A CAUSAL ANALYSIS OF ECONOMIC DEVELOPMENT IN THE AFRICAN STATES

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The purpose of this paper is to test the proposition that government is the most important single agent responsible for increases in levels of economic development in the African States. (1) The States are diverse with respect to political institutions, culture, and economic and social structure. They are similar, however, in that all the states can be considered potential or actual modernizers, almost all share a colonial heritage, and all are most appropriately in the "new nation" category in terms of outlook and aspiration. Moreover, economic development, unlike political or social development ,is the common denominator by which developing nations compare themselves to their neighbors and project a national image to the larger world community. Therefore, the States of Africa provide an ideal background for examining the relationship between governmental activity and economic development in the developing areas, whithout regard for the various types or kinds of political and social systems.

Economic development is a multi-dimensional concept. It can refer to the amount of domestic goods and services available to the general population of a country, the distribution of those goods and services among the various social and economic strata of a society, or to the amount of capital investment in terms of hardware, dollars or some other measurable quantity. Perhaps the most widely used statistic for measuring economic development is gross national product per capita (GNP/capita), and it will be used in this study.

(1) Because of missing data only 30 of the 31 African States are included in this analysis. The Congo is counted as two States.

McClelland, however, argues that a better indicator is power consumption per capita. (2) Such arguments, it seems, are futile. Obviously, whatever indicator or series of indicators or scale of economic development is used, some countries will rank higher on one end lower on another. The fact is that no "objective" indicator, as such, exists; bias is unavoidable. Nor is this necessarily a severe methodological or theoretical limitation. The effect of using one indicator over another may be to limit the extent of the generalization derived, but that should be true regardless of the indicator used. On the other hand, GNP/capita is widely accepted as *the* statistic of comparison among the leaders of the developing states as well as the academic community. The ideal solution to the choice of indicators, of course, is to use the largest possible number of indicators, hoping to capture as much as possible of the concept of economic development. But, that is well beyond the scope of this papel. Consequently, we use GNP/capita as a measure of economic development, cautioning the reader to be cognizant of its limitations.

The problem remains of why a political scientist would be interested in issues of economic development. And the simple answer is that it is one of the most convenient ways of determining the relative importance of political and social changes over time. That is to say, we are concerned with the *effects* of certains *kinds* of political and social changes, specially concerned with the effects these changes produce in the realm of economic development. Thus while economic development is our dependent variable and political and social change are our independent variables, the relationship of political change to economic development remains our primary concern.

The most common approach to the study of economic development by political scientists has been that suggested initially by Seymour Martin Lipset — that is, what effect does the level of economic development have on the type, kind, and style of governmental process retained within a given country? (3) He found that generally, high economic levels tended to support democratic processes. In this vein, economic development is an independent variable.

Another school of thought is perhaps best represented by Martin C. Needler, in which economic development is viewed as an intervening variable. (4) The subject of his inquiry was the relationship

(2) David McClelland, **The Achieving Society** (Princeton: Von Nostrand and Co., 1961). Also see: McClelland and David G. Winters, **Motivating Economic Achievement** (New York: The Free Press, 1969).

(3) Seymour Martin Lipset, **Political Man: The Social Bases of Politics**, (Garden City, New York: Doubleday and Company, Inc., Anchor Books Elition, 1963) pp. 31-40.

(4) Martin C. Needler "Political Development and Socio-economic Development: The Case of Latin America", **American Political Science Review** (September, 1968) pp. 889-897.

between participatory processes, broadly construed, and political system stability. He found that when participation rose faster than the level of economic development, constitutional functioning tended to break down. (5) And, this is not too surprising. It is wholly consonant with James Davies theory of revolution, for example, in which he points out the need for a rather close adherence between citizen expectations and general economic and political system delivery; when delivery falls sharply in the face of rising expectations, instability results. (6) But, in any case, economic development is viewed as an intervening "condition", which affets, alters or upsets the "normal" relationship between the citizen and his government.

Then, in an excellent book on political development, Charles Anderson, Fred von der Mahden, and Crawford Young point out the activist role of government in many developing areas toward the goal of economic development. (7) And, governments are measured, to some degree, on the basis of how well they perform their instrumental functions — instrumental in terms of facilitating economic growth. Several arguments are advanced by the leaders of developing nations for such an activist governmental role. First, increased governmental activity seems to offer a "short-cut to economic growth", because, "the state appears to many leaders of developing countries as the only really modern institution in the society." (8) And yet, little evidence is presented that increased governmental activity actually does result in economic growth . This is not a criticism on their book. Rather, it points to the need for increased research on the actual power of government to play a positive role in economic development, *without* the ideological overtness of "democracy", "socialism", or "communism." (9)

As the reader probably already realizes, neither the necessity nor the ability of government to materially affect economic development is agreed upon. McClelland, for example, points to the need for an "achievement motive", in the culture. (10) Daniel Lerner, while calling attention to necessary sociological processes such as urbanization, increased literacy, and so on, also sees what he calls "empathy", in the modern man, which enables him to participate effecti-

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(5) **Ibid**, p. 897.
(6) James Davies, "Toward a Theory of Revolution", **The American Sociological Review**, (February, 1962) pp. 5-19.
(7) Charles Anderson, Fred von der Mehden, and Crawford Young, **Issues of Political Development** (Englewood Cliffs: Prentice-Hall, Inc., 1967).
(8) **Ibid**, pp. 199-200.
(9) Karl Deutsch points out that governments in developing areas play a proportionately smaller role in economic matters than they do in "developed" countries. In substantially underdeveloped countries the government tends to spend 10% of the GNP, whereas in developed countries the government tends to spend 30% of the GNP. Karl W. Deutsch "Social Mobilization and Political Development" **American Political Science Review**, (Sept., 1961) p. 493.
(10) McClelland, **The Achieving Society** and **Motivating Economic Development**, op. cit.

vely and to assume a differentiated role in a modern economy. (11) D. Rustow and R. Ward point to Japan and Turkey as examples of moderately rapid economic development due primarily to factors other than governmental "intervention" in the economic sphere. (12) In other words, there are certain social and cultural processes quite apart from governmental activity, which are primarily responsible for economic growth.

