however, use the method of data splitting. We divide or split our data into a series of shorter time intervals and fit linear regression models to each of the new time periods. It should carefully be noted that while models fitted by these more complex methods might describe the growth structure of a variable more closely than a simple linear model fitted over the entire sequence of data, the complex models do not necessarily replace the simple linear model as the best estimator of the overall trend of the data. Only if the graph and correlation statistics indicate that the single linear model fits the data poorly, should we reject that model as an indicator of a variable's secular trend.

Growth patterns can be more complex than the sociocausal paradigm implies. In addition to specifying the direction and magnitude of a growth rate we should also wish to determine whether the rate itself is increasing, decreasing, or remaining constant. We should have knowledge of this information since we would most probably place different substantive interpretations

³¹ For a thorough discussion of the elementary differential calculus of functions of a single independent variable and of applications to rate problems see George B. Thomas, Jr., *Calculus and Analytic Geometry* (3rd ed.; Reading, Mass: Addison-Wesley Publishing Company, 1960), pp. 1-154, especially pp. 104-133.

³² See Croxton, Cowden, and Klein, pp. 249-284.

upon two situations one of which had output performance increasing each year by larger and larger amounts, the other of which had output performance increasing each year but by smaller and smaller amounts. The former situation might be thought to indicate that an institution was steadily increasing the scope of its decisionmaking authority, while the latter situation might indicate that the decisionmaking authority of an institution was beginning to stabilize or level off. The second derivative test provides a method which usually will tell whether the rate of an equation is itself increasing or decreasing.³³

Because it is stated in verbal rather than mathematical language the socio-causal paradigm never makes certain what type of growth-rate situation must exist for a variable's growth trend to be considered increasing. If we make five simplifying assumptions about the true (as opposed to the fitted) equation that describes the relation of a variable to time, we can distinguish seven analytically separate ideal growth-rate situations. The simplifying assumptions are that over the time interval for which we are considering the equation: 1) the value of the equation does not change sign; 2) the equation is continuous; 3) the equation is differentiable; 4) the equation possesses no points of inflection; and 5) the equation possesses a relative maximum and minimum only at the end points of the interval.

Table 2 summarizes the seven growth-rate types that we can distinguish. In order to make our test of the paradigm as rigorous as possible we will set as a necessary criterion for classifying a variable's growth trend as "increasing" the condition that the variable manifest a type six or seven growth rate—that is, the rate must increase at either a constant or increasing level. In the final classification of growth trends we must also consider the magnitudes of the rates and the actual levels of the output scores.

Analysis of the Data

As we have noted above, the operational indicator of the European Communities' output performance is a weighted index constructed from tabulations of institutions' actions as reported in official Community documents. First we will examine the output performance of each of the three Communities separately, and then we will examine the more theoretically interesting question of the overall output performance of the Communities as a whole.³⁴

Tables 3-5 and Figures 1-3 present a summary of the output performance growth of the European Coal and Steel Community from 1953 through 1964. An inspection of the values reported in the total output score column of

³³ See Thomas, pp. 104-133.

³⁴ The computations upon which this analysis is based were performed on the University of Wisconsin's CDC 3600 computer using programs written by the author and program *REGAN 1* of the University of Wisconsin Computing Center Statistical Program System. I wish to thank Keith Billingsley and Richard Trilling for their kind help in familiarizing me with the Wisconsin computing system.

TABLE 2: TYPOLOGY OF IDEAL GROWTH RATE SITUATIONS

Type of Growth Rate	Hypothetical Sequence of Data Values Corresponding Respectively to Time Periods 1, 2, 3, 4, and 5	Time Series Equation that Describes Data	First Derivative of Equation	Second Derivative of Equation
1. Decreasing at an ever decreasing rate	24, 21, 16, 9, 0	$Y = 25 - X^2$	$-2X$	-2
2. Decreasing at a constant rate	4, 3, 2, 1, 0	$Y = -X + 5$	-1	0
3. Decreasing at an ever increasing rate	16, 9, 4, 1, 0	$Y = (X-5)^2$	$2X - 10$	2
4. Rate is zero (no change in data values)	3, 3, 3, 3, 3	$Y = 3$	0	0
5. Increasing at an ever decreasing rate	$1, (\sqrt[3]{2})^2, (\sqrt[3]{3})^2, (\sqrt[3]{4})^2, (\sqrt[3]{5})^2$	$Y = X^{\frac{2}{3}}$	$\frac{2}{3X^{\frac{1}{3}}}$	$-\frac{2}{9X^{\frac{4}{3}}}$
6. Increasing at a constant rate	1, 2, 3, 4, 5	$Y = X$	1	0
7. Increasing at an ever increasing rate	1, 4, 9, 16, 25	$Y = X^2$	$2X$	2

FIGURE 1: GRAPH OF TOTAL ECSC OUTPUT PERFORMANCE, 1953-1964

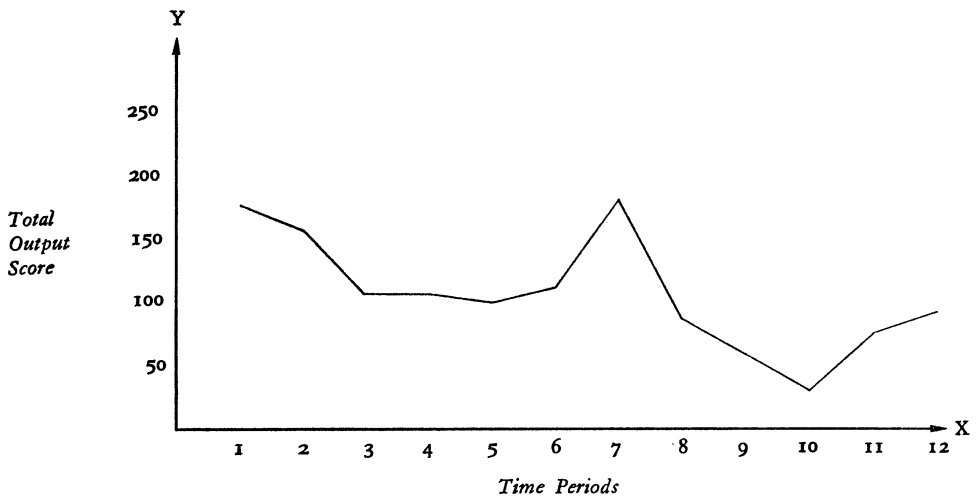


Table 3 and of the graph presented in Figure 1 reveals a situation that has become a common occurrence in social research—the data which we study

TABLE 3: OUTPUT GROWTH OF EUROPEAN COAL AND STEEL COMMUNITY, 1953-1964

<i>Year</i>	<i>Time Period</i>	<i>Decisions</i>	<i>Other Actions</i>	<i>Total Output Score</i>	<i>Years</i>	<i>Change Period</i>
1953	1	52	20	176	1953-1954	1
1954	2	50	7	157	1954-1955	2
1955	3	34	9	111	1955-1956	3
1956	4	34	6	108	1956-1957	4
1957	5	32	3	99	1957-1958	5
1958	6	36	5	113	1958-1959	6
1959	7	57	8	179	1959-1960	7
1960	8	26	9	87	1960-1961	8
1961	9	17	7	58	1961-1962	9
1962	10	9	4	31	1962-1963	10
1963	11	25	1	76	1963-1964	11
1964	12	27	7	88		

TABLE 4: LINEAR LEAST SQUARES REGRESSION EQUATION FITTED TO EUROPEAN COAL AND STEEL COMMUNITY OUTPUT SCORES, 1953-1964

$$Y = 163.2 - 8.7X$$

$$r = -.69 \quad r^2 = .48 \quad S_{yx} = 34.2 \quad \frac{dY}{dX} = -8.7$$

Y = Total Output Score

X = Time Period

often exhibits behavior patterns which do not appear to resemble simple linear models. While a linear regression equation cannot perfectly mirror the exact detail of the oscillating curve of the Coal and Steel Community's output performance scores, still a linear equation can be used to determine whether the overall secular trend of the data sequence is one of increase or decrease.

