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PN-ABI-391
72268 HT

November 28, 1964

Memorandum

To: See Distribution List, Below

From: Clarence Gulick, PC/PPD

Attached is "A Quantitative Study of Social and Political Determinants of Intercountry Differences in Per Capita Income" by Irma Adelman and Cynthia Taft Morris. In the basic research for the paper, 74 less-developed non-communist countries were classified with respect to 22 social and political characteristics for the period 1957-1962. These classifications (described in Appendix A of the paper) were analyzed statistically by factor analysis, a method developed by psychologists for the study of interdependent variables. The paper will be presented to the 1964 meetings of the Econometric Society and is designed to stimulate the interest of the academic community in more intensive research into the interaction of economic and noneconomic forces in the development process.

Some of the findings of the paper which may be of particular interest to you are summarized below. Those interested in further details on the results and their significance are referred to pages 15ff of the paper. Details on regional differences in the interrelationships analyzed may be found on pages 27Aff. A brief summary and conclusions begin on p. 36.

(1) About two-thirds of intercountry differences in broad levels of economic development are closely associated with differences in social and political characteristics alone. This is not to say that economic forces are not significant but suggests rather that the development process takes place through a systematic pattern of interaction among mutually interdependent economic, social, and political forces.

(2) Basic social characteristics such as size of traditional subsistence sector and modernization of education and communication are the variables most closely associated with differences in income per head. Among African countries they alone account for over three-quarters of intercountry variations in per capita GNP; this suggests that social institutions may form key barriers to growth in the early stages of industrialization. Even among Latin American countries, however, social characteristics are the key variables associated with per capita income differences.

(3) Differences in political structure are also found to be systematically related to variations in income per person. Broadly speaking, more democratic parliamentary institutions of the Western-type tend to be found in countries having higher income levels. The paper does not interpret this to mean either that economic development determines political change or that political evolution causes economic growth. It suggests rather that more sophisticated parliamentary institutions as well as capacity for sustained economic growth

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require basic social transformations characteristic of the evolution of Western society. The most crucial of these transformations, essential to both effective political modernization and successful entrepreneurial activity, appear to be the spread of individual receptivity to change and the creation of adaptable social institutions.

Your critical comments on the paper would be very welcome, together with any ideas you may have regarding A.I.D. sponsored research on the interrelationship of economic and noneconomic forces in development. I would appreciate having your comments by December 10.

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Quantitiative study of social and political ...

339.3 Adelman, Irma.
A229 Quantitiative study of social and political determinants of intercountry differences in per capita GNP. Irma Adelman and Cynthia Taft Morris. 1964.
39 p. appendices.

1. Gross National Product. 2. Political development. 3. Social conditions. I. [illegible]ris, Cynthia Taft. II. Title. III. Per capita GNP.

A QUANTITATIVE STUDY OF SOCIAL AND POLITICAL DETERMINANTS OF INTERCOUNTRY DIFFERENCES IN PER CAPITA GNP

by Irma Adelman and Cynthia Taft Morris*

I. Introduction

The interdependence of economic growth and socio-political change is generally recognized by social scientists. Development economists in particular, are aware that key economic functions used in analyzing advanced economies may take quite different forms in less-developed countries for reasons which are largely political, social and institutional.** However, efforts to extend growth analyses to include noneconomic factors are hampered by the absence of empirical knowledge about the manner in which they operate.

The best method for studying the interaction of economic and non-economic forces in development would clearly be joint research by inter-disciplinary teams of social scientists. However, few noneconomists have

* The authors are respectively Associate Professor of Political Economy at John Hopkins University and Associate Professor in Research (Department of Economics) at American University. At the time of this study they were both consultants to the Office of Program Coordination of the Agency for International Development. We are grateful to H. B. Chenery for making this study possible. We are indebted to David Cole, Clarence Gulick, Joan Nelson and Alan Strout for helpful comments and suggestions at various stages of this investigation. A large number of regional and country experts at the Agency for International Development and the Department of State were extremely helpful in the classification of individual countries with respect to the various social and political indicators included in the study. Final responsibility for both the country classifications and the results of the study rests of course with the authors.

** See, for example, B. F. Hoselitz, "Noneconomic Factors in Economic Development," American Economic Review, 47 (May 1957), pp. 28-41; and Benjamin Higgins, "An Economist's View," in Social Aspects of Economic Development in Latin America, II (UNESCO, 1963), pp. 141-251, esp. pp. 178-182.

shown interest in comparative empirical investigation of the process of economic growth.*** It may be desirable, therefore, for development economists to take the initiative in pursuing and stimulating empirical research into the complex interrelationships determining the course of development.

The current analysis of socio-political and institutional influences upon development is a modest attempt to gain more precise empirical knowledge about the extent and nature of interdependence of economic and noneconomic aspects of the development process. Such an analysis, undertaken by economists, may serve two purposes. First, it may suggest hypotheses relating noneconomic to economic variables which are both suitable for testing by more intensive analyses and relevant to the central concerns of development economics. Second, it may underscore the need felt by economists for more exact knowledge about the interrelationships of the development process and thus stimulate joint research efforts by economists and members of other disciplines.

More specifically, an attempt is made in this paper to gain some semi-quantitative insights into the interaction of various types of social

*** There are of course, excellent analytical and interpretive studies of development by political scientists and sociologists as well as a few studies by anthropologists. ~~See the bibliography in Appendix C for selected references to these works~~. A Cross-Polity Survey (Cambridge: M.I.T., 1964) by Arthur Banks and Robert Textor classifies a large number of developed and less-developed countries with respect to a wide variety of political and economic "raw characteristics;" this study provides a considerable amount of data suitable for comparative analyses of political structure. The Yale Political Data Program under the direction of Karl Deutsch has also prepared numerous series of social and political data which can be utilized in comparative analyses of socio-political change; see, for instance, Bruce M. Russett et al., Handbook of Basic Political and Social Data for Cross-National Comparisons (Partial Draft, New Haven: Yale University Political Data Program, Sept. 1, 1963.)

and political change with the level of economic development. For this purpose, the techniques of factor analysis are applied to per capita income and to a large number of indices representing the social and political structure of 74 less-developed countries in the period 1957-1962. Purely economic variables have been omitted from the analysis in order to see to what extent the transformation of socio-political institutions and cultural values associated with industrialization and urbanization in themselves contribute to understanding of differences in broad levels of economic development.

The results of the analysis show that a remarkably high percentage of inter-country variations in the levels of economic development (66%) can be "explained" by reference to differences in noneconomic characteristics. Thus it would appear that it is just as reasonable to look at underdevelopment as a social and political phenomenon as it is to analyze it in terms of intercountry differences in economic structure. This is not to say, of course, that economic forces do not play a significant role in accounting for cross-country variations in dynamic economic performance, especially once the take-off stage has been reached.

II. The Technique of Analysis

The technique used in this paper, factor analysis, was developed primarily by psychologists in connection with the determination of mental factors from scores on various psychological tests. The primary purpose of factor analysis is to reduce the original number of explanatory variables into a smaller number of independent factors in terms of which the whole set of variables may be understood. Factor analysis thus provides us with a simpler, more compact, explanation of the regularities apparent in the empirical results.

As in regression analysis, factor analysis decomposes the original variance of a variable into variance components associated with the variation of a set of other quantities. In regression analysis, the variable whose variation is decomposed in this manner is known as the dependent variable and the variables which account for various portions of its variation are the independent variables. In factor analysis, each of the variables included in the study is treated as dependent and as independent in turn. Thus, by contrast with regression analysis, which is a study of dependence, factor analysis is a study of mutual interdependence.*

Another point which distinguishes factor analysis from regression analysis is that in factor analysis the final explanatory variables are not observable magnitudes. They are, rather, groupings of the original variables into a number of clusters, known as "factors." Each cluster consists of a linear combination of the initial variables included in the study. The principles by which each cluster, or "factor", is formed from the observable variables are the following:

(1) Those variables which are most closely intercorrelated are combined within a single factor.

(2) The variables allocated to a given factor are those which are most nearly independent of those allocated to the other factors.

* This point is made by M. G. Kendall, "Factor Analysis as a Statistical Technique", Journal of the Royal Statistical Society (Series B), p. 61.

(3) The factors are derived in a manner which maximizes the percentage of the total variance attributable to each successive factor (given the inclusion of the preceding factors).

(4) The factors are independent (uncorrelated with each other).**

To state the method more specifically, let x_i be the ith variable and x_{ij} be the value assumed by the ith variable on the jth observation. In our study, the variables are the social and political indicators; the observations are the various underdeveloped countries included in our sample. A particular x_{ij} thus represents the score assigned to the jth country on the ith social or political characteristic.

As pointed out above, it is the purpose of factor analysis to represent each variable x_i $(i = 1, \ldots, n)$ as a linear combination of several underlying factors. Two types of factors are distinguished: common factors are those which are required to explain the intercorrelations among the variables; unique factors account for that portion of the variation of a variable which cannot be attributed to the correlation of the variable with other variables in the sets. If we denote the cth common factors by F_c, and the n unique factors by U_i the basic postulate of factor analysis is that

(1) $x_i = a_{i1} F_1 + \ldots + a_{im} F_m + b_i U_i + c_i E_i$ where E_i is a random error term. In other words, it is assumed that each variable x_i can be expressed as a linear composite of the m common factors, a unique factor, and a random error.

** One can also drop this last restriction, but its inclusion is obviously preferable, a priori.

Factor analysis can therefore be interpreted as a regression of the observed x_i on the unobserved common factors F_c and on a specific factor.

A major aim of factor analysis is to determine the coefficients $a_{i1}, \ldots, a_{im}$ of the common factors.* These coefficients, which are referred to as factor loadings, play the same role in factor analysis as do regression coefficients in correlation analysis. Since the squared factor loadings represent the relative contribution of each factor to the total standardized variance of a variable,** the sum for each variable of its squared factor loadings (known as the "communality") indicates the extent to which the common factors account for the total unit variance of the variable. Thus, the role of the communality in factor analysis is analogous to the role of the coefficient of multiple determination, R^2, in regression analysis.

The merit of factor analysis lies in its power to simplify statistical data arising from complex and comparatively unexplored areas of scientific endeavor. In the more advanced fields of scientific inquiry, the task of simplification is carried out in two steps. First, a throretical statistical model which the data may be presumed to obey is formulated. The data are then analyzed in the light of the model and checked against it. However, the theory of the dynamics of social and political development is not sufficiently well specified to permit the formulation of reasonable a priori models against which to test the empirical results Under such circumstances, it becomes desirable to leave the specification very general and to try to use the data as a guide in the formulation of hypotheses concerning the relative importance

*The contribution of the unique factor can be evaluated as a residual.