On the other hand, Lucian Pye heralds the contributions of governmental activity — especially the contributions of armies — in developing countries. (13) Armies provide channels of upward mobility and psychological change for the citizens as well as provide governmental stability, both of which are necessary for economic development. (14) This view is shared, in part, by Aristide Zelberg, who despite this sentiment, questions whether political scientists may be overemphasizing political institutions. (15) In his view, economic conditions are so bad in Africa that any "studies focused primarily on incipient central institutions almost necessarily exaggerate their importance in relation to the society as a whole." (16) Therefore, he says, we ought to "consider politics in the more general context of African societies." (17)

Thus, we conceive of what seems to be an important theoretical quest; what is the relationship of each of these to the overall process of economic development? In attempting to answer this question we will, (1) examine variance in the dependent variable, GNP/capita, over time and among the African States, (2) factor analyze the independent variables in order to conceptualize the varying dimensions of increased activity, and (3) causal model the realtionship between changes in governmental activity, other social and economic changes, and economic development.

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(11) Daniel Lerner, **The Passing of Traditional Society**, (New York: The Free Press, 1958).

(12) Dankword A. Rustow and Robert E. Ward (el.), **Political Modernization in Japan and Turkey** (Princeton: Priceton University Press, 1964).

(13) Lucian Pye, **Aspects of Political Development**, (Boston: Little, Brown, and Company, 1966) especially Chapter 9.

(14) **Ibid pp. 182-184.**

(15) Aristide Zolberg, "The Structure of Political Conflict in the New States of Tropical Africa" **American Political Science Review**, (March, 1968) pp. 70-87.

(16) **Ibid.**

(17) **Ibid.**

TABLE I

Economic Development Variables: Extent of Variation

Variable	High	Low	Range	Mean	Std. Dev.	Coefficient S/x̄ = 100) S. of Variation
GNP/capita, 1958	$240.	$37	203$	82.3	48.8	59.3
GNP/capita, 1966	$400.	40	360	109.0	75.6	69.3
Actual Dollar Increase 1958-60	160.	-37	197	27.4	38.5	140.5
% Increase/GNP/ capita 1958-63	% 160	%-39	199%	41.2	44.9	108.9

Table I summarizes the extent of variation in the dependent variable GNP/capita. The first three columns contain the high, low, and range respectively for each of the variables under consideration. The last three columns contain the mean ($\bar{x}$), standard deviation (s), and the coefficient of variation ($\frac{s}{\bar{x}} = (100)$ for the variables. The coefficient of variation is a useful statistic because it allows us to compare the variation of unlike quantities in a meaningful way — that is, we can compare percentages with dollars to determine the degree of similarity between the two with respect to variation.

Examination of Table I provides us with some important information regarding our dependent variable. We see that the greatest variation is exhibited in the actual increase in GNP/capita from 1958 to 1966. The next highest coefficient of variation is for the % increase from 1958 to 1963. The lowest amount of variation is for GNP/capita in 1958. The reason for the increased variation for GNP/capita in 1966 and ensuing years can be found by comparing the highs and lows for each of the variables. We see that the high GNP/capita in 1958 was $240, whereas the high in 1966 was $400. The corresponding lows are $37 and $40. Two conclusions are obvious. First, the lowert nations, in terms of GNP/capita, have made very little proggress toward economic development, increasing only three dollars ($3) per capita in six years . Second, the highest nations increased markedly, showing a corresponding $140 increase in six years. The resulting spread from poorest to richest was even greater in 1966 than it was in 1958. This fact alone makes research on economic development all the more important. It is one thing for the leaders of nations in the developing areas to compare the GNP/capita of their country with those of the more developed countries and see their own as lacking, and still another to see their nation's GNP/capita being stagnant in comparison with that of nations which were similar to their

own only a few short years before. The resultant internal pressure bears ill hope for a stable political system in such nations.

The research task, then, is to sort out those aspects of change which "pay off" in terms of increased economic development. One of the ways of doing so is to look at changes in value for selected variables for each of the countries, over time. Then, one can attempt to correlate these changes with increased GNP/capita. Let us proceed to that task.

Independent Variables

A total of fifteen independent variables were used in the preliminary stages of the analysis. The variables were selected on the basis of the availability of data and the contribution each was expected to make toward providing a representative description of political and social changes. Variation in the variables selected was in no way expected to directly *cause* increases or decreases in GNP/capita. Such an interpretation would be an oversimplification to be sure. Rather, the variables were selected because they had been used or mentioned by other authors, or in the opinion of the writer, were thought to be involved in a complex interactive sequence which *ultimately* results in increases in GNP/capita.

The fifteen independent variables were factor analyzed in order to satisfy the requirements of causal analysis, that being the assumption of linearity between independent and dependent variables. Obviously, any variable or scale of variables which is composed of more than one variance dimension cannot be assumed to possess the required linear form. Factor analysis allows us to locate these so-called "variance dimensions." The results of this analysis and the variables used are located in Table II.