The simple least squares linear equation which describes the secular trend of the Coal and Steel Community's output performance growth and the first derivative of the equation are:

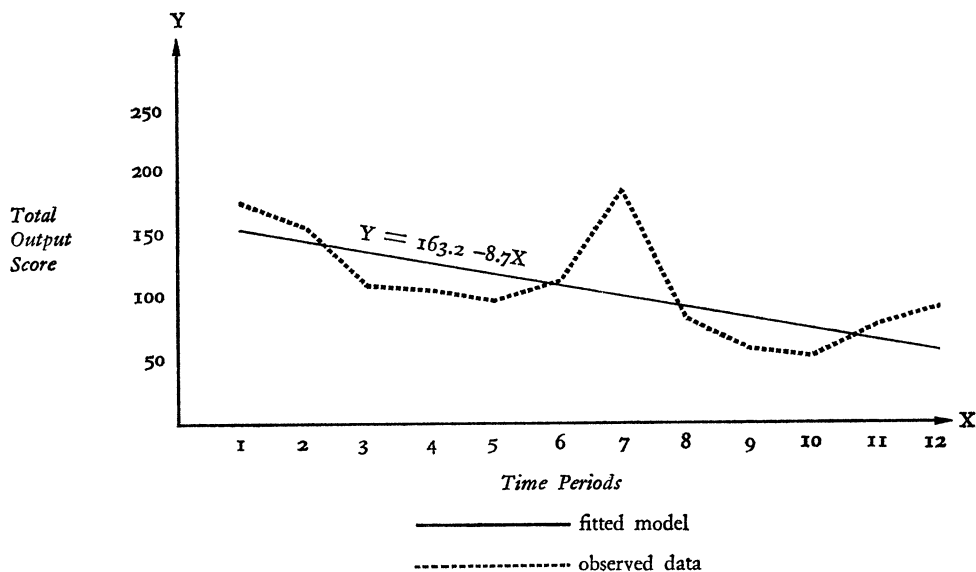
$$Y = 163.2 - 8.7X; \quad \frac{dY}{dX} = -8.7$$

The constant magnitude and the negative sign of the first derivative throughout the total range of X values, $1 \leq X \leq 12$, indicate that the Coal and Steel

Community has experienced what we have classified in Table 2 as a type 2 growth rate—a pattern of decrease at a constant rate. The overall trend of the Community's output performance is one of gradual decline. The value of the derivative, -8.7 , may be interpreted to mean that in any given year the Coal and Steel Community's output performance score was 8.7 units less than it was for the previous year. Because the output performance index is simply a weighted sum of the Community's authoritative actions, the derivative cannot tell us how the exact structure of the Community's authoritative actions varies from year to year. Rather, the derivative indicates only that with each passing year the Community tended to enact sets of decisions which summed to progressively lower output performance scores.

What we have presented so far is only an idealized statement of the Coal and Steel Community's output performance growth. We must now turn to the question of how closely this single-equation linear model describes the observed pattern of output growth. One way to examine this question of degree of fit is to superimpose a graph of the equation over the graph of the raw data values and inspect the congruence between the two curves. Figure 2

FIGURE 2: SINGLE-EQUATION LINEAR MODEL OF ECSC OUTPUT PERFORMANCE TREND, 1953-1964



reveals that the linear equation does reflect the overall downward trend of the Coal and Steel Community's output performance; but the equation does not accurately represent the nonregular pattern of the decline. In seven of the eleven change periods—1953-1957 and 1959-1962—the observed data is charac-

terized by decline, and this decline is reflected in the linear equation. However, in the other four change periods—1957–1959 and 1962–1964—the output performance data is marked by increases which are not represented by the equation.

We may also examine the goodness of fit of the linear model by observing the correlation statistics of the equation. The value of correlation coefficient is $-.69$, and the value of the coefficient of determination, which represents the proportion of variance in the output performance variable explained by the regression equation, is $.48$. Given contemporary standards of political research these statistics are high enough to suggest that the single-equation linear model does provide an adequate representation of the overall trend of decline even though the model cannot reflect the full complexity of the observed data path.

The final problem to be considered is whether we can find a model which will accurately reflect the pattern of nonregular decline of the Coal and Steel Community's output performance growth. An examination of the output scores reported in Table 3 and the graph in Figure 1 indicates that the output performance growth of the Coal and Steel Community occurred in four distinct stages. In the first stage, 1953–1957, the Community's output performance decreases, while in the second stage, 1957–1959, output performance increases. In the third stage, 1959–1962, output performance again declines, while in the fourth stage, 1962–1964, it increases. Since the relation between output performance and time within each of the four stages is approximately linear, we may attempt to describe the full detail of the Coal and Steel Community's pattern of output growth by fitting separate linear regression models to each of the four growth stages. The results of this analysis are summarized in Table 5 and Figure 3.³⁵

The equation of stage I indicates that between 1953 and 1957 the European Coal and Steel Community experienced a decline in output performance at the rate of -20.3 output units per year. Stage II is marked by a period of increase in output performance. During this period, 1957–1959, the Community increased its output performance at the rate of 40 units per year. The increase during stage II was so rapid that by 1959 the Coal and Steel Community had reached a level of output performance (estimated 1959 score of 170.3) which was virtually identical with the output performance level of its initial year of existence, 1953 (estimated 1953 score of 170.8). During stage III, 1959–1962, however, the Coal and Steel Community suffered a sharp decline in output performance at the rate of -47.3 units per year. From 1962–1964, stage IV, the Community increased its performance at the rate of 28.5 units per year

³⁵ Since the four equations have been fitted independently to the output scores of their respective stages, the interior end points of the regression lines will not necessarily join one another. One could construct a more elaborate four-equation model by fitting the regression equations under the constraint that all interior points must be joined.

TABLE 5: LINEAR LEAST SQUARES REGRESSION EQUATIONS FITTED TO THE FOUR STAGES OF EUROPEAN COAL AND STEEL COMMUNITY OUTPUT PERFORMANCE GROWTH, 1953-1964

<i>Stage I</i>	1953-1957	$Y = 191.1 - 20.3X$		
$r = -.94$	$r^2 = .89$	$S_{yx} = 13.3$	$\frac{dY}{dX} = -20.3$	
<i>Stage II</i>	1957-1959	$Y = -109.7 + 40.0X$		
$r = .94$	$r^2 = .89$	$S_{yx} = 21.2$	$\frac{dY}{dX} = 40.0$	
<i>Stage III</i>	1959-1962	$Y = 490.8 - 47.3X$		
$r = -.95$	$r^2 = .90$	$S_{yx} = 24.9$	$\frac{dY}{dX} = -47.3$	
<i>Stage IV</i>	1962-1964	$Y = -248.5 + 28.5X$		
$r = .95$	$r^2 = .90$	$S_{yx} = 13.5$	$\frac{dY}{dX} = 28.5$	

$$R^2 = .89 \quad ^a$$

Y = Total Output Score
X = Time Period

^a R^2 = Total percentage variance explained by four-equation model. R^2 was calculated according to the following formula suggested by Professor Hamish Thompson, Department of Statistics, University of Wisconsin.

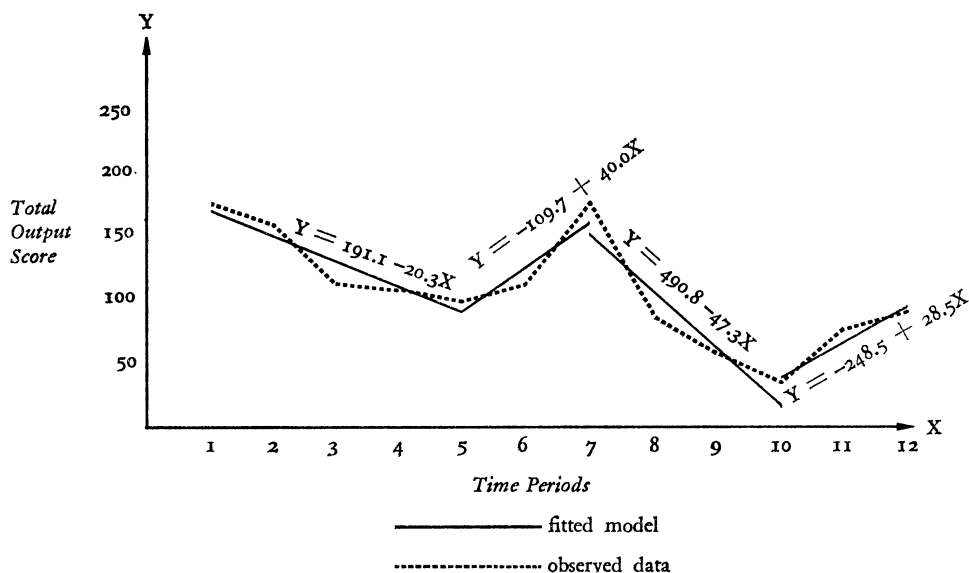
$$R^2 = \frac{\sum_{i=1}^n r_i^2 \cdot f_i \cdot S_{yxi}^2}{\sum_{i=1}^n f_i \cdot S_{yxi}^2}$$

where r_i^2 = coefficient of determination
 f_i = degrees of freedom
 S_{yxi}^2 = square of standard error of estimate

so that by 1964 the Community manifested an estimated output score of 93.5 output units.