** See Appendix B.

of different sources of variation. It is this latter approach which underlies the use of factor analysis. As pointed out by Thurstone,*** who pioneered the use of factor analysis in psychology, "Factor analysis has its principal usefulness at the border line of science. It is naturally superseded by rational formulations in terms of the science involved. Factor analysis is useful, especially in those domains where basic and fruitful concepts are essentially lacking and where crucial experiments have been difficult to conceive. The new methods have a humble role. They enable us to make only the rudest first map of a new domain. But if we have scientific intuition and sufficient ingenuity, the rough factorial map of a new domain will enable us to proceed beyond the exploratory factorial stage to the more direct forms of psychological experimentation in the laboratory."

III. Choice of Social and Political Variables

Since factor analysis can use as data inputs a relatively large number of intercorrelated variables, a broad selection of indicators of the social and political structure of 74 less-developed countries during the period 1957-1962 was included in our study of differences in levels of economic development.

*** L.L. Thurstone, Multiple Factor Analysis (University of Chicago Press, 1961) P. 56.

The social characteristics included were selected to depict the social changes associated with urbanization and industrialization. The transformation of social structure was represented by the character of basic social organization, the size of the traditional subsistence sector and the strength of the traditionally-oriented elite. Several characteristics were chosen to describe the modernization of communication, education and outlook: the extent of literacy, the extent of mass communication, the extent of cultural (in particular, linguistic) homogeneity and lastly, the degree of modernization. Other social aspects of industrialization are represented by the strnegth of indigenous middle class, the strength of labor movement, the extent of social mobility and the degree of social tension.

The choice of political indicators for our study was designed to summarize leading aspects of the growth of modern nation states. Those chosen to characterize differences in the nature and stability of political systems were: the strength of democratic institutions, the predominant basis of political parties, the extent of factionalization of political parties, the degree of freedom of political opposition and press, the extent of centralization of political power and the extent of political stability.

The quality and orientation of political administration and leadership are represented by several characteristics: the degree of administrative efficiency, the extent of leadership commitment to economic development, the intensity of nationalism and the extent of government participation in economic activity.

Three characteristics depict the importance of key interest groups within a nation: the strength of the labor movement and the strength of the traditionally-oriented elite already mentioned, and the political strength of the military.

We were obliged at an early stage in classifying countries to reject several indicators which we found could not be formulated with sufficient concreteness to permit unambiguous country classifications. The importance of achievement motivation and social attitudes toward economic activity were indicators which appeared desirable a priori but which we were obliged to reject on this score.

The complete list of the social and political characteristics included in the final version of the factor analysis is as follows:

1. Per Capita GNP
2. Size of Traditional Agricultural Sector
3. Basic Character of Social Organization
4. Extent of Literacy
5. Extent of Mass Communication
6. Degree of Cultural and Ethnic Homogeneity
7. Significance of Indigenous Middle Class
8. Degree of Modernization of Outlook
9. Extent of Social Mobility
10. Effectiveness of Democratic Institutions
11. Degree of Freedom of Political Opposition and Press
12. Degree of Factionalization of Political Parties
13. Basis of Political Party System
14. Strength of Labor Movement
15. Political Strength of the Military
16. Degree of Administrative Efficiency
17. Degree of Centralization of Political Power
18. Strength of Traditional Elite

19. Extent of Nationalism and Sense of National Unity
20. Degree of Commitment of Leadership to Economic Development
21. Extent of Government Participation in Economic Activity
22. Degree of Social Tension
23. Extent of Stability of Political System

IV. Definition of Variables and Method of Classification

A description of the classification scheme for each socio-political indicator incorporated in the study is presented in detail in Appendix A, together with a list of the countries included in the sample. The discussion in this section will be merely illustrative.

The procedures used in defining indicators and in ranking countries differed somewhat for various types of country characteristics. Three different types were distinguished: (1) those for which classification could be based solely on published statistics; (2) those for which it was necessary to combine statistical and qualitative elements; and (3) those which were purely qualitative in nature.

With respect to indicators defined by published statistics classification of countries was relatively simple. Four to six brackets were established into which countries were grouped. Where data permitted, gradations within categories were also differentiated. The classification scheme for the extent of literaty (the details of which are in Appendix A) illustrate the methods used for this type of variable.

Sometimes more than one statistical series was used to describe a characteristic. For example, the variable describing the extent of mass communication is based upon a composite index of newspapers in circulation and radios in use. The principal categories were set in terms of newspapers in circulation and gradations within brackets based on radios in use or licensed.* Where the decile into which a country fell with respect to the newspaper index was 2 or more deciles removed from that in which it fell with respect to the radio index, classification was determined by a rough average of the two. To illustrate, the classification scheme for the B category of the extent of mass communication is as follows:**

Classification	Case Deciles of Newspaper Circulation	Case Deciles of Radios Licensed or in Use
B+	V	III or IV or V
B	V	VI
B-	VI	V or VI or VII
B-	VII	V

The most complex of the characteristics described by composite statistical information is the degree of cultural homogeneity for which the principal categories are defined in terms of linguistic homogeneity and gradations within them determined by degree of racial and religious homogeneity.

A second type of country characteristic is distinguished by a blend of important judgmental elements with statistical elements. The derivation of the variable describing the extent of social mobility illustrates the procedures employed for this type of characteristic. Since social mobility proved too

* These Data are published in Russett et al., Handbook of Basic Political and Social Data.

** See Appendix A for further details.

broad a concept to be described by published statistics alone, two qualitative aspects of mobility, access to leadership elite and extent of ethnic barriers to advancement, were combined in this variable with a statistical measure of educational opportunity.

Four principal categories of social mobility were distinguished in the following manner. The fourth category was defined to include all countries with prohibitive racial or cultural barriers affecting important segments of the population; countries were assigned to this class on the basis of published country studies. Next, the third interval was distinguished on the basis of the extent of educational opportunity; this class comprised all countries not having prohibitive social barriers to mobility in which less than 25% of school-age children (5-19) were in school, since de facto social mobility is of necessity low where very few people have access to education.* Finally, the remaining countries with over 25% of school-age children (5-19) in school were distributed between the first and second categories according to access to membership in leadership elites.**

* We used adjusted data on primary and secondary pupils published in Russett et al., Handbook of Basic Political and Social Data for all countries but a few for which country experts considered that the published data were grossly in error.

** The principal source of judgmental information used for this purpose was Banks and Textor, A Cross-Polity Survey. The Banks and Textor raw characteristic deck became available prior to the publication of A Cross-Polity Survey, when the classification of countries on the basis of published sources was underway. The Survey provided basic information for four characteristics (the extent of cultural homogeneity, the extent of social mobility, the basis of political parties, and the factionalization of political parties) and valuable cross-checks for ten other characteristics (the degree of modernization, the degree of social tension, the degree of leadership commitment to development, the extent of political stability, the degree of centralization, the strength of democratic institutions, the degree of freedom of opposition and press, the strength of traditional elites, and the political strength of the military).

A third and important type of country characteristic included in our study was the purely judgmental one. Even for qualitative indicators, it proved possible to arrive at category descriptions which were sufficiently precise and inclusive to permit unambiguous classification of most countries. Cross-checks to preliminary classifications were obtained by consulting A.I.D. and other country experts and by referring to published country and regional studies.

The classification of countries according to extent of nationalism and sense of national unity illustrates the procedures followed with purely judgmental indicators. Three categories of countries were distinguished: A. Countries characterized by intense nationalism and strong senses of national unity; B. Countries having moderate degrees of nationalism and moderate senses of national unity; and C. Countries in which there was little evidence of nationalism or national unity. A statement of category descriptions together with preliminary country classifications was circulated to some 30 A.I.D. regional experts with a request for corrections and suggestions.* It appeared from their comments that the proposed scheme did not distinguish sufficiently between the intensity of nationalism of the leaders and overall sense of national unity. The final formulation therefore differentiated between two categories of intense nationalism, one for countries with intense nationalism and strong sense of national unity and another for those with intense nationalism and only moderate or limited sense of national unity.**

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* Our use of the suggestions of regional experts may require some comment. Where more than one expert made corrections of an individual country classification which were consistent with respect to direction and degree, these were accepted without further study. Where corrections were consistent with respect to direction but differed somewhat in degree, a rough average of the corrections was made. Where corrections showed marked inconsistency and differences, an attempt was made to reformulate the categories in an effort to obtain more consistent classification of individual countries.

** See Appendix A for detailed descriptions of these categories.

Once the classification of countries according to the various characteristics was complete, each 74 of less-developed countries had been given a letter score, A, A-, B +, B, etc., with respect to 22 social and political indicators.

Since the use of factor analysis requires that the variables be specified numerically, the final task in preparing data inputs was the assignment of scores to the letter classifications. The scale chosen was a simple linear one.* It is obvious, of course, that the choice of numerical scale for qualitative indicators is arbitrary. However, the use of an arbitrary scale does not appear seriously to invalidate the results. For inasmuch as the raw material of factor analysis consists of the correlation matrix

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*The linear scale used ranged from 1 to 100, assigning a score of 90 to the highest letter classification, A, and a score of 10 to the lowest letter classification of each characteristic (C, D, E, or F.) We then scored the intermediate letters at equidistant intervals between 10 and 90. Plus and minus classifications were not scored at equidistant intervals, but were scored in such a manner that the distance between the plus and minus of different adjacent categories was approximately double the difference between any given letter classification and its plus or minus. This procedure may be illustrated by the following scoring scheme for classifications ranging from A to C, and those ranging from A to D:

Letter Classification	Numerical Score	Letter Classification	Numerical Score
A +	100	A +	97
A	90	A	90
A-	80	A-	83
		B +	64
B +	60	B	60
B	50	B-	54
B-	40	C +	45
		C	35
C +	20	C-	20
C	10		
C-	1		

among the various social and political characteristics** and correlation coefficients are unaffected by linear changes in scale, the results are invariant with respect to linear transformations of the scale used.

Several nonlinear changes in scale were also tried (such as a log transformation and the use of reciprocal), but it was found that the results of these transformations either yielded similar results or made less sense and varied more with changes in sample size than the simple linear scale chosen.**

V. The Factor Analysis: Results and Interpretation

The results of the Factor Analysis are summarized in the matrix of common factor coefficients presented in Table I. Each entry a_{ij} of the matrix shows the importance of the influence of factor j upon socio-political indicator i. More specifically, the entries or "factor loadings" indicate the net correlation between each factor and the observed variables.