A few remarks on how to interpret the table are in order. The variables are listed with their complete name in the first column. The "communality" of each variable appears directly to the right of the variable. The "communality" can be interpreted as the portion of the total error free variance that correlates with the other variables. (18) The communality of each variable aplies to the four related factors, all of which are reproduced in the table. When the communality coefficient is low, it means that the variable has little in common with the other variables. (19) It can also mean that the variable contributes most of its variance to factors not included in the rotation, but that does not apply to this particular matrix, because of the criteria used for the selection of factors to rotate. The number of factors to

(18) Lee F. Anderson, Meredith W. Watts, Jr., and Allen R. Wilcox, **Legislative Roll-Call Analysis.** (Evanston: Northwestern University Press, 1966) p. 127.
(19) **Ibid.**

TABLE II

Rotated Factor Matrix of Fifteen Independent Variables Using Four Factors

Variable Name	Commu-nality	Factors 1	2	3	4
Average Annual % Change in number of Doctors 1960-63	.755	.836	.168	—.155	—.053
% of labor force in subsistence agriculture 1960	.766	—.059	.199	.110	..844
% change in primary scholl enrollment 1960-65	.119	—.196	—.280	—.044	—.001
% change in secondary school enrollment, 1960-65	.740	—.147	646	.204	—.214
Change in % of population literate, 1950-65	.437	—.031	—.070	.640	—.145
% change in radios per 10,000 population 1961-65	.681	.026	.092	—.794	—.204
% change in telephones per 10,000 population 1962-66	.659	—.216	—.781	.026	.043
% change in commercial vehicles per 100M population, 1958-66	.498	—.172	—.059	—.028	.682
Ratio of government spending to GNP: rate of growth 1963-65 b	.798	.869	—.075	—.195	.010
% rate of growth of all government revenue 1963-65	.897	.935	.071	—.023	—.128
% rate of growth of central government revenue, 1963-65	.649	.583	—.271	.475	—.101
% change in total armed forces, 1963-67	.125	—.073	.339	—.056	.038
% change in internal security forces per 100M population, 1964-67	.491	—.207	.469	.103	—.466
% increase in non-governmental international organizations, 1960-66	.585	—.153	.132	.737	.037
% increase in the % of population in cities over 20M population, 1955-65	.564	—.033	—.730	.134	—.112

be included in the "factor rotation" was determined by the amount of total variance in the unrotated matrix accounted for by a factor. If the factor did not account for over one-fifteenth (1/n) of the total variance, it was not included in the rotation sequence. Consequently, the rotated factor matrix has four factors. The first factor can be interpreted as the amount of communal variance accounted by that factor. Each succeeding factor can be interpreted as the amount of variance extracted from the residual communal variance. Since all of the factors have been rotated eleven times, the practical interpretation of each factor, regardless of whether it is number one or two or what, is that it is the amount of variance extracted from the residual communal variance. Therefore, we can meaningfully compare factor one with all other factors in the matrix.

We can now proceed with the interpretation of the table. Since the basic purpose of factor analysis is to simplify a set of relationships among a group of variables, there are no rigid set of steps to be used in the interpretation of the factors. (20) The only desired statistical result is that the patterns of relationship among the variables will be expressed in a minimum number of meaningful dimensions. Since the contribution each variable can make toward a dimension is conditional upon its amount of communality, we will begin by examining the communality coefficients. We see immediately that variable 3 (% change in primary enrollment) and variable 12 (% change in armed forces) have communality coefficients so low that they barely have any variance component in common with the other independent variables. Consequently, we eliminated these variables from further analysis.

Next, we look for variables that load heavily on one factor and do not load heavily on any other factor. The ideal solution would be to have a variable loading at a plus or minus one on one factor and have loadings approaching zero on all other factors. Since such "purity" is unlikely, we look for the closet approximation to such an ideal. One of the more troublesome situations is a variable that loads ont two factors, because this means that the variable is sharing variance with two dimensions, and consequently is of little conceptual utility. We notice that variable 13 (% change in internal security forces is such a variable, loading at the .46 level on both factors 2 and 4. Therefore, we eliminate this variable from further consideration as well. The general rule adopted in this analysis of factors is that the loading on one factor must exceed the loadings on all other factors combined, regardless of sign. This means that variable 11 (% rate of growth of central government revenue) will also be

(20) **Ibid**, p. 156.

eliminated from further analysis because one loading on factor 1 (.583) does not exceed the combination of loadings on factors 2, 3, and 4 (.271 + .475 + .1.01). Consequently, eleven variables remain for further analysis.

Next, we look for those variables which load highly on factor. 1. They are:

1) Variable 1 — the average annual percent change in doctors, 1960-63.
2) Variable 9 — the rate of growth of government spending to GNP, 1963-65.
3) Variable 10 — the rate of growth of all government revenue, 1963-65.

These variables have been interpreted as being representative of change on the governmental sphere of activity. Some may find it initially surprising that the percentage change in the number of doctors loads on the same factor with the change in governamental revenue and spending, but this is not too surprising in view of the high governmental participation in social welfare activities in most of the developing nations. What differentiates the change in the number of doctors from the change in various educational categories, another functional change with supposedly high governmental participation, is that the particular variables we have chosen for analysis represent *change*. Therefore, what we may be witnessing is a shift in committment toward certain kinds of change by the leaders of the developing nations. One thing is certain; as the rate of government spending and revenue increase the annual percentage change in the number of doctors tends to vary in direct proportion. Therefore we will conceptualize this dimension as change in governmental activity.

The variables loading on factor 2 are:

1) Variable 4 — the percentage change in secondary enrollment, 1960-1965.
2) Variable 7 — the percentage change in the number of telephones per 10,000 population, 1962-66.
3) Variable 15 — the percentage increase in the percentage of population living in cities over 20.000 population, 1955-65.

All of the variables in this dimension have what seems to be a common urban bias. It can be argued that secondary enrollment and telephones are phenomenon closely aligned with urbanization, especially in the more underdeveloped areas. Therefore, it is not surprising to find these particular variables loading on the same factor.

It will be noticed that variable 4 (% change in secondary enrollment) is the least clear-cut in terms of loading highly on one factor and low on all remaining factors. This suggests that the change in secondary enrollment tends to vary in accordance with a number of developmental phenomena, but is most dependent upon urbanization and the processes surrounding urbanization. Accordingly, we conceptualize this dimension as changes in urbanization.

The variables loading on factor 3 are:

1) Variable 5 — the percent change in literacy from 1950-55.
2) Variable 6 — the percent change in the number of radios per 10,000 population, 1961-65.
3) Variable 14 — the percentage increase in the number of non-governmental international organizations, 1960-66.