The four equations fitted to the separate stages of the Coal and Steel Community's output performance growth combine to yield a model which represents the data very closely. Each equation carefully reflects the increase or decrease

FIGURE 3: FOUR-EQUATION MODEL OF ECSC OUTPUT PERFORMANCE, 1953-1964



that occurred during the respective stages (see Figure 3); and unlike the single-equation model which was used to describe the full period from 1953-1964 at no time does the four-equation model predict increase when decrease occurs or decrease when increase occurs. The correlation statistics further illustrate the good fit between the four-equation model and the data. The correlation coefficients— $-.94$, $.94$, $-.95$, and $.95$ —and coefficients of determination— $.89$, $.89$, $.90$ and $.90$ (with a weighted average of $.895$)—are all considerably higher than the corresponding statistics for the single-equation model.

Two limitations of this four-equation model should be mentioned. First, although this model does represent the complexity of the growth pattern of the output performance data, the model does not provide as clear an indication of the overall trend of the data as the single-equation linear model. The single-equation model is the more appropriate analytical device for measuring the overall tendency of increase or decrease of output performance. Second, since each of the equations in the four-equation model is independent and is based upon a small number of observations, the model can be used only as a method of describing a state of events that happened during a specified period, 1953-1964, and should not be used as a device for predicting the future pattern of the Coal and Steel Community's output performance.

The data and equations which summarize the output performance growth of the European Economic Community are reported in Tables 6-8 and

Figures 4-6. The mixed pattern of decline and increase which characterized the growth structure of the Coal and Steel Community is markedly absent from the growth structure of the European Economic Community. The output scores in Table 6 and the graph in Figure 4 show that during the full

FIGURE 4: GRAPH OF TOTAL EEC OUTPUT PERFORMANCE, 1958-1964

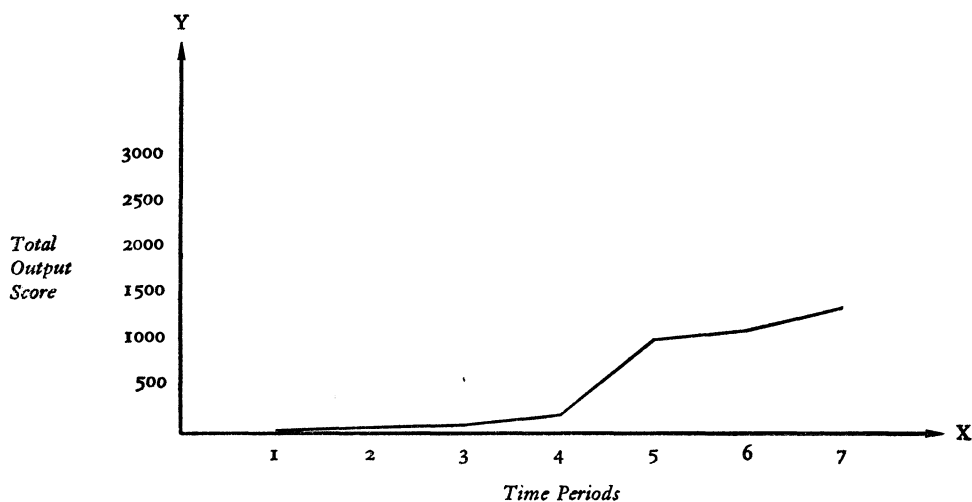


TABLE 6: OUTPUT GROWTH OF EUROPEAN ECONOMIC COMMUNITY, 1958-1964

Year	Time Period	Commission Regulations and Decisions	Commission Other Actions	Council Regulations and Decisions	Council Other Actions	Total Output Score	Years	Change Period
1958	1	2	0	6	0	22	1958-1959	1
1959	2	13	0	5	0	41	1959-1960	2
1960	3	14	0	12	2	66	1960-1961	3
1961	4	59	6	19	1	186	1961-1962	4
1962	5	303	28	104	3	949	1962-1963	5
1963	6	367	16	105	7	1072	1963-1964	6
1964	7	380	15	155	14	1358		

time period, 1958-1964, the output performance of the Economic Community was continually increasing. The least squares linear equation which expresses the overall trend of European Economic Community output performance growth is:

$$Y = -465.6 + 248.0X$$

The positive sign of the derivative of the equation indicates a growth situation of increase at a constant rate. The magnitude of the derivative, 248.3, can be interpreted to mean that in any given year the European Economic Community's output performance score tended to be 248.3 output units higher than in the preceding year. With each passing year the Economic Community was greatly expanding the number of authoritative decisions which it made.

How well does this model fit the data? As an indicator of the overall trend of Economic Community output performance the single-equation linear model fits rather well. Both the equation and the data reflect a situation of constantly increasing output scores. The correlation coefficient for the equation is .93, and the percentage of variation in output performance explained by the model is a high 87 percent. While this single-equation linear model seems to summarize well the overall tendency of output performance increase, the model does not provide a close description of the actual structure of performance growth. The standard error of estimate for this model is 227.6 which is considerably higher than any of the standard errors of estimate which we encountered in the Coal and Steel Community models. Also, for the first year in our data sequence, 1958, the model predicts a negative output performance score—a situation empirically impossible given our definition of the output score index—while the actual data value was a small positive number, + 22.

What other model might better reflect the exact growth structure of this data? The graph in Figure 4 reveals that the output performance growth of the European Economic Community exhibits three distinct stages and that within each stage the pattern of growth approximates linearity. The first stage, 1958-1961, is a period of gradual increase in output performance. In the second stage which lasted only one year, 1961-1962, the Community experiences a tremendous surge of output performance. Finally in the third stage, 1962-1964, the output performance levels off from the jump of the preceding stage but still continues to increase at a moderate rate.

TABLE 7: LINEAR LEAST SQUARES REGRESSION EQUATION FITTED TO EUROPEAN ECONOMIC COMMUNITY OUTPUT SCORES, 1959-1964

$$Y = -465.6 + 248.0X$$

$$r = .93 \quad r^2 = .87 \quad S_{yx} = 227.6 \quad \frac{dY}{dX} = 248.0$$

Y = Total Output Score

X = Time Period

FIGURE 5: SINGLE-EQUATION LINEAR MODEL OF EEC OUTPUT PERFORMANCE TREND, 1958-1964

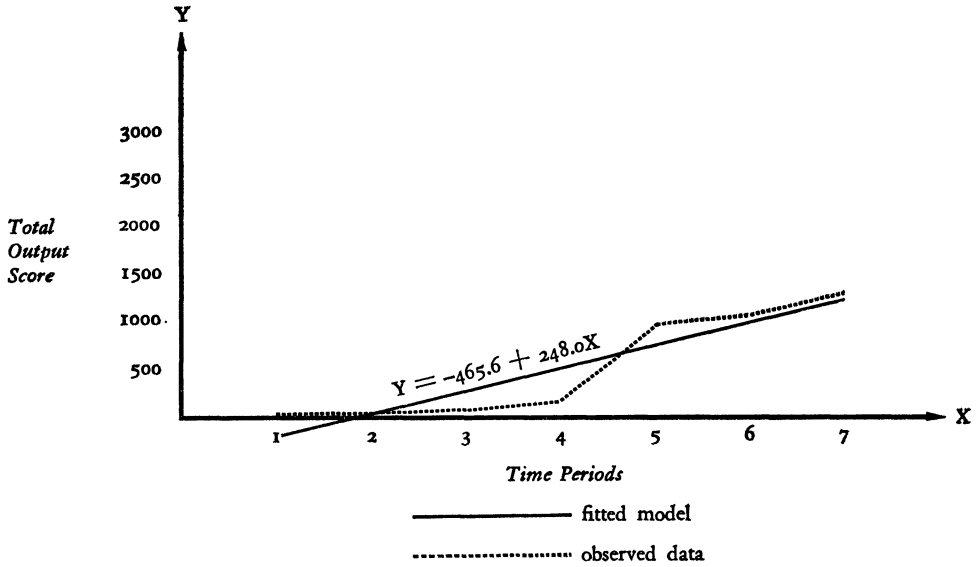


TABLE 8: LINEAR LEAST SQUARES REGRESSION EQUATIONS FITTED TO THE THREE STAGES OF EUROPEAN ECONOMIC COMMUNITY OUTPUT PERFORMANCE GROWTH, 1958-1964

Stage I 1958-1961

$$Y = -50.5 + 51.7X$$

$$r = .91 \quad r^2 = .82 \quad S_{yx} = 38.3 \quad \frac{dY}{dX} = 51.7$$

Stage II 1961-1962

$$Y = -2866.0 + 763.0X$$

$r = 1.0$	$r^2 = 1.0$	$S_{yx} = 0$
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^a $\frac{dY}{dX} = 763$