The interpretation of factor loadings may more easily be made in terms of the squares of the entries in the factor matrix. Each $(a_{ij})^2$ represents the proportion of the total unit variance of variable i which is explained by factor j, after allowing for the contributions of the other factors. If the first row of the table is examined, it can be seen that 41.5% of inter-country variations in per capita GNP are explained by Factor I, an additional 18.5% by Factor II, and another 4.8% by Factor III; the net contribution of Factor IV is only 1.4%.

**See Appendix B.

TABLE 1

Rotated Factor Matrix for Per Capita GNP
Together with 22 Social and Political Variables*
(74 Less-Developed Countries)

Political and Social Indicators	Rotated Factor Loadings				h_i^2
	F_1	F_2	F_3	F_4	(R^2)
1. GNP Per Capita	.64	.43	-.22	.12	.661
2. Size of Traditional Agricultural Sector	-.83	-.32	.21	.03	.832
3. Character of Basic Social Organization	.86	.26	-.05	-.04	.819
4. Extent of Literacy	.83	.37	-.08	.09	.840
5. Extent of Mass Communication	.85	.34	-.08	.04	.843
6. Degree of Cultural and Ethnic Homogeneity	.72	-.30	.07	.17	.646
7. Significance of Indigenous Middle Class	.63	.31	-.40	.05	.658
8. Degree of Modernization of Outlook	.64	.46	-.33	.13	.753
9. Effectiveness of Democratic Institutions	.36	.79	-.17	.19	.815
10. Freedom of Political Opposition and Press	.27	.86	.04	.08	.829
11. Degree of Factionalization of Political Parties	.33	.78	.07	-.30	.810
12. Basis of Political Party System	.42	.68	-.06	-.11	.659
13. Strength of Labor Movement	.29	.71	-.34	.08	.715
14. Political Strength of the Military	.38	-.58	.29	-.36	.690
15. Degree of Administrative Efficiency	.30	.53	-.48	.20	.636
16. Degree of Centralization of Political Power	-.03	-.76	.20	-.07	.617
17. Extent of Social Mobility	.42	.14	-.55	.24	.549
18. Strength of Traditional Elite	.03	-.15	.82	-.04	.700
19. Extent of Nationalism and Sense of National Unity	.61	-.05	-.57**	-.01	.694
20. Extent of Leadership Commitment to Development	.11	.21	-.75	.29	.696
21. Extent of Government Participation in Economic Activity	.27	-.41	-.48	-.41	.638
22. Degree of Social Tension	-.23	.03	.08	-.84	.771
23. Extent of Stability of Political System	.04	.08	-.24	.86	.808

* Boxes indicate the factor to which each variable has been assigned.

** Since the loadings for the indicator of extent of nationalism are not significantly different in Factors I and III, this variable is assigned to that factor to which it is judged to have the closest affinity.

The right hand column of the table gives the sum of the squared factor loadings, or the "communality" of each variable. It will be recalled that the communality indicates the proportion of the total unit variance explained by all the common factors taken together. The communality of per capita GNP, for example, is:

$$(.64)^2 + (.43)^2 + (-.22)^2 + (.12)^2 = .661$$

That is to say, 66% of inter-country variations in per capita GNP are explained by the four common factors which are extracted from the 22 socio-political variables incorporated in our analysis. This is a striking result which might not be expected from an analysis which excludes economic factors from its explanatory variables.

The matrix of factor loadings, in addition to indicating the weight of each factor in explaining the observed variables, provides the basis for grouping the variables into common factors. Each variable may reasonably be assigned to that factor with which it shows the closest linear relationship, i.e., that factor in which it has the highest loading. Where loadings of a variable in two factors are very close, the variable has been assigned to the one with which it is judged to have the closest affinity.* Table I lists first, indicators which have their highest loading in Factor I, then those with highest loadings in Factor II, III and IV successively. Boxes indicate the loading in that Factor to which each indicator is assigned.

*This is accepted procedure for combining variables into common factor groups. See, for example, Robert Ferber and P.J. Verdoorn, Research Methods in Business and Economics (New York, 1962), p. 105. Unfortunately, no tests for the significance of differences in factor loadings exist; however, it is evident that small differences in loadings cannot be considered significant.

Once variables are assigned to common factors, the factors need to be "identified" by giving a reasonable explanation of the underlying forces which they may be interpreted to represent. To quote Thurstone**

> "They derived variables are of scientific interest only insofar as they represent processes and parameters that involve the fundamental concepts of the science involved."

We shall, therefore proceed to identify the factors which are specified in the results of our statistical analysis.

The First Factor

The characteristics having their highest loadings in Factor I are: the size of traditional sector, the character of basic social organization, the extent of literacy, the extent of mass communication, the degree of cultural homogeneity, the significance of indigenous middle class and the degree of modernization. Thus, this factor obviously portrays the social and cultural changes accompanying urbanization and industrialization.

More specifically, Factor I may be interpreted to represent the processes of change in attitudes and instutitions associated with the breakdown of traditional social organization. Social change may be viewed as taking place through the mechanism of differentiation and of integration of social structure.*** Differentiation involves "the establishment of more

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**Multiple Factor Analysis, p. 61.

***See Neil Smelzer, "Mechanisms of Change and Adjustment to Change," in B.F. Hoselitz and W.E. Moore, Eds., Industrialization and Society (UNESCO, 1963), pp.32 ff.

specialized and autonomous social units;"**integration is the process which coordinates and fuses the interactions of specialized social entities.

Three variables with high loadings in this factor depict the process of social differentiation: the basic character of social organization groups countries according to the degree of differentiation of nuclear family (the parent-children unit) from extended kinship, village and tribal complexes; the size of traditional sector measures the extent to which self-sufficient family-community economic units have broken up. The strength of indigenous middle class indicates the importance of a specialized group whose economic activities are removed from traditional socio-economic contexts.

The process of social integration is also portrayed by several variables. Improvements in mass communication media, increases in literacy and the growth of linguistic homogeneity may all be viewed as part of the evolution of modern mechanisms which tend to weld together relatively diversified social units.***

The final variable composing Factor I, the degree of modernization, represents fundamental changes in socio-cultural attitudes which typically accompany urbanization and industrialization. It is an over-all indicator of the extent to which attachments to traditionalism and traditional society have lost their strength. The decline of traditionalism in outlook has often been associated causally with increased receptivity of society to technological

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**Ibid. p. 33.

***Emil Durkheim has pointed out with special emphasis that the increasing division of labor and growing social heterogenoity which accompany industrialization require the creation of new mechanisms for integrating societies. The Division of Labor in Society (Glencoe, Ill., 1949), Ibid., p.41.

change and industrialization.**

The direction of the relation between per capita GNP and the socio-cultural characteristics grouped in Factor I is indicated by the signs of their loadings in this factor. Six of the seven characteristics show positive associations with per capita GNP; only size of traditional agricultural sector is negatively related to per capita GNP. This association of low income per person with large subsistence sectors is what one would expect, since societies characterized by large subsistence sectors tend also to be those in which customary low-productivity methods of production and traditional social values and institutions still prevail.

Similarly, the positive loadings in Factor I of average income and basic social organization indicate that the less specialized kinship forms - the tribe, the clan, and the extended family - tend to be found in countries with low per capita income.

The positive sign of the extent of literacy in Factor I reflects the well-known positive relation between level of education and income per person, while the plus sign for extent of mass communication is consistent with the familiar finding that modern urbanized industrialized nations tend to have both extensive mass communication media and high income per head.

Since the main criterion for scoring countries with respect to their degree of cultural homogeneity was the proportion of population speaking the predominant language, the association of greater cultural homogeneity

**An interesting discussion of the interrelationship of economic development and the decline of traditionalism is by W.E. Moore, "The Social Framework of Economic Development," in Ralph Braibanti and J.J. Spengler, Tradition, Values, and Socio-Economic Development (Durham, N.C., 1961), pp.57-82.

with higher income apparent in Factor I reflects the impact of urbanization and industrialization in improving communication among members of the population.

The strength of the indigenous middle class is another indicator associated with Factor I which varies directly with income per person. This result was to be anticipated, in view of the key role of the middle classes in furthering the processes of industrialization.

It was also to be expected that per capita income would be higher in countries in which modernization - social, economic and political - receives widespread support from both urban and rural groups; this is evident from the similar signs in Factor I of per capita GNP and the degree of modernization.

The finding that levels of economic development are closely associated with the degree of specialization and integration of social structure is a familiar one.* The rationalization and specialization of economic roles reflected in the decline of traditional social organization and the rise of the middle class are essential concomitants to the creation of an institutional framework favorable to economic change. At the same time, improvements in communication and education and modernization of outlook both promote the integration of specialized social units and also contribute to an increase in receptivity to technical and organizational innovations which is essential to successful economic performance. In general, therefore, Factor I expresses the strong interaction between economic development and the degree of rationalization of social behavior, values and institutions.

*See, for example, W.E. Moore, "Industrialization and Social Change," in B.F. Hoselitz and W.E. Moore, Eds., Industrialization and Society (UNESCO, 1963), pp. 299-368.

The Second Factor

The socio-political indicators with their highest loadings in Factor II are the strength of democratic institutions, the freedom of political opposition, the degree of factionalization of political parties, the basis of political party system, the strength of labor movement, the political strength of the military, the degree of administrative efficiency, and the degree of centralization of political power. These are all indicators which describe variations among countries in political systems.

In particular, the pattern of associations incorporated in Factor II is strongly suggestive of broad historical and contemporary differences between the political organization of the countries of Western Europe and the North Atlantic and those of the rest of the world. An increase in this factor may be interpreted to represent a movement along a scale which ranges from centralized authoritarian political forms to Western-type parliamentary systems. Such an interpretation is consistent with the particular juxtaposition of characteristics subsumed in the factor. Thus, a positive change in Factor II is composed of (1) increases in the effectiveness of democratic institutions, the freedom of political opposition, the factionalization of political parties, the strength of labor movements and the efficiency of public administration; (2) a movement from political parties emphasizing considerations of national unity toward those stressing ideological platforms; and (3) decreases in the strength of the military and in the extent of centralization. Historically, it is in Western Europe that a

pattern of change occurred in which effective parliamentary institutions were associated with strong labor movements, weak political strength of the military and decentralization of political power. This factor, therefore, may be interpreted to represent the extent of political westernization.

The coefficients resulting from the factor analysis indicate that a typically western configuration of political traits is generally associated with higher average income. Thus, the variable representing the basis of party system shows that there exists a tendency for high-income nations to have ideologically-based or personalistic multi-party systems rather than mass-directed one-party systems. By the same token, countries with high income also tend to have well established labor movements and politically weak military groups. Finally, higher degrees of administrative efficiency and greater decentralization of political power often accompany higher income per head.