Quite clearly, each of these variables shares with the other some aspect of communication. What factor analysis tells us, of course, is that these three aspects of development tend to change together, and that they represent something quite apart from the other dimensions. Just how, or why they happen to vary together is subject matter for further research. All we can do at this point is speculate rather cautiously. Referring now to both the communication variables and the urbanization variables, it is worth noting how Lerner sees these processes relating.

> The secular evolution of a participant society appears to involve a regular sequence of three phases. Urbanization comes first, for cities alone have developed the complex of skills and resources which characterize the modern industrial economy. Within this urban matrix develop both of the attributes which distinguish the next two phases — literacy and media growth. There is a close reciprocal relationship between these, for the literate develop the media which in turn spread literacy. But literacy performs the key function in the second phase. The capacity to read, at first acquited by relatively few people, equips them to perform the varied tasks required in the modernizing society. Not until the third phase, when the elaborate technology of industrial development is fairly well advanced, does a society begin to produce newspapers, radio networks and motion pictures on a massive scale. This in turn, accelerates the spread of literacy. (21)

(21) Lerner, op. cit., p. 60.

It is also worth noting that Lerner's analysis of the relationship among these processes does not square with the data derived from his own parable of the Grocer and the Chief. In the parable, as described by Lerner, the foremost "modernizing agent" in the village of Balgat was the radio, and second most important was the highway leading to Ankara. (22) What seems most likely to influence the relationship between the communication processes and the urbanization processes is the matter of contextual development. In other words, whether urbanization processes are followed by communication and literacy or whether the reverse holds, seems to be a mater of the relationship of the particular stage of development of the nation as a whole. Where a village is located outside an urban area, much as Balgat was located next to Ankara, then it seems that the communication processes provide the first link in the larger modernization chain. And, where such urban centers do not exist, it seems that the first step is as Lerner indicates — urbanization followed by literacy and media growth.

This leads us to the variables which load on the fourth factor. They are:

1) Variable 2 — the percentage of the labor force in subsistence agriculture.
2) Variable 8 — the percentage change in the number of commercial vehicles per 100,000 population, 1960-66.

These two variables are measures of occupational change. Variable 2 (% in subsistence agriculture) does not, strictly speaking, measure change in occupational employment. The reason this variable was chosen as opposed to one which measured change in the percentage of persons engaged in subsistence agriculture was that the data were not available. Consequently, this variable was used in lieu of the more precise mesasure. At any rate, the combination of the two variables should provide a measure of shift in employment from subsistence agriculture to marketing agriculture or urbanized employment, both of which should be reflected in an increase in the number of commercial vehicles. Thus, we conceptualize this dimension as change in occupational employment.

Scale Construction

A scale score was derived for each of the countries on each dimension following the same basic procedure. The Z-score for each country on each variable was computed. This figure was multiplied by

(22) Ibid, Chapter I.

ten. Then a constant of fifty was added to each score. The result is a standardized score for each variable. This allows us to compute the mean standadardized score for each country, on each dimension. We simply added the standardized scores for each of the variables in a dimension, and divided by the number of variables in the dimension. (23)

Causal Analysis

One of the knottiest methodological problems in causal analysis is being able to pick out one variable which stands apart from the other variables being considered. It is absolutely essential that the researcher pick out one such variable because if this is not done, there can be no basis for inferring causality. In general, two basic approaches are used in selecting such a variable. One method is to select the "most independent" variable in the system. In using this mehod, the researcher is saying, in effect, that the other variables being considered cannot possibly exert an influence on the particular variable chosen, changes in the "most independent" variable in the system, using this method, the researcher is saying, in effect, that the other variables being considered cannot possibly exert an influence on the particular variable chosen, changes in the "most independent" variable, are taken as given — that is, the chain of causality is viewed as not extending *backward* any further than this variable, or if there are forces influencing or causing variation in this variable, such forces are viewed as exogenous to the system of variaables being considered. In other words ,the variable selected is the beginning point of the causal sequence under consideration.

Another basic approach is to select the variable that is at the end of the causal sequence being considered — in other words, the dependent variable. Regardless of the variable chosen, however, the choice

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(23) This procedure has some limitations. First, it equates all variables in terms of their importance. It can be argued, perhaps, that the percentage change in radios is not as important as the percentage change in literacy. But, lacking any valid means of "weighting" the importance of each variable, it was decided that if any errors were going to be committed, it would be on the side of omission rather than commission. Second, the process of standardizing the variables, places severe restrictions on our ability to generalize from the causal analysis to follow. Basically, two distinct methods can be followed in causal analysis. One is based on correlation coefficients and other is based on regression coefficients. The regression method is the more desirable for maximum generalizability. The method of correlation coefficients is based on standardized data. Since each data "set" has a unique mean and standard deviation, the method of correlation coefficients, or standardized data, is rather limited. Regression coefficients, on the other hand, specify precise unit changes in X and Y, in terms of their original units. Obviously, these coefficients are more easily compared to fields of inquiry not included in the original analysis, of course, is that we begin, in a sense, with standardized data. For a further explication, see: Hubert M. Blalock, Jr., Causal inferences in **Nonexperimental Research** (Chapel Hill: University of North Carolina Press, 1964) especially Chapter I and pp. 133-134.

must be justified, and here is where the methodological issues become paramount. The researcher can draw upon the literature and thereby establish a priori the variable chosen. This procedure is most commonly followed by those who seek to establish the "most independent" variable in the sequence. (24) The alternative procedure is to temporally isolate the variable chosen, either "most independent" or the dependent variable. This is done by selecting data which, in the case of the "most independent" variable, precedes, in terms of time sequence, the data collected for the other variables being considered. In the case of a dependent variable selection, the data colected must be taken from a time period following that for all other variables being considered.