Stage III 1962-1964

$$Y = -100.7 + 204.5X$$

$$r = .97 \quad r^2 = .95 \quad S_{yx} = 66.5 \quad \frac{dY}{dX} = 204.5$$

$$R^2 = .898$$

Y = Total Output Score

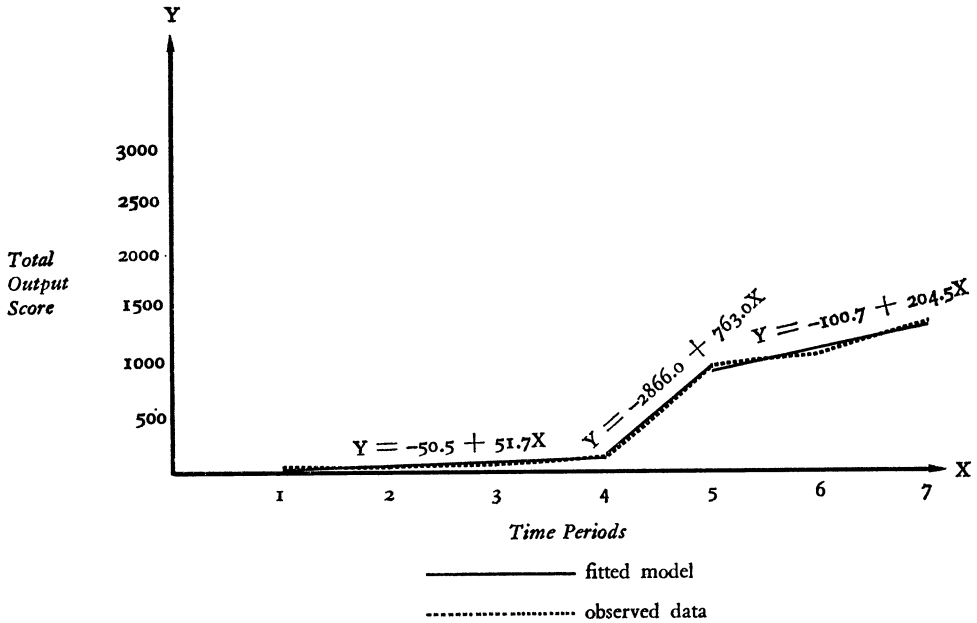
X = Time Period

^a Since two points determine a straight line the correlation statistics for this equation have no real meaning.

The equation for stage I indicates that from 1958 to 1961 the European Economic Community experienced an increase in output performance at the rate of 51.7 output units a year. It should be observed that although the rate of growth shown in stage I is by far the smallest of the three rates in the three-equation model, it still is larger than either of the rates of increase shown by the Coal and Steel Community during its two stages of output performance increase. Stage II, 1961-1962, is characterized by a huge rise in the rate of output performance increase. The rate of increase in this stage was 763.0 output units. Strong increase continued in stage III, 1962-1963, at the rate of 204.5 output units per year.

The three-equation linear model fits the Economic Community's output performance data well. Each of the three equations appears to closely represent the structure of the data in its respective growth stage (see Figure 6).

FIGURE 6: THREE-EQUATION MODEL OF EEC OUTPUT PERFORMANCE, 1958-1964



Also, this model does not produce any negatively valued estimates of output scores. The correlation statistics further demonstrate the congruence between this model and the data. The correlation coefficients of the equations I and III are .91 and .97 with the respective coefficients of determination being .82 and .95.³⁶ The weighted average of the coefficients of determination is .898,

³⁶ Since equation II is determined by only two points, there can be no variation about the regression line and consequently the correlation statistics for the equation have no meaning.

which is slightly higher than the .87 value of the coefficient of determination of the single-equation linear model. The clearest indication of the better fit of the three-equation model over the single-equation model comes from an examination of the standard errors of estimate of the equations. The standard errors of estimate for equations I and III of the three-equation model, 38.3 and 66.5, respectively, are considerably smaller than the 227.6 standard error of the single-equation model.

The output performance scores reported in Table 9 and graphed in Figure 7

TABLE 9: OUTPUT GROWTH OF EUROPEAN ATOMIC ENERGY COMMUNITY, 1958-1964

<i>Year</i>	<i>Time Period</i>	<i>Commission Regulations and Decisions</i>	<i>Commission Other Actions</i>	<i>Council Regulations and Decisions</i>	<i>Council Other Actions</i>	<i>Total Output Score</i>	<i>Years</i>	<i>Change Period</i>
1958	1	1	0	5	0	17	1958-1959	1
1959	2	2	0	4	2	18	1959-1960	2
1960	3	1	1	3	1	13	1960-1961	3
1961	4	1	0	7	0	23	1961-1962	4
1962	5	5	1	11	1	45	1962-1963	5
1963	6	0	0	20	0	60	1963-1964	6
1964	7	0	1	13	0	40		

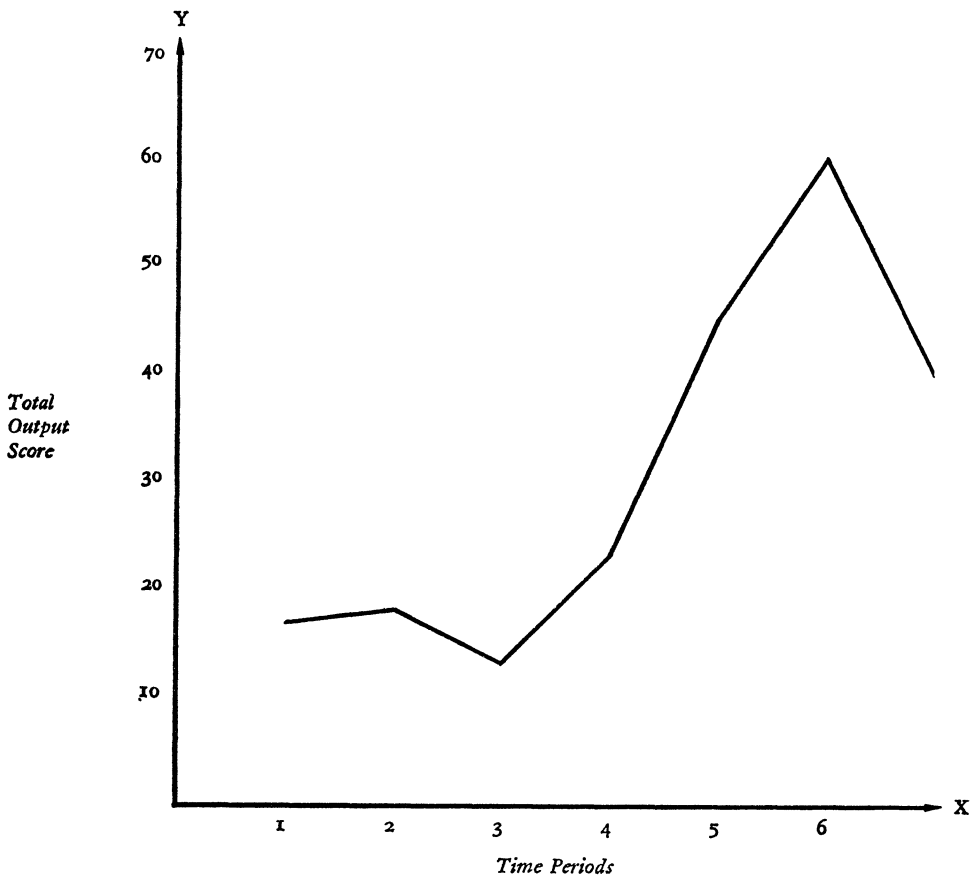
indicate that the European Atomic Energy Community possesses a mixed growth pattern. The least squares linear equation which represents the overall trend of the Atomic Energy Community's output performance is:

$$Y = 4.4 + 6.6X$$

The positive derivative of the equation indicates that the overall trend of the output performance is a pattern of increase at a constant rate. The magnitude of the derivative for the Atomic Energy Community, 6.6—a value lower than the absolute magnitude of the derivative of any of the other equations yet reported—indicates that the Community experienced a trend of slow output growth; for any given year the output performance score of the Community would be approximately 6.6 output units higher than in the previous year.

Given the mixed pattern of Atomic Energy Community output performance growth—a pattern in which two of the six change periods were characterized by decline—we would not expect a linear equation to mirror perfectly the exact structure of the data. The linear model predicts an increase of out-

FIGURE 7: GRAPH OF TOTAL EURATOM OUTPUT PERFORMANCE, 1958-1964



put performance throughout the whole period from 1958 to 1964. Yet, the data manifests a pattern of slight decline from 1959 to 1960 followed by an interval of sharper decline from 1963 to 1964. Still, the dominant feature of the data is the steady increase of the output scores from 1960 to 1963, and this increase is reflected in the regression equation. The correlation statistics of this equation lend support to the contention that it is appropriate to describe the overall trend of the Atomic Energy Community's output performance as one of increase. The correlation coefficient of the equation is .81 and the coefficient of determination is .65. The linear model thus explains 65 percent of the total variance of the Community's output performance.