The presence of a systematic association between political systems and income per person is not perhaps surprising. The explanation for this association of political structure with level of economic development appears to be that the processes of differentiation and integration of social structure accompanying the breakdown of ascriptive traditional patterns are not only important concomitants of industrialization and urbanization but are also essential contributors to the evolution of modern political systems. To

quote J.S. Coleman,*

> The most general characteristic of (a modern political system) is the relatively high degree of differentiation, explicitness, and functional distinctiveness of political and governmental structures, each of which tends to perform, for the political system as a whole, a regulatory role for the respective political and authoritative functions.

It thus appears that, to facilitate the evolution of the legal and political forms characteristic of western polities requires a transformation both in political organization and institutions and in the living habits, beliefs and emotions of the individual members of society. It is this transformation of basic attitudes which tends to generate the receptivity to technical change and the approval of enterprise and initiative which are crucial to the creation of capacity for sustained economic growth.

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* J.S. Coleman, "The Political Systems of the Developing Areas," in G.A. Almond and J.S. Coleman, Eds., The Politics of the Developing Areas, (Princeton, 1960), p. 532. The quote continues, "In the political socialization process, the manifest, secondary, system-wide structures serve to create a distinct loyalty to the general political system, not only by their direct impact upon the individual citizen, but also by their penetration and regulation of primary structures. In political recruitment, ascriptive elements are present, but they tend to be contained within or limited by general performance criteria. In the articulation of interests, associational interest groups perform a system-wide regulatory role by processing raw claims and directing them in an orderly way and in aggregable form through the party system, the legislature, and the bureaucracy - thus helping to maintain the boundary between the society and the polity. In the aggregation of interests, a party system - characterized by competing, pragmatic, and bargaining parties - regulates and gives order to the performance of the aggregate function by other structures in the system. Political communication is performed by autonomous and specialized media which tend to penetrate all other structures and to transmit a steady flow of information within the polity. Finally, in the performance of authoritative functions by government structures, boundaries between the latter tend to be more sharply delineated and more effectively maintained; and informal, particularistic structures throughout the system tend to be penetrated and acculturated to the secondary formal structures."

The Third Factor

Factor III (which accounts for 5 per cent of total unit variance) is based upon five socio-political characteristics: strength of traditional elite, extent of nationalism, degree of leadership commitment to development, extent of government participation in economic activity, and extent of social mobility.** The character of leadership and the nature of leadership strategies provide the common bond for these indicators.

At one end of the scale are leaders motivated by strong attachment to the preservation of traditional society. Access to these traditional leadership groups is limited to particular social, cultural or ethnic strata of the population. At the other end of the scale are intensely nationalistic leaderships committed to industrialization and to state direction of economic development. A movement along the scale thus implies a decline in the power of traditional elites and a rise in the strength of nationalistic "industrializing elites".***

The signs of the loadings in Factor III indicate a tendency for countries characterized by nationalistic industrializing leaderships and a weakening of the power of traditional elites to have higher average incomes. This positive association of leadership characteristics and income levels is not unexpected. It is well known, for example, that the break-up of

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**The reason for the high loading of the indicator of extent of social mobility in the factor which groups together leadership characteristics is that an important element in the definition ofthis indicator is the degree of openness of access to membership in the leadership elite.

***The concept of an industrializing elite is discussed in Clark Kerr et al, Industrialism and Industrial Man (New York, 1960), Chap. 2.

control by landed elites over the agricultural surplus is an important precondition for the take-off stage of economic development. The significance for economic growth of the willingness and ability of governments to direct or attract this surplus and other resources into modern sectors is also frequently emphasized.* Finally, nationalist forces may accelerate economic advance by weakening regionally-based pre-modern social structures and by focusing nation-wide effort upon the tasks of economic, social and political modernization.** This tendency for nationalist forces to promote increasingly important central government economic activity has been emphasized by Clark Kerr and his co-authors.***

> While nationalism itself has no social philosophy, and is usually more pragmatic than ideological, it does predispose toward state-directed effort. Nationalism initially is negative - against the old order or the external enemy. This is enough of a platform to gain power but not to rule an economy. There may be no theory in advance as to how to proceed, but there must be a practice, a practice which will almost inevitably involve the state as the only available mechanism for a great national effort. This tends to lead to a planned economy, to state or state-sponsored investment, to state-controlled labor organizations, to workers dependent on the state for economic benefits and political direction, to state guidance of the new industrialists, to state appeals for hard work and saving, and to a call for unity.

The small proportion of intercountry differences in per capita GNP explained by Factor III is surprising. It arises in part because, while per capita GNP is an indicator of broad stage of economic development, the leadership characteristics are defined only with respect to the period 1957-1962, rather than in terms of the country's entire historical experience. The leadership variables used in this study would undoubtedly be of greater relative importance in an explanation of recent short-term economic performance.

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* On these points, see W.W. Rostow, The Stages of Economic Growth (Cambridge, England, 1960), Chap. 3.

** Nationalism may of course hinder economic growth if it seriously hampers the contributions to development of foreign investment and entrepreneurial activity.

*** Clark Kerr et al, Industrialism and Industrial Man, p. 47.

The Fourth Factor

An examination of Factor IV shows a positive relation between per capita GNP and social and political stability. This appears to reflect the fact that the absence of serious social tensions and of grave political instability is a prerequisite for sustained economic growth. This necessity for reasonable stability arises from the well-known interdependence of socio-political environment and incentives to save and to invest: the prevalence of tension and instability greatly increases the desire to hoard; an atmosphere of uncertainty tends to promote investment in real estate and commercial activities showing a quick return rather than in productive capital projects requiring longer periods of gestation; frequent changes in political leadership may have detrimental economic effects upon personal savings decisions and business investment activity; and finally, to attract foreign investment in the expansion of productive capacity requires that foreign entrepreneurs be assured of reasonably stable and secure domestic social and political conditions.

The quantitatively small impact of Factor IV results in part from the different time periods reflected in the indicator of development levels and in the stability variables. While per capita GNP is a rough index of a country's long-run achievement in developing its economy, the degrees of social and political stability, as defined in this study, refer to the recent short-run period, 1957-1962. Another explanation of the weakness of the relationship between this factor and income per head is that two opposing forces are at work relating growth and stability. On the one hand, the breakdown of traditional social and political structures commonly accompanying the industrialization-urbanization process tends frequently

to aggravate internal discontent and tensions, thereby creating a negative association between stability and changes in average income. On the other hand, acute and widespread uncertainty clearly tend to retard economic development, thus producing a long-run tendency for stability and growth to be positively interrelated.

VI. Regional Pattern of the Impact upon Per Capita GNP of Social and Political Influences

One of the tests of the validity of a relationship is the consistency with which it appears in sub-samples of the larger population analyzed. Tables 2, 3 and 4 present the rotated factor matrices for per capita GNP together with series of social and political variables for three regions: Africa (Table 2), the Near East and Far East (Table 3), and Latin America (Table 4).* It may immediately be seen that the over-all communality for per capita GNP in the three sub-samples is even larger than for the full sample, ranging as it does from 71 to 80 percent. To obtain "explanation" of variance in the small samples which is as good or better than that found in the large sample is a rather unusual finding which tends to support the reliability of the full sample results.

In all three regional samples, the grouping of variables into (1) a factor representing the social aspects of industrialization and

* Variables showing little variation within a region (as indicated by regional standard deviation less than 1/3 the regional mean) have been eliminated from the regional sub-sample. The indicator of basic social organization was omitted on this score from the African and Latin American samples. Also omitted from the African sample was the indicator of indigenous middle class. One country, Israel, was dropped from its sub-sample because its per capita GNP represented an extreme value for that sample which could have distorted the results of the analysis.

TABLE 2

Rotated Factor Matrix for Per Capita GNP
Together with 20 Social and Political Variables*
(27 African Countries)

Political and Social Indicators	Rotated Factor Loadings				h_i^2
	F_1	F_2	F_3	F_4	(R^2)
1. Per Capita GNP	-.88	.04	.02	.13	.800
2. Size of Traditional Agricultural Sector	.73	-.20	-.36	-.31	.796
3. Extent of Literacy	-.67	.43	.21	.21	.724
4. Extent of Mass Communication	-.93	.17	.01	-.17	.929
5. Degree of Modernization of Outlook	-.71	.22	.30	.36	.775
6. Effectiveness of Democratic Institutions	-.27	.83	-.14	.02	.776
7. Freedom of Political Opposition and Press	.08	.81	-.26	-.12	.739
8. Degree of Factionalization of Political Parties	-.24	.85	-.04	.33	.888
9. Basis of Political Party System	-.12	.64	-.30	.15	.532
10. Strength of Labor Movement	-.20	.75	.04	.02	.596
11. Degree of Administrative Efficiency	-.31	.56	.40	.18	.598
12. Degree of Centralization of Political Power	-.36	-.66	-.16	.08	.593
13. Strength of Traditional Elite	-.39	-.08	-.75	.15	.745
14. Extent of Social Mobility	.15	.24	.47	-.43	.485
15. Extent of Nationalism and Sense of National Unity	-.22	-.26	.68	-.01	.576
16. Extent of Leadership Commitment to Development	-.22	-.07	.76	-.10	.639
17. Extent of Government Participation in Economic Activity	-.25	-.18	.51	.08	.357
18. Political Strength of the Military	-.43	-.33	-.01	.61	.675
19. Extent of Stability of Political System	.02	-.15	.19	-.83	.743
20. Degree of Social Tension	-.28	.17	-.04	.84	.817
21. Degree of Cultural and Ethnic Homogeneity	-.39	-.16	-.16	-.50	.456

* Boxes indicate the factor to which each variable has been assigned.