In our case, we have selected the dependent variable (GNP/capita) as the object of analysis. In order to obtain the methodological "purity" referred to above, we used data for the dependent variable for the year 1966. The data for the independent variables being considered was obtained for the years preceding 1966, or, since the independent variables refer to change over a specified time period, the data preceded *and* included the year 1966. Therefore, there is ample justification for isolating the dependent variable. And, in strict terms, we are not looking at how changes in the independent variables over time affect changes in economic development, but rather, we are looking at the relationship between the changes in the independent variables and the *level* of economic development in 1966. Interestingly enough, the change in GNP/capita from 1958-1966 is correlated with GNP/capita in 1966 at .87. Moreover, in terms of the relationships examined in this study, it makes no difference whether we use the change in GNP/capita from 1958-66 or GNP/capita in 1966, as the dependent variable. Yet, the rules of causal analysis demand that one use GNP/capita in 1966, specially in the absence of valid criteria to the contrary.

In order to test the relationship of changes in governmental activity (GA) affecting GNP/capita in 1966 (GNP), and the relationship of changes in governmental activity (GA) to the other independent variables, we conceptualized those relationships in the manner outlined in Figure I.

Analyzing the relationships in the manner indicated we have restricted our causal analysis to three variable models. The alternative conceptualization would be one, five variable models.

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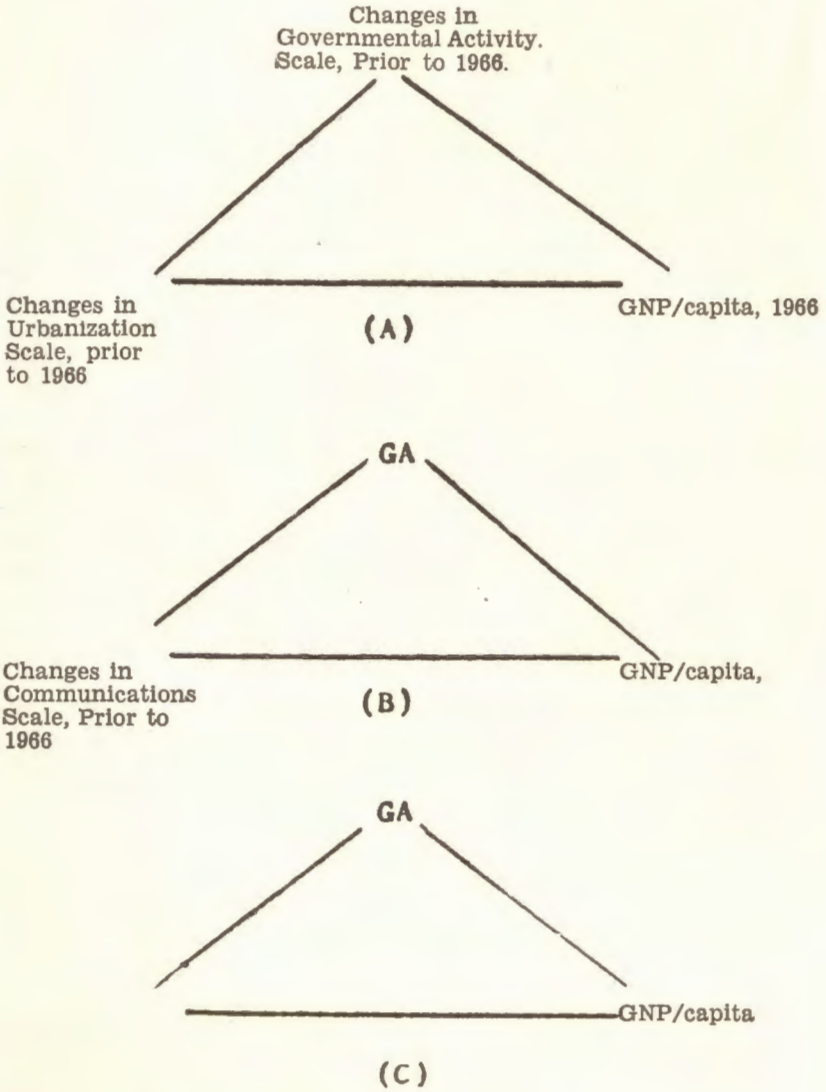
(24) This is the procedure followed by Arthur K. Smith, Jr., for example in: "Socio-Economic Development and Political Democracy: A Causal Analysis" Midwest Journal of Political Science (February, 1969) pp. 95-125. For an example of the same procedure used in an American setting see: Charles F. Crudde and Donald J. McCrone, "Party Competition and Welfare Policies in the American States", American Political Science Review, (September, 1969) pp. 858-866.

FIGURE I

Conceptualized Relationships of Increased Governmental Activity, GNP/Capita in 1966, and Selected Independent Variables.



Analysing the relationships in the manner indicated

The three variable model was chosen for several reasons. First, the three variable model allows us to look at the relationship between changes in governmental activity and GNP/capita, obviously. Second. the three variable model does not let us become embroiled in discussing the causal relationship among the independent variables of urbanization, communications, and occupational change. This design was not structured for a definitive examination of this relationship in terms of the time periods in which the data was collected, and therefore, it was deemed advisable not to include this relationship in the analysis. Third, the three variable model is much simpler to work with than the five variable model, thereby allowing for a more definitive analysis of the relationship being considered. (25) Thus, we will be examining three, three variable models.

Assuming that all three variables exhibit simple inter-variable correlations, there are seven possible relationships adhering among each of the three variable models being considered. The "universe" of possible model is illustrated in Figure II.

The first five models (A through E) are commonly referred to as "spuriousness" models, meaning that the simple correlations adhering between the two variables without a connective are spurious. These models are easily determined by looking at the partial correlation coefficient for each of the possible two variable conditons; where the partial coefficient is zero, and there is a simple correlation, the relationship is said to be spurious. Models (F) and (G), on the other hand, are commonly referred to as "hybrid" models and are distinguished by the fact that all three partial coefficients, as well as simple coefficients, are nonzero. And, these are the models which apply to the variables we are considering; all relationships have both a simple and partial correlation. Therefore, the modeling problem, in this case, is to distinguish between the "hybrid" models (F) and (G).