The graph of the Atomic Energy Community's output performance (see Figure 7) indicates that the growth pattern of the Community can be divided into three stages. The first stage characterized by a trend of slight decline runs from 1958 to 1960. The second stage, 1960-1963, is a period of definite

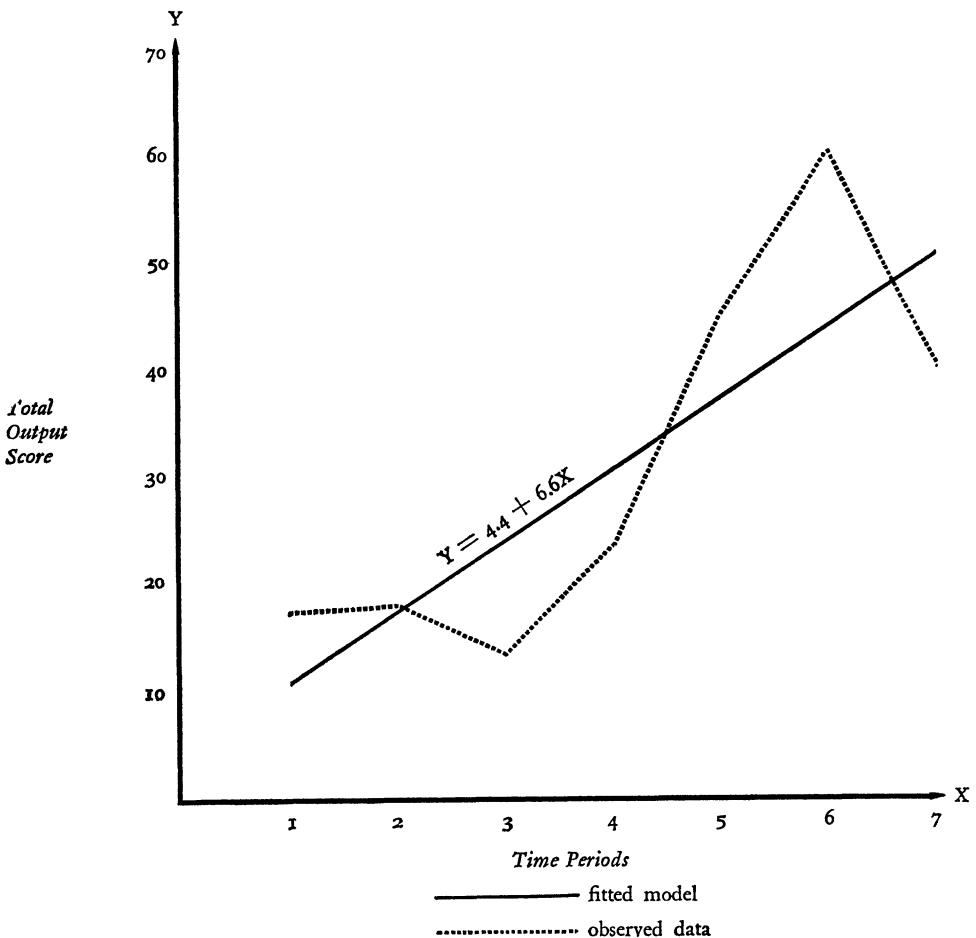
TABLE 10: LINEAR LEAST SQUARES REGRESSION EQUATION FITTED TO EUROPEAN ATOMIC ENERGY COMMUNITY OUTPUT SCORES, 1958-1964

$$Y = 4.4 + 6.6X$$

$$r = .81 \quad r^2 = .65 \quad S_{yx} = 11.3 \quad \frac{dY}{dX} = 6.6$$

increase in output performance. The third stage, 1963-1964, represents a period of decline. By fitting linear equations to these separate intervals we can attempt to construct a model which will more closely represent the mixed growth pattern than the single-equation linear model.

FIGURE 8: SINGLE-EQUATION LINEAR MODEL OF EURATOM OUTPUT PERFORMANCE TREND, 1958-1964



The derivative of the stage I equation, -2 , indicates that the period from 1958 to 1960 was characterized by a decline at a rate of 2 output units per year. The stage II equation with a derivative of 16.3 reflects the 1960-1963 period of increase in the Atomic Energy Community's output performance. During this second growth stage the Community would increase its yearly output performance score by an average of 16.3 output units. The derivative of the stage III equation, -20 , reflects the drop of 20 output units which occurred between 1963 and 1964. The three-equation model represents quite well the exact structure of the Atomic Energy Community's output growth. Only in the one change period, 1958-1959, does the three-equation model predict a trend which is not reflected by the data. The correlation coefficients and the coefficients of determination of the equations for stages I and II are, respectively: $r = -.76$ and $r = .99$; and $r^2 = .57$ and $r^2 = .99$. The weighted average proportion variance explained by the three-equation model is .905 compared to the .65 proportion of variance explained by the single-equation model. Also, the standard errors of estimate for the equations of stages I and II—2.5 and 3.5—are considerably less than the standard error of the single-equation model—11.3.

TABLE II: LINEAR LEAST SQUARES REGRESSION EQUATIONS FITTED TO THE THREE STAGES OF EUROPEAN ATOMIC ENERGY COMMUNITY OUTPUT PERFORMANCE GROWTH, 1958-1964

Stage I 1958-1960

$$Y = 20.0 - 2.0X$$

$$r = -.76 \quad r^2 = .57 \quad S_{yx} = 2.5 \quad \frac{dY}{dX} = -2.0$$

Stage II 1960-1963

$$Y = -38.1 + 16.3X$$

$$r = .99 \quad r^2 = .99 \quad S_{yx} = 3.5 \quad \frac{dY}{dX} = 16.3$$

Stage III 1963-1964

$$Y = 180.0 - 20.0X$$

$r = -1.0$	$r^2 = 1.0$	$S_{yx} = 0$	^a	$\frac{dY}{dX} = -20.0$
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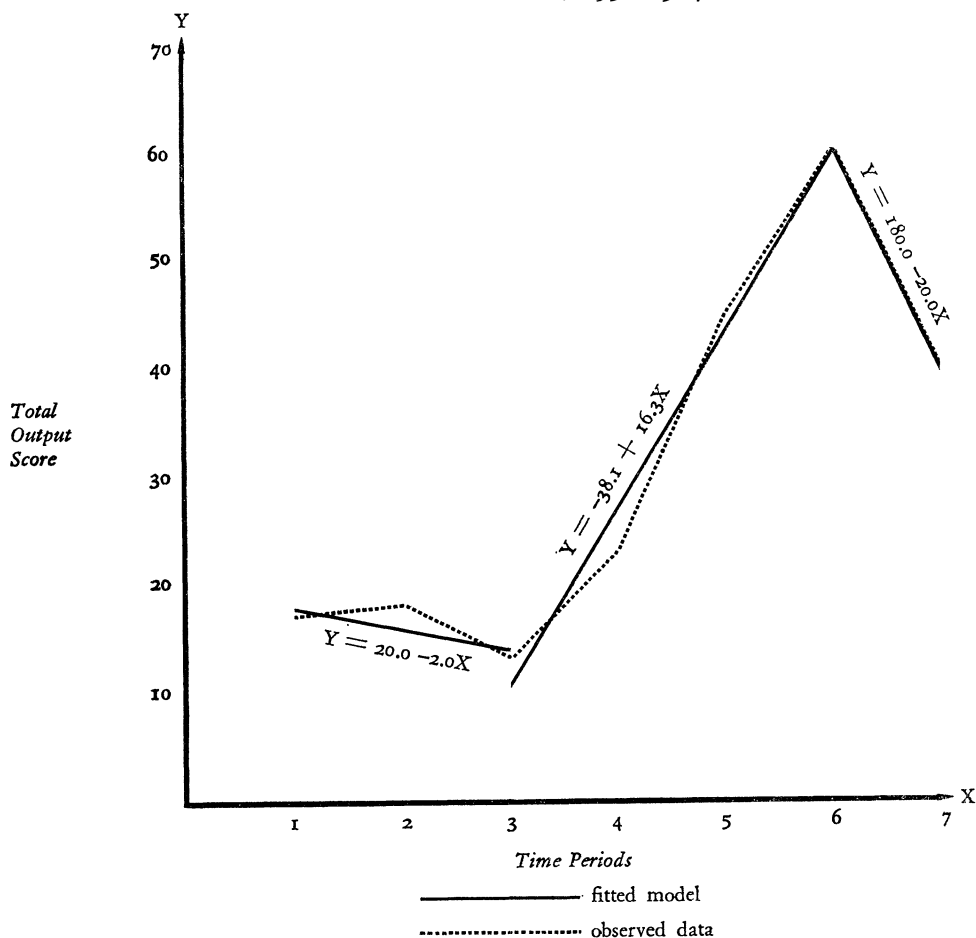
$$R^2 = .905$$

Y = Total Output Score

X = Time Period

^a Since two points determine a straight line the correlation statistics for this equation have no real meaning.