TABLE 3

Rotated Factor Matrix for Per Capita GNP
Together with 22 Social and Political Variables*
(25 Near Eastern and Far Eastern Countries)

Political and Social Indicators	Rotated Factor Loadings				h_i^2
	F_1	F_2	F_3	F_4	(R^2)
1. GNP Per Capita	.72	.47	-.14	-.03	.762
2. Size of Traditional Agricultural Sector	-.77	.41	.17	-.29	.881
3. Character of Basic Social Organization	.58 **	.35	.04	.58	.793
4. Extent of Literacy	.64	.38	-.15	.29	.655
5. Extent of Mass Communication	.82	.33	-.03	.25	.850
6. Degree of Cultural and Ethnic Homogeneity	.79	-.43	-.11	-.15	.831
7. Significance of Indigenous Middle Class	.70	.32	-.09	.37	.747
8. Extent of Social Mobility	.77	-.03	-.16	.38	.765
9. Effectiveness of Democratic Institutions	.27	.85	-.26	.25	.926
10. Freedom of Political Opposition and Press	.31	.88	-.02	.25	.935
11. Degree of Factionalization of Political Parties	.28	.58	.32	.54	.800
12. Strength of Labor Movement	.28	.63	-.11	.39	.639
13. Political Strength of the Military	-.04	-.81	.14	-.08	.688
14. Degree of Centralization of Political Power	-.11	-.87	-.07	-.18	.810
15. Extent of Government Participation in Economic Activity	-.00	-.71	.18	.34	.654
16. Degree of Modernization of Outlook	.40	.52	-.52	.43	.882
17. Extent of Leadership Commitment to Development	.08	.09	-.73	.49	.781
18. Degree of Social Tension	-.23	.01	.81	.10	.714
19. Extent of Stability of Political System	-.01	.19	-.92	-.05	.883
20. Degree of Administrative Efficiency	.47	.33	-.50 **	.51	.851
21. Extent of Nationalism and Sense of National Unity	.48	-.19	-.48	.61	.871
22. Strength of Traditional Elite	-.51	-.13	.09	-.60	.650
23. Basis of Political Party System	.18	.52	.00	.60	.658

* Boxes indicate the factor to which each variable has been assigned

** Variables having loadings which are nearly the same in two factors are assigned to that factor to which they are judged to have the closest affinity.

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TABLE 4

Rotated Factor Matrix for PerCapita Income
Together with 21 Social and Political Variables*
(21 Latin American Countries)

Political and Social Indicators	Rotated Factor Loadings				h_i^2 (R^2)
	F1	F2	F3	F4	
1. GNP Per Capita	.62	.46	-.32	-.13	.706
2. Size of Traditional Agricultural Sector	-.81	-.29	.08	.08	.760
3. Extent of Literacy	.87	.24	-.09	.17	.856
4. Extent of Mass Communication	.71	.23	-.41	-.18	.761
5. Degree of Cultural and Ethnic Homogeneity	.80	-.26	.15	-.14	.753
6. Significance of Indigenous Middle Class	.59	.32	-.24	-.26	.581
7. Effectiveness of Democratic Institutions	.52	.68	-.27	-.02	.814
8. Strength of Labor Movement	.23	.79	-.08	-.28	.771
9. Political Strength of the Military	-.17	-.70	.24	.03	.577
10. Degree of Administrative Efficiency	.59	.60	-.38	-.04	.862
11. Degree of Centralization of Power	-.12	-.70	.31	.41	.770
12. Degree of Modernization of Outlook	.55	.70	-.05	-.20	.838
13. Extent of Social Mobility	.35	.74	.36	-.04	.808
14. Strength of Traditional Elite	-.07	-.87	-.22	.17	.841
15. Extent of Leadership Commitment to Development	.05	.83	-.27	-.03	.770
16. Extent of Stability of Political System	.52	.51**	.15	.37	.688
17. Degree of Social Tension	-.37	-.46**	-.26	-.48	.647
18. Freedom of Political Opposition and Press	.45	.27	-.72	.07	.799
19. Degree of Factionalization of Political Parties	.07	-.07	-.82	.05	.677
20. Basis of Political Party System	.00	.41	-.52	-.48	.671
21. Extent of Nationalism and Sense of National Unity	.30	.19	-.06	-.82	.808
22. Extent of Government Participation in Economic Activity	.02	.19	.19	-.78	.681

*Boxes indicate the factor to which each variable has been assigned.
**Variables having loadings which are nearly the same in two factors are assigned to that factor to which they are judged to have the closest affinity.

(2) a factor (or factors) representing the extent of political westernization is broadly similar. The principal differences in the small sample results lie, on the one hand, in variations in the relative weight of political as distinct from the social factors and, on the other hand, in the grouping into factors of the leadership and stability variables. These differences and the reasons for them will be discussed in detail below.

Africa

The results of the factor analysis for Africa are very similar to those for the full sample. The grouping of variables into common factors is the same in all but two instances and the directions of the relationships to per capita income are the same within three of the four factors. The interpretation of the forces which Factors I, II and III represent, which was made in analyzing the full sample, appears to hold without important qualification for this subsample. Only Factor IV (representing the character of social and political stability) shows markedly different characteristics.

A principal distinctive feature of the African results is the very large percent of intercountry variations in levels of development explained by Factor I alone. In this region, intercountry differences in social structure and in degrees of modernization of education, communication and outlook account for more than three-quarters of cross-country variations in per capita GNP.* The explanation for this striking

* As noted above, the indicators of character of basic social organization and of the significance of indigenous middle class, both associated with Factor I in the full sample, were omitted from the African subsample.

weight of social influences lies in the concentration in Africa of countries which are characterized by the predominance of preliterate communities. As emphasized by Rostow, an essential prerequisite for successful economic take-off is a social transformation characterized by the breakdown of traditionalism, the spread of literacy, increased communication and greater receptivity to modern ideas and techniques. The results of the regional analysis underscore the fact that most African nations are still in the pre-take-off stage of development in which traditional social structures create the critical barriers to growth.

The degree of explanation offered by Factors II and III is negligible and that contributed by Factor IV is less than 2 percent. This lack of a significant relationship between the political characteristics summarized in these three factors and per capita income is probably due to the fact that most African countries have not yet experienced the minimal transformations of social institutions required for successful westernization of political forms.

The character of the stability factor (IV) is yet another distinctive feature of the African results. In this factor higher per capita GNP levels are accompanied by more serious social tensions, greater political instability, stronger military influence,* and less cultural homogeneity.** The negative association of short-run social and political

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* The reason for the inclusion in this factor of the political strength of the military is obvious, since increases in political tensions are frequently generated by military coups.

** A test run of the African subsample omitting South Africa indicated that the presence of the indicator of cultural homogeneity in the stability factor results from the fact that South Africa, the African country with the highest average income and highest score with respect to degree of social tension, is also characterized by marked cultural heterogeneity. When South Africa is omitted from the sample, the indicator of cultural homogeneity is grouped in Factor I as in the full sample.

stability and income levels in Africa probably arises in part because of the tensions and unrest created by the early stages of economic change during which traditional social structures and norms are being undermined and transformed..

Near East and Far East

The results of the factor analysis for the Near East and Far East strongly resemble the results for the 74-country sample. As before, Factor I is the most important factor associated with differences in development levels. The grouping in this factor of the extent of social mobility (which did not appear in the overall sample) is a logical one, since Factor I has been interpreted to represent the social and cultural changes accompanying industrialization. As pre-modern social structures are broken down, individual movement between social classes, types of community and occupations becomes freer and facilitates the adaptation of skills to the requirements of economic change.

Factor II with one notable exception* contains the same indicators of character and democracy of party system as in the overall sample. By contrast with the African subsample, this factor accounts for a significant

* The exception is that the indicator of government participation in economic activity is associated with this factor rather than with the leadership factor; also, it is negatively rather than positively related to income levels. The explanation for this pattern of associations appears to lie in the particular composition of this subsample. At one end of the scale in this sample are several countries (among which, Greece, Japan and Lebanon) which have experienced fairly lengthy periods of indigenously directed westernization and modernization (with little if any Western colonial rule); these countries have been able to raise their per capita incomes above the average for their regions with important reliance upon private indigenous activity. At the other end of the scale in the sample are several lower-income countries such as Afghanistan, Iran and Cambodia, in which indigenous non-Western religious beliefs and traditions have historically tended to pervade the entire social, political and economic structure; in these countries governments have tended to hamper severely both indigenous and foreign private enterprise.

percent of unit variance in income levels. This greater importance of forces of political westernization probably occurs because in the Near East and Far East economic growth is less critically hindered by traditional social structures than it is in Africa.

Factor III in this sample groups together the two indicators of social and political stability with three variables characterizing central government administrations. Associated with higher per capita income levels are greater modernization of outlook, more leadership commitment to economic development, better administrative efficiency, less social tension and more stability of political system. This particular pattern of associations is a reasonable one in view of the well-known long-run tendency for greater government efficiency and commitment to economic modernization to promote economic growth. The reason that these relationships between leadership and stability appear only in this sample may be due to the concentration in this subgroup of several higher-income countries in which social and political stability and fairly effective leadership date back a considerable number of years.

In Factor IV, higher per capita GNP is associated with more intense nationalism, weakened power of traditional elites and political party systems based on ideological and personalistic considerations rather than upon regional interests or mass-based appeals. The logic of these relationships is self-evident.* It should be noted, however, that the influence of these variables in explaining per capita income in the Near East and Far East is extremely small, if not negligible.

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* See p. 26 above for the discussion of the full sample.

Latin America

The results of the factor analysis for Latin America display the most typically regional pattern of the three subsamples. While no important differences emerge in the composition and absolute weight of Factor I, the influences of political westernization assume a distinctive regional aspect.

In Latin America, two factors, rather than one, represent the impact of westernization. The first of these includes not only the effectiveness of democratic institutions, strength of labor movement, degree of administrative efficiency and centralization of political power, as in the full sample, but also indicators of leadership characteristics* and of social and political stability. The fusion of these varied elements into a single factor is probably the outcome of the longer historical experience which Latin American countries have had with westernizing influences.

The second of the political westernization factors, which alone explains some 10 percent of the total unit variance of income per head, is composed of three indicators of the degree of articulation of political party systems (the freedom of political opposition and press, the degree of factionalization and the predominant basis of political party systems). The separation of this subset of political variables into a separate factor emphasizes the fact that they represent more sophisticated forms of political articulation than the other political characteristics

* The extent of social mobility and the strength of traditional elite, included in this Factor, are indicators which express degree of access to leadership groups. The degree of modernization of outlook and the extent of leadership commitment to economic development indicate modernization of leadership.

incorporated in Factor II of this subgroup. The significant positive association of GNP levels with this factor undoubtedly results from the close relationship between degree of political articulation and degree of urbanization and industrialization. To quote an expert on Latin American political development,*

> It is typical of Latin America that, with the exception of the landowners and the Church, few interests arising in the rural areas are capable of making themselves heard in national politics. In the cities, however, interest groups form more readily and give voice to the demands of the urbanized sectors of the population. Similarly, new interests find organized expression in consequence of the processes of restratification, secularization, and commercialization.

Factor IV, which contributes insignificantly to the analysis, groups together more intense nationalism with greater government participation in economic activity. This association was also found in the overall sample.**

VII. Summary and Conclusion

In this paper, a systematic relationship was derived between income per head and two aspects of socio-political change: the socio-cultural concomitants of the industrialization-urbanization process (Factor I) and the westernization of political institutions (Factor II).