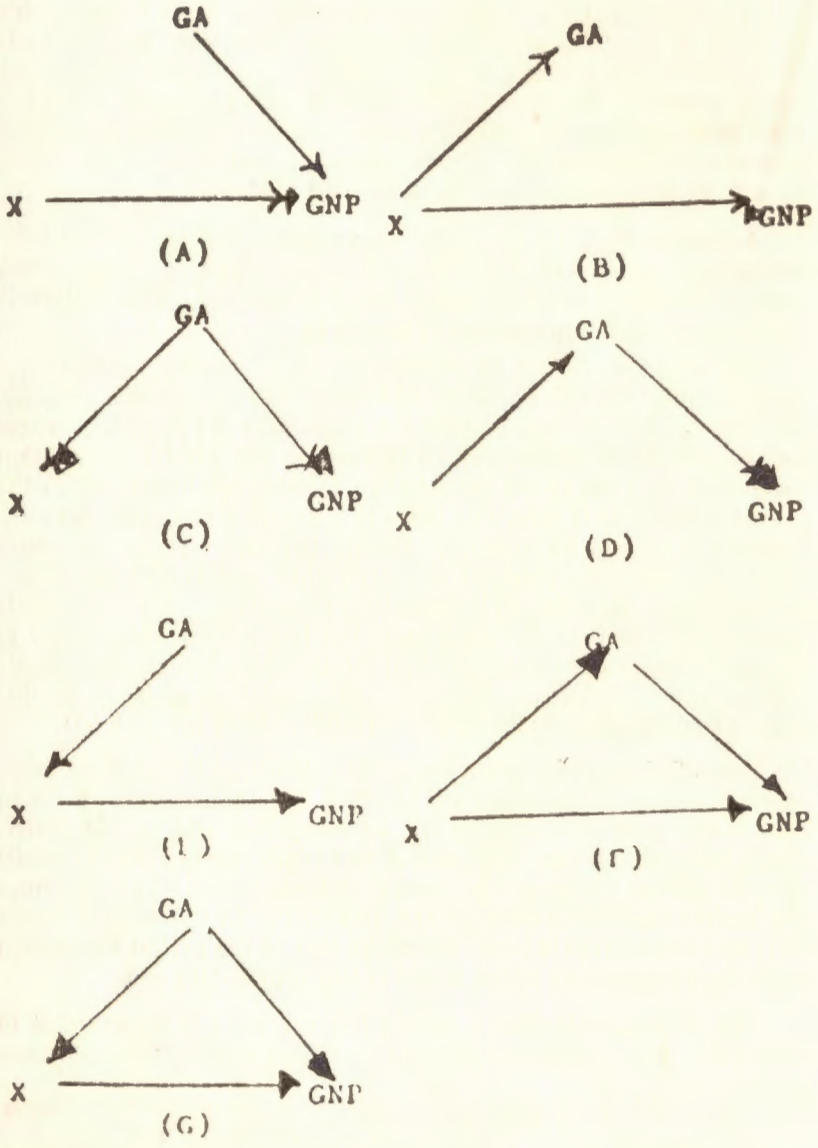
Assuming that the relationships are linear and that the effects of one variable upon another are additive, we can distinguish between models (F) and (G), (Figure II), by comparing the partial coefficients between GA and GNP, and X and GNP. In the case of model (F), the partial coefficient between X and GNP should be larger than the partial coefficient between GA and GNP. In the case of model (G), just the reverse is true. Thus, the size of the partial correlation coefficient determines which model is the appropriate one.

The causal relationships among the variables is summarized in Figure III. The simple and partial correlation coefficients pertaining

(25) This is true because the universe of possible relationships adhering among a set of variables is determined by their exponential relationship — that is, three variables have a universe of possible relationships of 33, whereas a five variable model has a universe of 55. The "universe" takes into account the possibility of no relationship or no correlation, as such.

FIGURE II

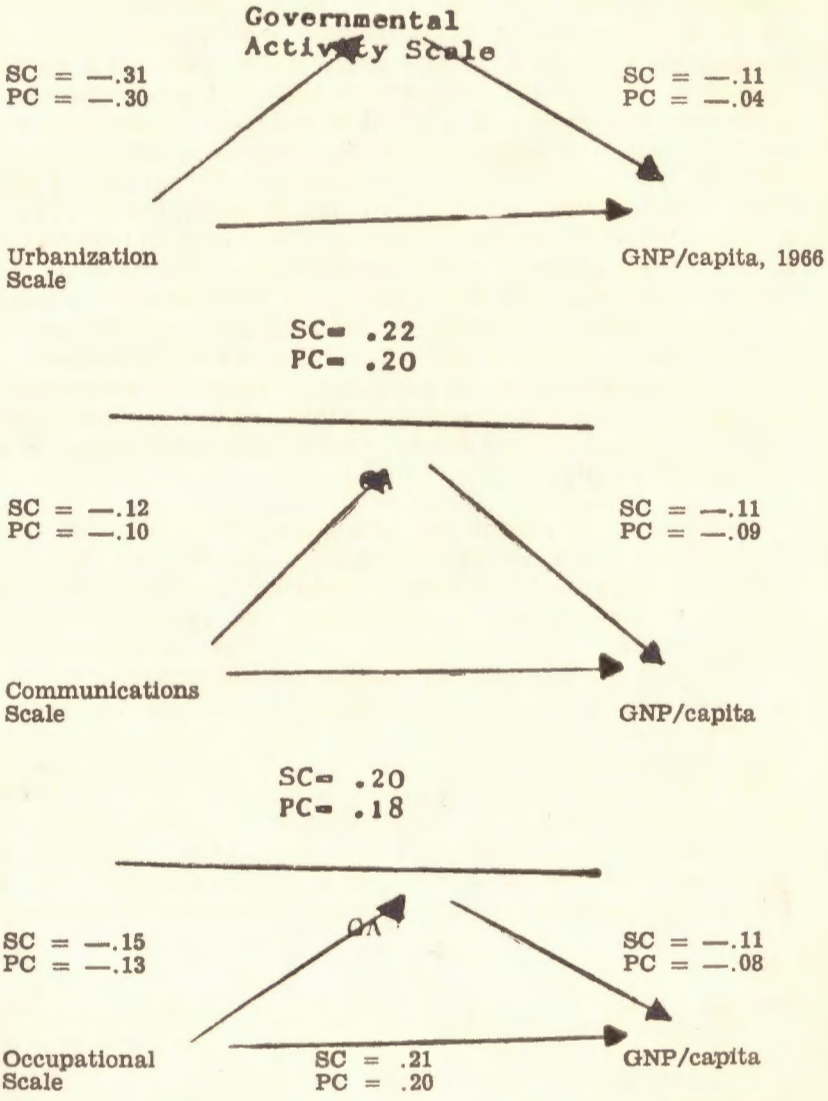
The Universe of Possible Relationships Among Three Variables, Assuming That All Are Intercorrelated