FIGURE 9: THREE-EQUATION MODEL OF EURATOM
OUTPUT PERFORMANCE, 1958-1964



So far we have examined the secular trends of output performance growth of the three European Community institutions taken separately. Two of the institutions, the Economic Community and the Atomic Energy Community, showed overall trends of performance increase, while the Coal and Steel Community showed a trend of decrease. Our results are thus mixed and do not seem to point in a clear direction. However, theoretically what we should really be interested in is not the separate institutional performance patterns but the composite performance pattern of the European Communities taken as a whole. We are interested in the total supranational institutional authority that is exercised in Western Europe, and we seek a summary measure of the total pattern of institutional performance growth. There are, in fact, theoretical reasons for believing that the separate institutions will show mixed per-

formance patterns while the Communities as a whole nevertheless will show a stable overall growth pattern. For example, Lindberg has suggested that within the total staff membership of the three European Communities there exists a smaller subset of members who form a creative, innovative elite. Lindberg claims that much of the new programs and actions instituted by a given institution are formulated by this elite. The members of this elite have moved from one institution to another, partly because of the shifts in importance that the national governments of the Common Market countries attributed to different problems at different times. Since this elite transferring does exist and since this elite is responsible for the periods of innovative actions taken by an institution, one would expect that the separate institutions would show somewhat varied patterns of output performance over time.

Tables 12-14 and Figures 10-12 summarize the total Communities' output performance data. The least squares linear equation of the overall trend of output performance is:

$$Y = -279.9 + 109.6X$$

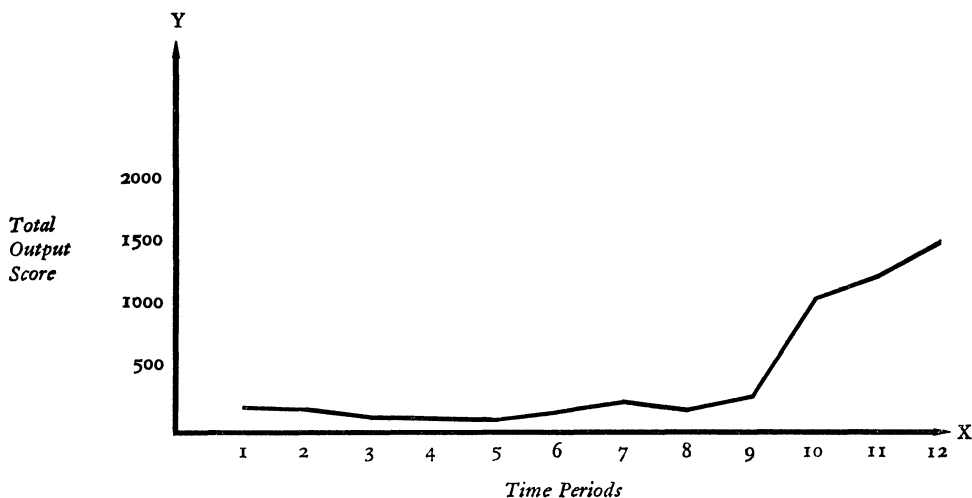
The positive sign of the derivative of the equation means that the total Communities' output performance growth trend is one of increase at a constant rate. The derivative further indicates that the total output performance score of the Communities tended to increase at the rate of 109.6 output units per year.

Since the actual growth pattern of the total Communities' output performance scores is marked by periods of both increase and decrease, we cannot expect a single linear equation to reflect the full detail of data. Still, we must answer the question of how well the single equation summarizes the *overall*

TABLE 12: OUTPUT GROWTH OF EUROPEAN COMMUNITIES, 1953-1964

<i>Year</i>	<i>Time Period</i>	<i>Total Community Output Score</i>	<i>Years</i>	<i>Change Period</i>
1953	1	176	1953-1954	1
1954	2	157	1954-1955	2
1955	3	111	1955-1956	3
1956	4	108	1956-1957	4
1957	5	99	1957-1958	5
1958	6	152	1958-1959	6
1959	7	238	1959-1960	7
1960	8	166	1960-1961	8
1961	9	267	1961-1962	9
1962	10	1025	1962-1963	10
1963	11	1208	1963-1964	11
1964	12	1487		

FIGURE 10: GRAPH OF TOTAL EUROPEAN COMMUNITIES' OUTPUT PERFORMANCE, 1953-1964



trend of the output performance scores. With the exception of the decline in 1960 the decrease in the Communities' output performance is concentrated in the early years of the Communities' existence, 1953-1957, when the Coal and Steel Community was the only institution to have been created. Beginning in 1958 the trend of output performance is plainly increasing, and the magnitude of this increase is far greater than the magnitude of the decline which had occurred earlier. The pattern of increase from 1958 on (except for 1960) does seem to be the most striking feature of the total Communities' output performance data; and this pattern of increase is clearly reflected in our upward sloping regression line. The correlation statistics of the regression equation— $r = .79$ and $r^2 = .63$ —indicate that it is indeed appropriate to characterize the overall trend of the total Communities' output performance pattern as one of increase. The single-equation model is able to explain 63 percent of the variance in the output performance variable.

It is possible to construct, however, a model which will more closely mirror the exact structure of the Communities' output performance growth. Table 12 and Figure 10 indicate that we can break the Communities' growth pattern into four stages. The first stage, a period of output decline, runs from 1953 to 1957. From 1957 to 1961 the Communities experience a stage of gradual increase in output performance. The third stage of output performance is the period 1961-1962 which is marked by a great increase in the Communities' output performance. In the final stage, 1962-1964, output performance continues to increase although at a slower rate than the surge period of 1961-1962.

The equation and graphs of the four-equation model are reported in Table 14 and Figure 12. The derivative of the stage I equation, -20.3, indicates that from 1953 to 1957 the Communities experienced a decline in output performance at the rate of -20.3 output units per year. In stage II, however, the pattern of output performance began to increase at a rate of 35 output units per

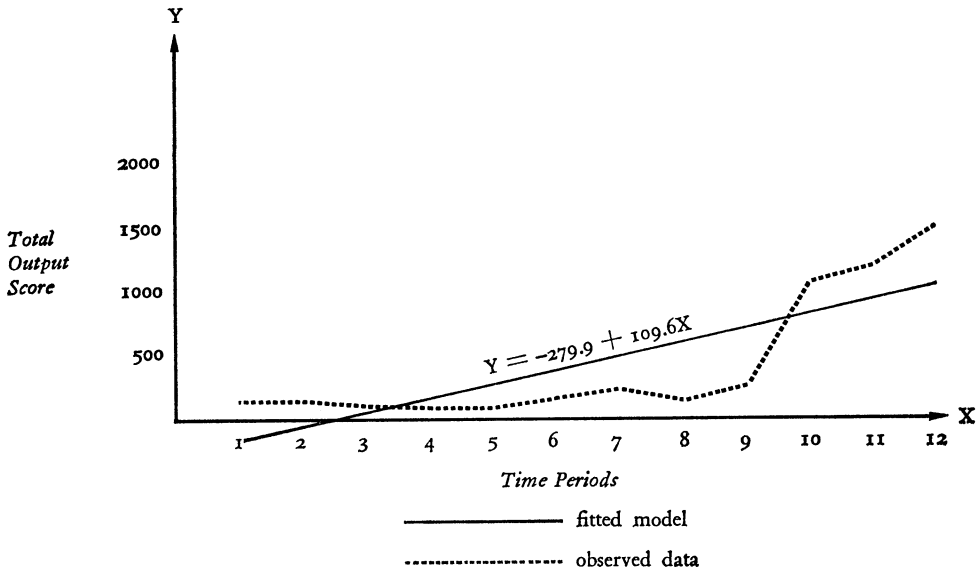
TABLE 13: LINEAR LEAST SQUARES REGRESSION EQUATION FITTED TO THE TOTAL EUROPEAN COMMUNITIES' OUTPUT SCORES, 1953-1964

$$Y = -279.9 + 109.6X$$

$r = .79$ $r^2 = .63$ $S_{yx} = 319.6$ $\frac{dY}{dX} = 109.6$

$Y =$ Total Output Score
 $X =$ Time Period

FIGURE II: SINGLE-EQUATION LINEAR MODEL OF TOTAL EUROPEAN COMMUNITIES' OUTPUT PERFORMANCE TREND, 1953-1964



year. The derivative of the stage III equation, 758, strikingly demonstrates the magnitude of the increase in the total Communities' output performance between 1961 and 1962.³⁷ Finally, the derivative of the stage IV equation, 231,

³⁷ Lindberg has suggested that the attempt of the European Community to develop a common agricultural policy provided the opportunity for this great surge in output performance. See Leon Lindberg, "Decision Making and Integration in the European Community," in *International Organization*, Winter 1965 (Vol. 19, No. 1), pp. 1-19.