* G.I. Blanksten, "The Politics of Latin America," in G.A. Almond and J.S. Coleman, Eds., The Politics of the Developing Areas (Princeton, 1960), p.477.

**See page 26 above for a discussion of the rationale of this association.

The relationship expressed in Factor I indicates a strong tendency for levels of economic development to be positively associated with the extent of functional differentiation and integration of diverse social units. A similarly significant positive association is evident in Factor II between income levels and the degree of articulation and westernization of political systems. In contrast, a rather weak relationship appears between broad levels of development and indicators summarizing the character of leadership and the degree of social and political stability in the past decade (Factors III and IV).

The results of the regional studies support the findings of the overall analysis. In addition, they indicate that the role of the social aspects of the industrialization-urbanization process is overwhelmingly important for low income economies in which the absorptive capacity is sharply limited by the inhibiting nature of the social structure. As the barriers to industrialization imposed by the social institutions become weaker, the importance of the forces summarized in Factor I tends to decline. However, even among countries at higher stages of evolution, the social variables remain the most important element in the explanation of intercountry differences in per capita GNP.

Another feature of the regional analyses is the systematic pattern of variation in the significance of the factor representing the forces of political westernization. At the early stages, Factor II is of negligible importance; it assumes increasing relevance as social institutions become more adaptable to the requirements of economic growth. This association between more democratic and better articulated and

integrated political systems, on the one hand, and levels of economic development, on the other, probably arises because the evolution of more sophisticated political institutions requires fundamental changes in mentality characteristic of Western thought patterns. The participant style of life typical of Western culture tends to generate a capacity to adapt existing institutional frameworks to continual economic and social change. This malleability of social structure is essential to industrialization and to successful entrepreneurial activity.

In interpreting the results of this investigation, it is important to bear in mind that the relationships found between levels of economic development and differences in social and political structure are neither caused nor causal. Rather they reflect the interaction of an integrated system of institutional and behavioral change which underlies the process of economic development. As emphasized earlier by one of the authors,*

> The phenomenon of underdevelopment must be understood... in the context of the entire complex of interrelationships that characterize the economic and social life of the community.

The degree of intimate interrelationship found in this analysis between the economic and noneconomic concomitants of a country's historical evolution is rather surprising. It lends support to the views, long held by development economists, that, in the last analysis, the purely economic performance of a community is strongly conditioned by the social and political setting in which economic activity takes place. It would appear that the splitting off of "homo economicus" into a

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* Irma Adelman, Theories of Economic Growth and Development (Stanford, Calif., 1961), P.145.

separate analytic entity, a common procedure since Adam Smith in theorizing about growth in advanced economies, is much less suited to countries which have not yet made the transition to self-sustained economic growth.

APPENDIX A

Definition of Variables and List of Countries

The following table lists the countries included in the sample used in the factor analysis:

Table A-1

List of Countries in Sample

Name of Country		
1. Afghanistan	26. Honduras	51. Paraguay
2. Algeria	27. India	52. Peru
3. Argentina	28. Indonesia	53. Philippines
4. Bolivia	29. Iran	54. No. Rhodesia
5. Brazil	30. Iraq	55. So. Rhodesia
6. Burma	31. Israel	56. Nyasaland
7. Cambodia	32. Ivory Coast	57. Senegal
8. Cameroon	33. Jamaica	58. Sierra Leone
9. Ceylon	34. Japan	59. Somalia
10. Chad	35. Jordan	60. South Africa
11. Chile	36. Kenya	61. Sudan
12. Taiwan	37. South Korea	62. Surinam
13. Colombia	38. Laos	63. Syria
14. Costa Rica	39. Lebanon	64. Tanganyika
15. Cyprus	40. Liberia	65. Thailand
16. Dahomey	41. Libya	66. Trinidad
17. Dominican Republic	42. Malagasy	67. Tunisia
18. Ecuador	43. Mexico	68. Turkey
19. El Salvador	44. Morocco	69. Uganda
20. Ethiopia	45. Nepal	70. Egypt
21. Gabon	46. Nicaragua	71. Uruguay
22. Ghana	47. Niger	72. Venezuela
23. Greece	48. Nigeria	73. South Vietnam
24. Guatemala	49. Pakistan	74. Yemen
25. Guinea	50. Panama	

1. Scoring of Less-Developed Countries with Respect to Per Capita GNP

The score which each country is given with respect to this indicator is the value of its per capita GNP in 1961, as reported in "84 Underdeveloped Countries - Two Thirds World Population Grouped According to Estimated Annual Per Capita Income (U.S. Dollar Equivalents)" issued by the Agency for International Development, Statistics and Reports Division, April 1963.

Adelman/Morris, 5/1/64

2. Classification of Less-Developed Countries by Size of Traditional Agricultural Sector

This classification indicates the proportion of the population of less-developed countries engaged in traditional subsistence agriculture in which production is largely for self-contained indigenous communities and marketing of surpluses of incidental importance. Both modern commercial agriculture and indigenous cash-crop agriculture are excluded.

Four principal categories of less-developed countries are distinguished. Where a country falls within 5 perentage points of a classification limit, an appropriate plus or minus classification has been assigned.

A. Countries having 80% or more of their population in the traditional sector.

B. Countries having from 55 to 79% of their population in the traditional sector.

C. Countries having from 25 to 54% of their population in the traditional sector.

D. Countries having less than 25% of their population in the traditional sector.

Adelman/Morris, 5/1/64

3. Classification of Less-Developed Countries by Character of Basic Social Organization

This classification is based upon the predominant character of a less-developed country's basic social organization.

Three principal categories are distinguished. In category A are countries in which the predominant form of basic social organization is the immediate family group. Countries in this category with population subgroups having extended kinship or tribal systems are classified A-.

In category B are countries in which the predominant form of social organization is the extended family or the clan. Countries in this group having important tribal sectors are classified B-.

In category C are countries in which strong tribal allegiances are widespread. Where these allegiances are very strong throughout the nation, the country is classified C-. However, where important rural as well as urban areas are experiencing marked weakening of tribal ties, the country is classified C+.

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4. Classification of Less-Developed Countries by Extent of Literacy

This classification groups countries by the percentage of population (aged 15 and over) which is literate.

Four principal categories are distinguished: countries in which at least 65 percent of the population are literate are classified A; countries in which at least 35 percent, but under 65 percent, of the population are literate are classified B; countries in which over 15 and under 35 percent of the population are literate are classified C; and countries in which 15 percent or less of the population are literate are classified D.

Gradations within the principal categories are differentiated as indicated below:

Classification	Percentage Literate
A+	over 85
A	75-85
A-	65-74
B+	55-64
B	45-54
B-	35-44
C+	30-34
C	23-29
C-	16-22
D+	11-15
D	6-10
D-	under 6

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5. Classification of Less-Developed Countries According to the Extent of Mass Communication

This classification is designed to indicate the prevalence of mass media of communication in less-developed countries. It is based upon a composite measure of newspaper circulation and of radios in use, in which the former is given the greater weight.

Classification of a country depends upon the deciles within which it falls in the radio and newspaper series when all countries for which data are available are ranked. The following table summarizes the basis for classification:

Classification	Case Deciles of Newspaper Circulation	Case Deciles of Radios Licensed or in Use
A+	II	II or III
A	II	IV
A	III	III or IV
A-	IV	III or IV or V
B+	V	III or IV or V
B	V	VI
B-	VI	V or VI or VII
B-	VII	V
C+	VI	VIII
C+	VII	V or VI or VII
C+	VIII	V
C	VII	VIII
C-	VII	IX
C-	VIII	VII or VIII or IX
C-	IX	VI
C-	X	V
D+	VIII	X
D+	IX	VIII or IX or X
D	IX	X
D-	X	IX or X

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6. Classification of Less-Developed Countries by Degree of Cultural and Ethnic Homogeneity

This classification is based upon a composite measure of linguistic, racial and religious homogeneity in which linguistic homogeneity is the most heavily weighted and religious homogeneity the least heavily weighted.

Four principal categories are distinguished:

A. Countries in which over 85% of the people speak the same language and in which over 70% are of the same race.

B. Countries in which over 70% of the population speak the same language, but in which less than 70% of the population are of the same race.

C. Countries in which 51-70% of the population speak the same language.

D. Countries in which less than 51% of the population speak the same language.

Gradations within Categories A, B, C and D are determined by the extent of racial and religious homogeneity, as is shown below in tabular form.

	Language	Race	Religion
A+	over 85%	over 90%	homogeneous
A	over 85%	over 90%	heterogeneous
A	over 85%	70-90%	homogeneous
B+	over 85%	70-90%	heterogeneous
B+	over 85%	51-70%	homogeneous
B	over 85%	51-70%	heterogeneous
B	over 85%	under 51%	homogeneous or heterogeneous
B	70-85%	over 90%	homogeneous or heterogeneous
B-	70-85%	under 90%	homogeneous or heterogeneous
C+	51-70%	over 90%	homogeneous
C	51-70%	over 90%	heterogeneous
C	51-70%	70-90%	homogeneous or heterogeneous
C-	51-70%	under 70%	homogeneous or heterogeneous
D+	under 51%	over 90%	homogeneous
D	under 51%	over 90%	heterogeneous
D	under 51%	70-90%	homogeneous or heterogeneous
D-	under 51%	under 70%	homogeneous or heterogeneous

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7. Classification of Less-Developed Countries by Significance of Indigenous Middle Class (1957-62)

This classification is based upon the size and importance of the indigenous middle class in less-developed countries. Middle class is interpreted to include entrepreneurs, and managerial, technical, administrative, commercial and banking employees.

Four principal categories of less-developed countries are distinguished:

A. Countries having relatively strong indigenous middle classes of at least moderate political importance. These countries generally have at least 20% of their active male population in commerce, banking, or insurance, or in technical, professional, managerial, administrative or clerical employments. All countries having over 60 percent of their labor force in the nonagricultural sector are included in this category.

B. Countries having small but growing indigenous middle classes. These countries generally have at least 10% of their active male populations in commerce, banking or insurance or in technical, professional, managerial, administrative or clerical employments. Some of them have expatriate commercial and entrepreneurial elements but these elements are less important than the indigenous middle class.

C. Countries in which a non-indigenous entrepreneurial, commercial, and technical class predominates over a very small or negligible indigenous middle class. Countries in this category in which the indigenous middle class is clearly growing rapidly are classified C+.