X = Urbanization, Communications, *or* Occupations, in turn.

FIGURE III

Causal Relationships: Correlation Analysis



SC = Simple Correlation Coefficient, PC = Partial Correlation Coefficient

to each pair of variables are located between those variables. And, conforming to our method for differentiating between hybrid models, we see that in every case the partial coefficients between GA and GNP/capita are less than those for the other independent variables. (26)

Perhaps the most surprising finding is that there is a *negative* correlation between governmental activity and gnp/capita. Moreover, we see that there is a *positive* correlation between each of the other independent variables and GNP/capita. Further, there is a *negative* correlation between the urbanization scale and GA, between the communications scale and GA, and between the occupational scale and GA. What this suggests is that the processes connected with urbanization, communications, and occupational changes have a negative relationship with (or, effect on) GA. Similarly, the inference to be drawn from the negative correlation between GA and GNP/capita is that GA has a negative effect on GNP/capita. The crowning inference, of course, is that these findings in their total effect suggest that the processes of urbanization, communications, and occupational change tend to offset the negative effects of GA on GNP/capita. In other words, according to this analysis, the effects of GA on GNP/capita would be even more detrimental if urbanization, communications and occupational changes did not tend to suppress increases in governmental activity.

Needless to say perhaps, but this pattern of cause was not what was expected during the incipient stages of the research. Yet, these findings tend to confirm Zolberg's hypothesis that political scientists may be over emphasizing the importance of the "central institutions" of government in the overall process of economic development. (27) Further, this analysis tends to confirm the importance of the work oh those scholars who focus on individual sociological and psychological processes of change as well as the aggregate manifestations of these changes. In other words, and to use Zolberg's terminology, we ought to "consider politics in the more general context of African societies." (28) And, this is especially true of "politics" relating to government, if we are concerned with the problem of economic development in the African States, and if we are concerned with the role of government in that process. Thus, the theoretical significance

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(26) These findings are also consistent with two other methods of causal analysis — the Simon Blalock Technique of "Path Analysis", and the Cnudde and McCrone technique of using regression coefficients. For an example of both technique see: Cnudde and McCrone op. cit. and Smith, op. cit. For the data on regression coeffcients in this study see Appendix A.

(27) Zolberg, op. cit.

(28) Ibid.

of these findings could be monumental. But that significante is dependent upon *statistical* significance. Let us turn now to those questions.

Questions of Significance of Findings

We have left the question of the statistical significance of these findings until now, because the related issues of a critique of the present research and suggestions for further research were deemed worthy of extensive discussion.

First, the question of statistical significance: None of the correlation coefficients used in the causal analysis were statistically — even at the .10 level, except the negative correlation between the urbanization scale and GA (SC—.31, PC— —.30). With an N of 30, all coefficients must be greather than a plus or minus .26 to be significant at the .10 level. (29) There are several possible reason why the coefficients are so low. First, all of the independent variables used in the causal analysis were constructed from two or three variables derived from the factor analysis of independent variables. It will be recalled that these composite scores were obtained by taking the mean of the two or three (as the case may be) standardized scores for each of the variables included in each of the scales. This has the effect of "leveling out" extreme scores for any one country on any one variable included in the scale. Consequently, this procedure tends to minimize the total variance possible among all of the countries on the composite scale score.

Second, all of the individual variables, except one, considered were "change" variables — that is, the only variance obtained was the variation in the actual change which had taken place in a specified time differential. And, for many of the variables, the time differential was rather short; consequentely, the change was rather slight, and the resulting variation small. Coupled to this is the statistical fact that whatever measurement error exits is always relative or proportional to the amount of *actual* variation in the variable. In other words, the error becomes proportionally greater, the smaller the total amount of variation. And, of course, such error, either due to exogenous influences or to measurement, is reflected in low correlatives. It is worth noting Blalock's comment:

(29) The formula for determining the significance of correlation coefficients is, $= v \frac{n-2}{1-r2}$. The t-score is then evaluated on any standard t table. See: David V. Huntzberger, Elements of Statistical Inference (Boston: Allyn and Bacon, Inc., 1967) pp. 272-273.