TABLE 14: LINEAR LEAST SQUARES REGRESSION EQUATION FITTED TO THE FOUR STAGES OF THE TOTAL EUROPEAN COMMUNITIES' OUTPUT PERFORMANCE GROWTH, 1953-1964

Stage I 1953-1957

$$Y = 191.1 - 20.3X$$

$$r = .94$$

$$r^2 = .89$$

$$S_{yx} = 13.3$$

$$\frac{dY}{dX} = -20.3$$

Stage II 1957-1961

$$Y = -60.6 + 35.0X$$

$$r = .82$$

$$r^2 = .67$$

$$S_{yx} = 45.2$$

$$\frac{dY}{dX} = 35.0$$

Stage III 1961-1962

$$Y = -6550.0 + 758.0X$$

$r = 1.0$	$r^2 = 1.0$	$S_{yx} = 0$
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$$\frac{dY}{dX} = 758.$$

Stage IV 1962-1964

$$Y = -1301.0 + 231.0X$$

$$r = .99$$

$$r^2 = .99$$

$$S_{yx} = 39.1$$

$$\frac{dY}{dX} = 231.$$

$$R^2 = 74.4$$

Y = Total Output Score

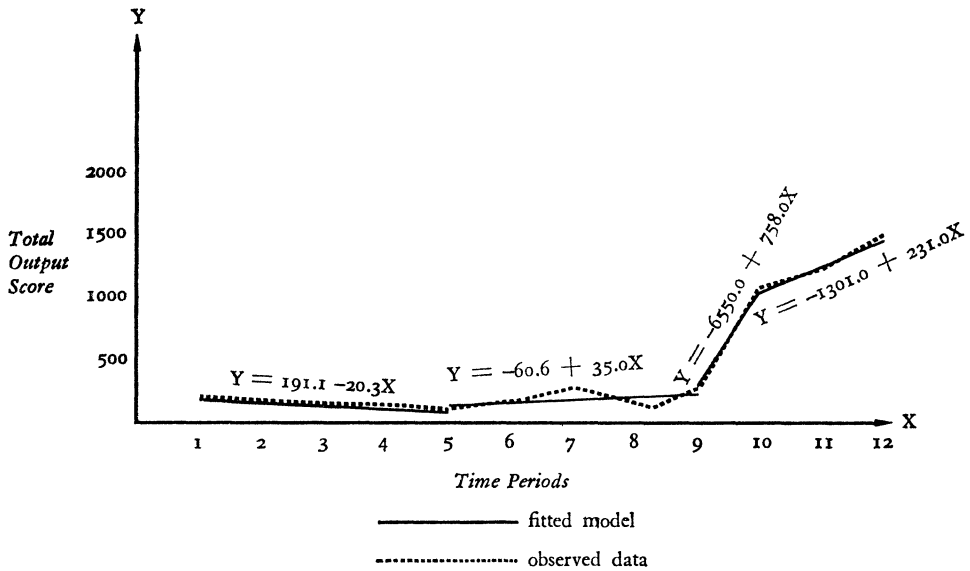
X = Time Period

^a Since two points determine a straight line the correlation statistics for this equation have no real meaning.

indicates that output performance was still increasing from 1962 to 1964. The rate of growth during stage IV, while smaller than the rate of increase in the 1961-1962 period, was still considerably greater than the 35-unit growth rate of the 1957-1961 period.

The four-equation model fits the structure of the data well. With the one exception of 1960 the model mirrors the patterns of increase and decrease in the data perfectly. The correlation coefficients and coefficients of determination for the equation of this model are all higher than the coefficients of the single-equation model (see Tables 13 and 14). The weighted average variance explained in the total Communities' output performance is 74.4 percent—a figure higher than the 63 percent of the variance explained by the single-equation model. Furthermore, the standard errors of estimate for the four-equation model—13.3, 45.2, and 39.1 for equations I, II, and IV, respectively—

FIGURE 12: FOUR-EQUATION MODEL OF TOTAL EUROPEAN COMMUNITIES' OUTPUT PERFORMANCE, 1953-1964



are all very much smaller than the 319.6 value of the standard error for the single-equation model.

The Sociocausal Paradigm Rejected

We have now reached the point where we can make a limited judgment regarding the validity of the sociocausal paradigm's assumption. Since Deutsch and others report that social assimilation is not increasing, we have already reduced our testable propositions to two statements.

TABLE 15: TRUTH TABLE FOR $S \leftrightarrow P$ GIVEN S FALSE

		Truth Values of Separate Variables		Truth Value of Total Statement
		S	P	$S \leftrightarrow P$
Logical	3	F	T	F
Possibilities	4	F	F	T

Since the overall trend of the total Communities' output scores which served as an indicator of institutional output performance growth in Western Europe can be characterized as increasing at a constant rate and since the output scores manifest more than a seven-fold increase between 1953 and 1964, we must conclude that supranational institutional decisionmaking and allocating au-

thority in Western Europe is increasing. Since supranational institutional decisionmaking and allocating authority is closely related to the sociocausal paradigm's concept of political development, we conclude that political development in Western Europe is increasing. Accordingly, P must be assigned a value of true. Thus, row 3 of the truth table is the statement which best describes the situation that exists in Western Europe.

TABLE 16: TRUTH TABLE GIVING VALUE FOR STATEMENT $S \leftrightarrow P$
GIVEN S FALSE AND P TRUE

		Truth Values of Separate Variables		Truth Value of Total Statement
		S	P	$S \leftrightarrow P$
Logical Possibility	3	F	T	F

The sociocausal paradigm's assumption that social assimilation causes political development is rejected as false. It is our contention that the paradigm not only fails to describe the events that have taken place in Western Europe in the past fifteen years but also that it would probably be of limited value in studying political integration in any setting.

PART III—EXPLANATIONS

The purpose of this project has been to empirically test how well the sociocausal paradigm describes the events in Western Europe from 1953 to 1964.⁸⁸

⁸⁸ Before turning to a possible explanation of why the sociocausal paradigm did not describe the empirical reality of political events in Western Europe, I must call attention to the limitations of my own research.

A problem which confronts my work is one of validity. Does my weighting and summation index really describe the variable of output performance? As is often the case in exploratory social research, a scholar has no direct or foolproof check which he can easily use to test the validity of his indicators. Also, relatively little effort has been made by political scientists to devise methods for treating validity problems. What I hope I have done is to state as clearly as possible the reasons underlying the decisions I have made so that the reader may decide for himself whether or not he approves of these procedures.

There exists in my mind the nagging question that perhaps my index does not fully represent output performance. For example, it might be possible that a supranational institution could at a given time period make a series of decisions regarding a particular area. Let us further assume that the actions which were taken in this time period were of such a nature that they effectively allowed the institution to become the dominant political body making binding and allocating decisions for that particular issue area. If this was the situation, the institution would receive a high score on my index for the time period when the crucial decisions were being made that allowed the institution to gain authority in that field. However, in later periods, even though the institution would possess the same or perhaps even greater authority in that field, the institution might have to make fewer actual decisions regarding that area. In other words, once an institution had established its preeminence in an area it might only have to make a few minor decisions for that area as events change slightly. However, such a course of action would result in a low institutional output performance score on the index. (The findings presented by Lindberg in *International Organization*, Vol. 19, No. 1, pp. 1-19, seem to agree with this conclusion.)

If the above pattern actually prevailed, one might predict that my index scores would be expected to level off or decline after a period of years. Since, however, my data indicated that output performance has increased steadily over the period being studied, I would argue that while leveling off of the index

The purpose was neither to formulate a new theory of international political community formation nor to empirically investigate possible explanations why the paradigm might prove inadequate. Before one can attempt to research possible explanations of a theory's failure, one must first test the theory itself. Testing the paradigm was the aim of this article. Accordingly, the explanations that will be presented about why the paradigm proved inadequate must be accepted as highly tentative. They represent only possible, not proven, explanations.

Before turning to these explanations we should mention that the possibility exists that the sociocausal paradigm might provide a valid description of events in Western Europe. John Early has seriously questioned the validity of several of the indicators of social assimilation used by Deutsch and other writers.³⁹ Thus, it is possible that social assimilation might actually be increasing in Western Europe, although Deutsch failed to detect the situation because he used poor indicators. If this is the case, then the value of S in our truth table would be changed to true and we would find that row 4 of the table would then become the statement that most corresponds to the empirical world.