D. Countries in which the indigenous middle class is very small or negligible, and in which there is not an important non-indigenous entrepreneurial, commercial and technical class. Countries in this category generally have less than 10% of their active male populations in commerce, banking or insurance or in technical, professional, managerial, administrative or clerical employments. All countries having more than 90% of their populations in agriculture are included in this category. Countries in which 5 percent or less of the population are outside agriculture are classified D-.

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8. Classification of Less-Developed Countries by Degree of Modernization (1957-62)

This classification is a composite measure of the degree of modernization of outlook of educated urban groups and of the extent to which programs of political and economic modernization have gained the support of rural and urban population.

Three principal categories of less-developed countries are distinguished:

A. Countries in which the outlook of the urban educated population is significantly modernized and in which political and economic modernization have gained significant support among both the urban and rural populations.

B. Countries in which the outlook of the urban educated population is significantly modernized but in which political and economic modernization have not gained significant support among the rural population.

C. Countries in which the outlook of the educated urban sector may be partially, but is not significantly, modernized and in which modernization programs, if they exist, have gained relatively little support among either the urban or rural populations.

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~~18~~ 9. Classification of Less-Developed Countries by Extent of Social Mobility (1957-62)

This classification is based upon a composite measure of several aspects of social mibility, including the extent of racial or cultural barriers to mobility, the extent of educational opportunity, and access to membership in the leadership elite.

Four principal categoris are distinguished:

Countries in Category A are those in which (1) access to the leadership group is non-elitist (i.e., not limited to a particular social or political group), (2) there are no prohibitive racial or cultural barriers to economic and social advancement affecting important segments of the population, and (3) 25% or more of school-age children (5-19) are in school. Countries in this group are classified A if over 40% of school-age children are in school; they are classified A- if from 25% to 40% are in school.

Countries in Category B are those in which 25% or more of school-age children (5-19) are in school and in which there are no prohibitive racial or cultural barriers to mobility; but in which access to the leadership group is elitist (i.e., confined to a particular racial, social or ideological stratum) or moderately elitist (i.e., largely so confined). B+ countries have over 40% of school-age children in school and moderately elitist leadership; B- countries have from 25 to 40% of school-age children in school and elitist leadership. The remainder of the countries in this group are classified B.

Countries in Category C have no prohibitive racial or cultural barriers to advancement, but they are distinguished from countries in Categories A and B by very limited access to education; less than 25% of school-age children (5-19) are in school. Graduations within Category C are made according to access to membership in the leadership elite: C+ countries have non-elitist leadership groups; C countries have moderately elitist groups, and C- countries have elitist leadership groups.

Countries in Category D are distinguished from those in Categories A, B and C by prohibitive racial or cultural barriers to social and economic advancement affecting important segments of their populations.

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10. Classification of Less-Developed Countries by Effectiveness of Democratic Institutions and Practices During the Period 1957-1962

This classification of less-developed countries is based upon a composite measure of several aspects of the strength of democratic institutions: the existence and effectiveness of political parties and parliamentary forms, the extent of voter participation in elections, and the stability and continuity of democratic institutions.

Four principal categories of less-developed countries are distinguished:

A. Countries characterized by quite well-established democratic institutions: at least two political parties operated effectively; political parties were free to oppose the government; and at least 30% of the voting-age population participated in national elections. Countries in this category having over 70% voter participation are classified A + ; those having 30-40% voter participation are classified A-.

B. Countries in which democratic parliamentary institutions operated fairly effectively but in which their effectiveness was restricted by low voter participation, constraints upon opposition parties, instability of party system or inexperience with democratic forms.

C. Countries in which democratic parliamentary institutions operated over some part of the period 1957-1962, but in which they gave evidence of marked instability or weakness. This category includes countries in which parliamentary forms were only recently established or were suspended at some time during the period 1957-1962. Countries with only a single effective political party, in which opposition was permitted over part of the period, or in which the internal organization of the party was fairly democratic, are classified C -.

D. Countries in which there was little or no effective practice of institutional democracy during the period 1957-1962. Countries in which all political parties were banned or ineffective during most or all of the period 1957-1962 are classified D -.

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11. Classification of Less-Developed Countries by Degree of Freedom of Political Opposition and Press During the Period 1957-1962

This classification is a composite measure of the degree of freedom of political opposition and of the degree of freedom of domestic press, in which the former is given the greater weight.

Three principal categories of less-developed countries are distinguished:

A. Countries in which political parties (other than extremist ones opposing constitutional forms of government) were free to organize, operate and oppose the government throughout all or almost all of the period 1957-1962. Countries in this category in which domestic freedom of the press was somewhat restricted or intermittent are classified A-.

B. Countries in which political parties, while generally free to organize, were limited in their political activities and in their freedom to oppose the government. These restrictions may have operated over only part of the 1957-62 period. Countries in this category in which domestic freedom of the press was restricted or intermittent are classified B-.

C. Countries in which political parties were limited to non-political activities or in which political opposition to the government was banned. Countries in which political opposition was banned and in which domestic freedom of the press was absent are classified C-.

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12. Classification of Less-Developed Countries by Degree of Factionalization of Political Parties

This classification groups countries according to the number of political parties operating in the period 1957-1962. In some countries in which changes in political system occurred during 1957-1962, the classification is based upon a briefer subperiod.

Four principal categories are distinguished:

A. Countries in which there are more than two reasonably effective political parties, between at least two of which rotation or sharing of government control may reasonably be expected.

B. Countries in which there are two reasonably effective political parties. If there is reasonable expectation that control of the government will rotate between the two parties, the country is classified B+. If one of the two parties is unable to win a majority but nevertheless has significant power, the country is classified B. If one of the two parties is ineffective at the national level, but nevertheless retains its identity in elections, the country is classified B-.

C. Countries in which there is only one political party and in which all others are non-existent, banned, or adjuncts to the dominant party.

D. Countries in which there are no political parties or in which all parties are illegal or ineffective.

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13. Classification of Less-Developed Countries by Predominant Basis of Political Party System During the Period 1957-1962

This classification groups less-developed countries by the predominant character of their political party systems during the period 1957-1962. Where political parties operated over only part of the period, classifications are based upon shorter subperiods.

A. Countries having party systems characterized by significant class or ideological orientation, among other things. Countries having a mixture of both important ideological and important personalistic elements are classified A -.

B. Countries in which political parties were highly personalistic rather than doctrinal or nationalistic. Party systems in these countries may have been characterized by extensive political opportunism. Countries in which political parties combined significant personalistic and ethnic or regional elements are classified B -.

C. Countries in which the principal basis of political parties was regional, ethnic or religious groupings of the population.

D. Countries in which the dominant party was a national unity party not having a predominantly class or ideological orientation.

E. Countries in which there were no effective political parties, or in which all political parties were banned, for more than three years of the period 1957-1962.

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14. Classification of Less-Developed Countries by Strength of Labor Movemnet (1957-62)

This classification groups countries according to the strength of their labor movements. Weight is given to several aspects to labor strength, including extent of political power, degree of independence from government restrictions and extent of popular support.

Four principal categories of less-developed countries are distinguished:

A. Countries which have well-established active labor movements having considerable popular support (judged by the standards of less-developed countries), considerable independent political power and significant freedom to oppose the government. The labor movement, through substantially independent, may well be allied with one or more political parties. Countries in this category which have a very small industrial labor force, i.e., 30% or less of their labor force in the non-agricultural sector, are classified A -.

B. Countries which have fairly well-established labor movements with moderate political power which may have restricted freedom to oppose the government. Political parties in these countries may tend to dominate the labor movement; however, countries having only one political party in which the single party dominates the labor movement are excluded from this category. Countries in this category which have a very small industrial labor force are classified B -.

C. Countries in which a fairly well-established labor movement is either government sponsored or seriously restricted in its activities by the government. This category includes countries having only one political party which dominates the labor movement. Countries in this category which have a very small industrial labor force are classified C -.

D. Countries in which labor movements are negligible or, in effect, proscribed. Countries having very small independent labor movements of negligible political influence are classified D+. Countries in which labor organization is banned completely are classified D -.

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15. Classification of Less-Developed Countries by Political Strength of the Military (1957-62)

This classification depends upon the extent to which the military either controls political systems in less-developed countries or is a significant influence in civilian regimes.

Three principal categories are distinguished:

A. Countries in which the military was in direct political control over some of the period 1957-62. If the military was in direct control over the entire period, the country is classified A+. If the military controlled the country for only one or two years of the period, it is classified A -.

B. Countries in which the military was an important political influence but was not in direct political control over most of the period 1957-62. Countries in which the tie between the military and the government in control was very close are classified B+. Those in which military influence was significant over only part of the period 1957-62 are classified B -.

C. Countries in which the military has little or no political role.

16. Classification of Less-Developed Countries by Degree of Administrative Efficiency During the Period 1957-1962

This classification is based upon several aspects of efficiency of administration in less-developed countries: including the degree of permanence and training of administrators, the extent to which corruption interferes with government functioning, the extent to which bureaucratic inefficiency and incompetence hamper government functioning, and the extent to which instability of policy at higher levels of administration promotes inefficiency. When the quality of administrative efficiency changed noticeably over the 1957-62 period, greater weight has been given to more recent years.

Three principal categories of less-developed countries are distinguished:

A. Countries in which public administration was relatively efficient: these countries had relatively trained civil services and did not suffer from instability of policy at higher administrative levels; corruption was not common, and bureaucratic inefficiency was less marked than in most less-developed countries.

B. Countries in which public administration was marked by considerable bureaucratic inefficiency, but in which there was, nevertheless, some kind of a permanent body of administrators. Corruption may have been common, and there may have been moderate instability of policy at higher levels of administration, but these phenomena did not operate to the point where they seriously interfered with government functioning.

C. Countries in which public administration was characterized by extreme bureaucratic inefficiency and/or widespread corruption and/or serious instability of policy at higher administrative levels. Countries in which all three of these phenomena prevailed are classified C -.

17. Classification of Less-Developed Countries by Degree of Centralization of Political Power During the Period 1957-1962

This classification is based upon several related aspects of the centralization of political power: the degree of concentration of power in the hands of central government; the extent of repression used in carrying out central government decisions; the effectiveness of central government control over the country; and the effectiveness of local and regional government institutions.

Four principal categories of degree of centralization are distinguished:

A. Countries having highly centralized authoritarian governments, in which most major decisions were referred to the central executive, central government control was effective throughout most of the country, and regional and local government authorities had little significant political power. Repression of opposition by the central government was common.

B. Countries having highly centralized governments, effective control by central government throughout most of the country, and weakness of local and regional government institutions, but which are distinguished from countries in category A by the absence of marked measures of repression by central governments.