> Many types of change studies are especially vulnerable to measurement errors, since for practical reasons it is often difficult to create or find situations in which independent variables change by considerable amounts. This is particularly so where time intervals are purposely kept short in order to minimize distortion from uncontrolled events. Even in decade-by-decade census analysis, real changes may be relatively small as compared with measurement errors. (30)

A third, and almost trite reason for the lack of statistical significance, is that the independent variables used in the analysis are not the most appropriate variables for explaining variance in GNP/capita. It must be kept in mind, of course, that this was not our primary purpose — that being to define the relationships among selected social and political changes, and between those changes and GNP/capita, regardless of whether those variables happened to be the most important variables for explaining variance in the dependent variable. Unfortunately, questions of statistical significance and hence reliability of findings can be answered only by the amount of variance explained and the relative size of the error terms. Thus, our initial research purposes were not wholly consonant with sound statistical procedures for determining the reliability of findings. Yet, the research methods used did allow us to look at a question that may otherwise have been unapproachable, given the data sources at our disposal. Therefore, while the findings in this study must remain tentative, for statistical reasons, they do provide the hypotheses and methodological bases for a more definitive study.

Conclusions

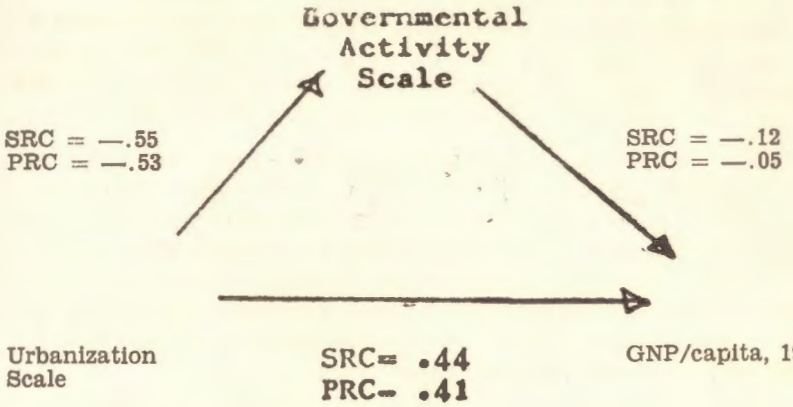
Our analysis leads us to accept several tentative conclusions. First, we are encouraged to accept the Zolberg hypothesis that political scientists might be well advised to evaluate the politics of the developing states in a more general societal content — at least as far as economic development is concerned.

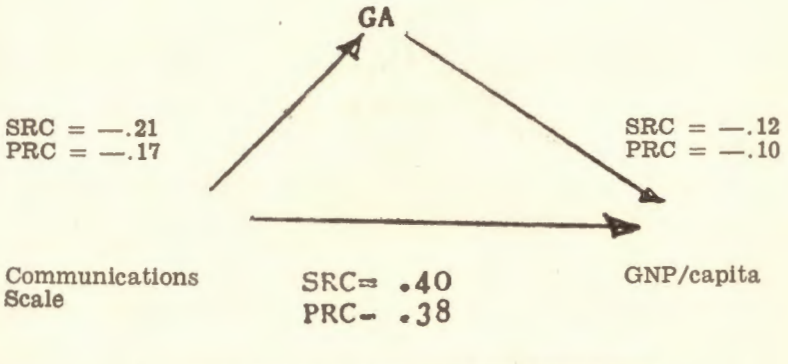
Second, the "hybrid" model seems to be the appropriate one for describing the causal nexus between the three dimensions of social change (urbanization, communications, and occupations) and increased governmental activity, and between each of these and eco-

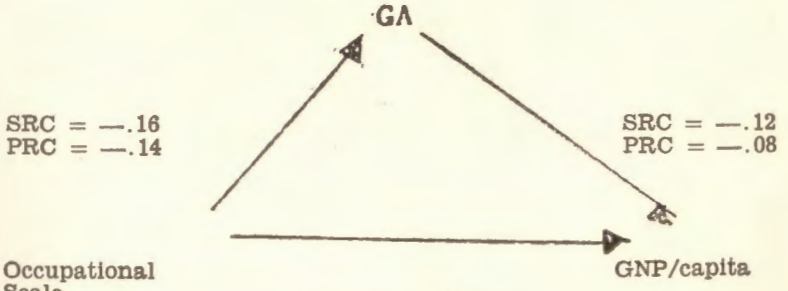
(30) Hubert M. Blalock, Jr. "Theory Building and Causal Inferences", In: Hubert Blalock and Ann Blalock (eds) **Methodology In Social Research** (New York: McGraw-Hill, Inc. 1968) p. 173. The discussion in the previous paragraph was also stimulated by Blalock's issights in the work cited.

APPENDIX A

Causal Relationships: Regression Analysis







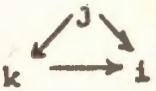
SRC = Simple Regression Coefficient PRC = Partial Regression Coefficient

nomic development. There does not seem to be any reason to accept the alternative developmental model.

Third, and contrary to our initial expectations, there seems to be no basis for accepting the notion that increased governmental activity is related differently to each of the three dimensions of social change. All seem to have a negative effect on governmental activity.

Finally, due to the indeterminate nature of our findings, some research considerations are in order. If we are to examine the impact of various political and social changes on economic development, it may be necessary to place more emphasis on developing variables which more adequately measure those changes. There seems to be ample evidence for the proposition that the variables most commonly used as indicators of statistic social processes are not adequate for measuring social and political change.

Causal inference, using the technique of regression analysis, is based on the fact that bik.j = bik — (bjk) (bij.k) and that bijlk = bij — (bkj) (bik.j) in the following diagram:



For a "proof" oh the validity of this approach, see Cnudde and Mc Crone, op. cit., Appendix, pp. 865-866. The reliability of the findings is based on the *difference in size* between the SRC and the PRC. The difference between the two must *exceed* the lower or upper confidence limit for the SRC. The formula for establishing the confidence limits of the SRC is: $L = b \overset{x}{—} /2, (n-2) \overset{S}{b}$, where = alpha and s= the standard error of the regression coefficient, and L— the upper or lower limit. See: Huntzberger, *op. cit.*, pp. 263-266.

As with the correlation coefficients, the error terms for the regression coefficients $(\overset{S}{b})$ were so large that the findings are statistically inconclusive . For a further explication of the reasons why this is so, see the "Significance" section of this paper.