TABLE 17: TRUTH TABLE GIVING VALUE FOR STATEMENT $S \leftrightarrow P$
GIVEN S AND P BOTH FALSE

		<i>Truth Values for Separate Variables</i>		<i>Truth Value to Total Statement</i>
		S	P	$S \leftrightarrow P$
<i>Logical Possibility</i>	4	F	F	T

We would then conclude that $S \leftrightarrow P$ is true and that the sociocausal paradigm does serve as a descriptive model of events in Western Europe. Even if we

scores might have occurred in some issue areas, the European Communities institutions were gaining authority in even more new areas so that the total effect was one of output performance increase. As I have shown, a leveling off of the index of output performance scores might not necessarily mean that an institution's actual output performance was declining. Since the index never did show any leveling off, I feel safe in making the conclusion that supranational institutional output performance in Western Europe has increased from 1953 to 1964.

Another difficult problem is devising a weighting system for my index. I have earlier discussed how I arrived at the final procedures which I used in determining weights for the different types of official actions taken by Community institutions. In my research I did not begin to devise a weighting system for actual decisions made within each of the main action type categories. It is undoubtedly true that certain decisions taken by an institution are of far greater significance than others in expanding the institution's authority in a given area. Clearly this problem of within-category weighting is one which deserves much future attention.

A final problem which bothered me throughout my research was the lack of theoretical criteria presented in the existing scholarly literature which could have served as an aid in designing my research project and in analyzing and interpreting my results. We have very little theory relating to the formation of political systems and what theory we do have is stated in a verbal terminology which gives no clear and precise help for the researcher attempting to quantitatively study an empirical problem.

³⁹ John Early, "Support for the European Community as a Political System: The Quantitative Aspects" (Unpublished seminar paper, University of Wisconsin, 1967), p. 25.

found that the above situation held, for reasons which will presently be stated, the paradigm would be inadequate to provide an explanatory, as opposed to descriptive, analysis of the process of political community formation.

Also it is possible that the sociocausal paradigm would provide a more valid description if it was stated in probabilistic terms. Since, however, the paradigm has not really been stated as a strict probabilistic model, we have been forced to treat it as a deterministic sort of model.⁴⁰

We conclude that the sociocausal paradigm not only fails as a device to describe and explain the events in Western Europe but also that it is of limited use as a general paradigm that could be used to study political integration in other settings. The paradigm is inadequate for two closely related reasons. First, it fails to specify a theoretical linkage between the two central variables studied. Second, it omits from consideration certain variables which other writers have felt were essential in order to meaningfully conceptualize a political integration process.

Turning to the first reason, we recall that the paradigm posits the existence of a direct causal relation between two types of variables—social assimilation which can be described as a psychological variable relating to the attitudes of mass publics and political development which can be described as a variable relating to the behavior of selected elite populations. Never does the paradigm, however, theoretically state how the attitudes of mass populations are translated into elite behaviors.

Recent research by Miller and Stokes illustrates the problems involved in providing explanations of even the most simple of linkage situations: the case in which mass opinion is related to elite behavior through the two intervening variables of elite perceptions of mass opinion and elite attitudes.⁴¹ In order to fully describe this type of linkage situation we must specify the variables involved—the substantive issue or problem, the relevant elite, the specific elite behavior, the distribution of mass opinion, the elites' perception of mass opinion, and the elites' attitudes; we must state the logically distinct models of opinion transmission; and finally we must test the separate models by various statistical techniques to determine which model best fits the observed system of variable interrelationships.⁴² In other types of linkage situations in which

⁴⁰ See Johan Galtung, *Theory and Methods of Social Research* (New York: Columbia University Press, 1967), pp. 321–323. Also see Kaplan, pp. 121–125.

⁴¹ Warren E. Miller and Donald E. Stokes, "Constituency Influence in Congress," in Angus Campbell and others, *Elections and the Political Order* (New York: John Wiley & Sons, 1966), pp. 351–372. Also see V. O. Key, Jr., *Public Opinion and American Democracy* (New York: Alfred A. Knopf, 1961), pp. 411–531; and Norman Luttbeg (ed.), *Public Opinion and Public Policy: Models of Political Linkage* (Homewood, Ill: Dorsey Press, 1968).

⁴² See Charles F. Cnudde and Donald J. McCrone, "The Linkage between Constituency Attitudes and Congressional Voting Behavior: A Causal Model," *American Political Science Review*, March 1966 (Vol. 60, No. 1), pp. 66–72; Hubert Blalock, *Causal Inferences in Non-Experimental Research* (Chapel Hill: University of North Carolina Press, 1964); Hayward Alker, Jr., "Causal Inference and Political Analysis," in Joseph Bernd (ed.), *Mathematical Applications in Political Science II* (Dallas, Tex: South-

variables such as parties or interest groups are thought to intervene between mass opinion and elite behavior the models to be specified and tested become considerably more complex. Because of the primacy which it places upon social factors in determining the course of political integration the sociocausal paradigm does not explicitly state which specific elites, which elite behaviors, which elite attitudes, and which elite perceptions of mass opinion are involved in the process of political development. Neither does the paradigm specify the logically possible models of opinion transmission nor suggest any procedures for evaluating separate transmission models.

Miller and Stokes in their study of the relation between constituency attitudes and legislators' voting in the established American political system report that direct relations between mass opinion and elite behavior exist only in situations where a strong majority of the population intensely prefers the same position on a given issue.⁴³ To the extent that this finding reflects a general limit on the potential influence of mass opinion on elite behavior and would thus be applicable to our problem of the relation between mass opinion and the behavior of members of policymaking organs of supranational institutions in an incipient transnational political system we would expect that mass opinion would directly influence European Community policymakers only if most people in Western Europe intensely favored the same position on issues relating to integration. However, none of the evidence presented by Deutsch and others in support of the paradigm leads one to feel that the opinion structures of European mass populations are so united in direction of feeling and so intense in strength of belief that we would have a situation in which mass opinions would have a direct effect on elite behavior. Deutsch's factor-analytical and cross-tabulation techniques fail to show either a measure of absolute intensity of European populations' feelings regarding integration or a measure of intensity of feelings about integration relative to other issues. What the attitudinal data does seem to reveal is that in Europe there exists a loose enough structure to public opinion so that various elite leaders can have great freedom in deciding their positions and behaviors regarding political integration. The absence of any unified, strong, national mass feelings against behavior that might be thought of as leading to integration seems to indicate the existence of a permissive consensus.⁴⁴

In summation, the paradigm's simple model of a direct relation between mass attitudes and elite behavior does not seem to describe the true complexity of the empirical world.

ern Methodist University Press, 1966), pp. 7-43; Hubert Blalock, "Theory Building and Causal Inferences," in Hubert Blalock and Ann Blalock (ed.), *Methodology in Social Research* (New York: McGraw-Hill, 1968), pp. 155-198; and Raymond Boudon, "A New Look at Correlation Analysis," in Blalock and Blalock (ed.), pp. 199-235.

⁴³ Miller and Stokes in Campbell and others, pp. 360-371.

⁴⁴ Key, pp. 32-35.

The second reason why the sociocausal paradigm is inadequate is that it omits theoretical consideration of certain crucial variables. Political development is very much a process involving the interactions of various political elites. Yet the paradigm fails to specify the variables which probably determine elite *behaviors* regarding integration. Inglehart, for example, feels that the attitudes of the head of government of a given nation are a most important factor in determining the role that a country will play in making efforts toward political integration.⁴⁵ Also, it seems that one would wish to know the potential which a given chief of state would have to make certain that his feelings regarding integration would be followed by his nation. It would appear that Charles de Gaulle as President of France is in a much stronger structural situation to influence France's policy toward integration than would be the head of government in a cabinet-style democracy.

Finally, it seems that variables regarding the attitudes and the ability of other elite groupings to influence national policy must be specified in any model that seeks to explain political integration.⁴⁶ Attention must be given to assessing the feelings, values, and objectives of national legislative members, political party members, and leaders of affected interest groups.

The purpose here is not to spell out in full detail the exact variables and their theoretical relations which must be considered in a complete model of integration. Rather, the intent is simply to show that the sociocausal paradigm did not consider variables which are critical for explaining a process characterized by elite actions.

⁴⁵ Ronald Inglehart, "An End to European Integration?," *American Political Science Review*, March 1967 (Vol. 61, No. 1), pp. 91-105. Also compare with Nye, *International Organization*, Vol. 22, No. 4.

⁴⁶ Compare with Amitai Etzioni, *Political Unification: A Comparative Study of Leaders and Forces* (New York: Holt, Rinehart and Winston, 1965), pp. 44-47; and Raymond Bauer, Ithiel de Sola Pool, and Lewis Dexter, *American Business and Public Policy: The Politics of Foreign Trade* (New York: Atherton Press, 1963).