C. Countries characterized by centralization of government authority without marked repression of opposition, in which, however, central governments did not maintain effective administrative control throughout important parts of the country. Local village or tribal authorities continued to be the key administrative units in many areas.

D. Countries characterized by movement toward administrative decentralization of political power. Central governments may have continued strong, but decentralized national, regional or local government authorities had, or were gaining, significant political power.

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~~19~~ 18. Classification of Less-Developed Countries by Strength of Traditional Elites During the Period 1957-1962

This classification groups less-developed countries according to the political strength of traditionally-oriented elites in the period 1957-1962. These elites may have been land-holding, government, religious or military elites who were in favor of preserving existing political, social and economic systems.

Three principal categories of less-developed countries are distinguished:

A. Countries in which the traditional and/or traditionally-oriented elites were politically dominant over the greater part of the period 1957-1962. Countries in which feudal-type landed aristocracies were in complete control are classified A+. Those having no important landed aristocracies, but in which controlling elites exhibited clearly traditional attitudes are classified A-.

B. Countries in which traditionally-oriented national or colonial elites had moderate political influence over an important part of the period 1957-1962; rising commercial and industrial groups, or modernizing military leaders or civil servants had growing political power in these countries. Countries in which these latter groups were or became more influential than the traditional elites during the period are classified B-.

C. Countries in which traditionally-oriented elites had little or no political power over most of the period 1957-1962. This category includes countries in which modernizing colonial regimes were succeeded by modernizing nationalist governments. Countries in which traditional elites were specifically or forceably excluded from political activity over most of the period are classified C-.

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~~20~~ 19. Classification of Less-Developed Countries by Extent of Nationalism and Sense of National Unity During the Period 1957-1962

This classification is a composite measure of the intensity of nationalism and of the extent of the sense of national unity over the period 1957-1962.

Four principal categories are distinguished:

A. Countries which are marked by both a strong sense of national unity and the strong assertion by their leaders of political, economic and spiritual independence.

B. Countries whose leaders assert strong political, economic and spiritual nationalism, but which are characterized by only a moderate or limited sense of national unity; that is, in which important segments of the population do not share the nationalistic sentiments of the ruling group.

C. Countries which are characterized by a moderate or fairly well developed sense of national unity, but whose leaders do not assert extreme nationalistic sentiments.

D. Countries which show little or no overall national unity. Although there may be growing nationalism among members of a significant political, cultural or racial group, the national leadership group does not practice strongly nationalistic policies.

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~~21~~ 20. Classification of Less-Developed Countries by Degree of Commitment of Leadership to Promoting Economic Development During the Period 1957-1962

This classification is based upon the strength and effectiveness of leadership commitment to economic development over the period 1957-1962. Greater weight is given to the strength of leadership commitment than to actual leadership achievement.

Three principal categories of less-developed countries are distinguished:

A. Countries in which governments exhibited strong and effective commitment to economic development. These countries practiced some form of reasonably effective development planning. Countries characterized by strong verbal commitment and considerable planning effort, but in which leadership had only moderate success in gaining support for its prgrams are classified A-.

C. Countries which had a definite commitment to development as evidenced by an official development plan or a government planning group, but in which planning efforts were very recent, unrealistic and/or poorly executed. Countries in which administrative or paper commitments to planning were carried out to only a small degree are classified B-.

C. Countries which had little or no leadership commitment to development. These countries had neither development plans nor government planning groups, although their leaders may have made statements of their intentions to plan.

~~22~~ 21. Classification of Less-Developed Countries by Extent of Government Participation in Economic Activity During the Period 1957-1962

This classification is a composite measure of two aspects of government participation in economic life: the extent of direct economic activity by the government and the extent to which government policy promoted private economic activity.

Four principal categories of less-developed countries are distinguished:

A. Countries in which the sector which was owned or wholly controlled by the government was small compared with the private non-agricultural sector, and in which the policy of the government was not to hinder the growth of private enterprise.

B. Countries in which the sector which was owned or wholly controlled by the government was small compared with the private non-agricultural sector, and in which government policy hampered either the indigenous or foreign private sectors.

C. Countries in which the sector which was owned or wholly controlled by the government was large compared with the private non-agricultural sector, and in which the policy of the government was not to hinder the growth of private enterprise.

D. Countries in which the sector which was owned or wholly controlled by the government was large compared with the private non-agricultural sector, and in which government policy hampered either the indigenous or foreign private sectors.

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~~23.~~ 22 Classification of Less-Developed Countries by Degree of Social Tension During the Period 1957-1962

This classification is based upon the degree of social tension prevailing during 1957-1962 as a result of class, cultural, racial or tribal frictions.

Three principal categories of countries are distinguished:

A. Countries which were suffering marked social tensions accompanied by considerable violence and social instability arising from interracial, intertribal, interreligious or intercultural tension, or from unrest associated with the breakdown of traditional values.

B. Countries characterized by important overt social tensions possibly accompanied by some violence. These tensions may have arisen from any of the sources mentioned in category A. Countries experiencing occasional or even frequent small-scale violence are classified B+.

C. Countries characterized by insignificant or moderate social tensions, in which, however, there were very few or no overt signs of such tensions during the period 1957-1962.

23 ~~24~~. Classification of Less-Developed Countries by Extent of Stability of Political System During the Period 1957-1962

This classification groups countries according to the stability of their political systems over the period 1957-1962. The degree of stability is judged by the frequency of changes in ruling party, the frequency and violence of coups, the extent of political subversion and domestic violence, and the effectiveness of internal security.

Three principal categories are distinguished:

A. Countries characterized by reasonably stable political systems, judged by the standards of less-developed countries, and by reasonably effective internal security. These countries have forms of government which are relatively stable.

B. Countries characterized by moderate instability of their political systems without, however, much domestic violence. They may be subject to frequent non-violent changes in political system, marked internal political antagonisms or significant Communist subversion. The internal security of the country is not, however, seriously threatened. Countries with considerable continuity in form of government combined with sporadic domestic violence which does not however seriously threaten internal security are classified B-.

C. Countries characterized by considerable instability of political system marked by violent coups, violent domestic outbreaks and/or localized insurrections which are not, however, widespread or of long duration. Most of these countries show relatively high rates of deaths from domestic violence. Countries are classified C- if they are characterized by marked, widespread and continuing absence of effective government control over the country.

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APPENDIX B

The Technique of Factor Analysis

A. The Statistical Model

Let x_i be the ith variable and x_{ij} the value assumed by the ith variable on the jth observation. ($i = 1, \ldots, n$ and $j = 1, \ldots N$).

As pointed out above, it is the purpose of factor analysis to represent each variable x_i as a linear combination of several underlying factors. If we denote the m common factors by F_c and the n unique factors by U_i the basic postulate of factor analysis is that

$$(1) \quad x_i = a_{i1}F_1 + a_{i2}F_2 + \ldots + a_{im}F_m + b_iU_i + c_iE_i$$

where E_i is a random error term. Factor analysis can thus be interpreted as a regression of the observed x_i on the unobserved common factors F_c and on a specific factor. A major purpose of factor analysis is to determine the coefficients $a_{i1}, \ldots, a_{im}$ of the common factors.*

It is apparent from equation (1) that the system as it stands is underdetermined, inasmuch as it contains more parameters than observations regardless of the number of observations taken. It is therefore necessary to introduce some additional postulates in order to evaluate the a_{ic}. It is usual to assume in this connection that:

(a) the unique factors are uncorrelated with the common factors and with the error terms;

(b) the common factors are uncorrelated with the errors;

(c) the common factors, the unique factors and the errors are independent among themselves; and that

(d) x_i, F_c, U_i and E_i have unit variances.

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* The contribution of the unique factor can then be evaluated as a residual.

While the raw data of a factor analysis are the values of the statistical variables x_{ij}, it is customary to reduce these data to a set of correlation coefficients among the observed variables before a factor analysis is undertaken. In view of assumptions (a)-(d) above, the correlation between any two variables x_i and x_k $(i,k = 1, 2, \ldots, n)$ can be written as

(2) $r_{ik} = a_{i1} a_{k1} + a_{i2} a_{k2} + \ldots + a_{im} a_{km}$

for $i \neq k$, and as

(3) $r_{ii}^2 = a_{i1}^2 + a_{i2}^2 + \ldots + a_{im}^2 + b_i^2 + c_i^2$

for $i = k$.

In (3) a_{ic}^2 represents the contribution of the factor F_c to the total standardized variance of x_i, b_i^2 indicates the role of the unique factor and c_i^2 the contribution of the error term.

Psychologists refer to

(4) $h_i^2 = a_{i1}^2 + \ldots + \ldots + a_{im}^2$

as the "communality" of the variable x_i. The communality of a variable indicates the extent to which the common factors account for the total unit variance of the variable. The communality in factor analysis is thus analagous to the value of the coefficient of multiple determination, R^2, in regression analysis. $(b_i^2 + c_i^2)$* are called the "uniqueness" of the variable; the uniqueness represents the extent to which common factors fail to account for the variance of x_i.

As pointed out in the introductory discussion, the basic purpose of factor analysis is to derive a simpler representation of the apparent interactions among the original variables in the study. In other words, it is

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* b_i^2 is known as the "specificity" of x_i and c_i^2 as the "unreliability" of x_i.

desired to represent the x_{ij} by a number of common factors m smaller than the number n of original variables x_i. Geometrically, this is equivalent to finding the coordinates of an m-dimensional subspace of the original n-dimensional space in which to express the points representing the N sample countries. The method used in this study to extract factor patterns is based upon taking the principal axes of the n-dimensional ellipsoids which are the loci of the clusters of points of uniform frequency density as reference axes for the new m-dimensional space.

Algebraically, the complexity of the factor pattern (i.e., the number of factors, m, included in the model) is equal to the rank of the matrix of observed values $X = (x_{ij})$ $(i = 1, \ldots, n;\ j = 1, \ldots, N)$. However, since the rank of the matrix of observed values is equal to the rank of the correlation matrix, the factor pattern can also be found from the correlation matrix

$$R = (r_{ik}) \qquad (i, k = 1, \ldots, n)$$

instead. When the correlation matrix contains ones in the diagonal, its rank is usually n and the variables would then be describable in terms of not less than n factors. Since it is desired to express the n variables in terms of less than n common factors, a factor pattern of the requisite form can be obtained by substituting for correlation matrix R a correlation matrix R* with the $r_{ii} = 1$ on the diagonal replaced by the communalities h_i^2. That is,

$$(5) \quad R^* = \begin{bmatrix} h_1^2 & r_{12} & r_{13} & \cdots & r_{1n} \\ r_{21} & h_2^2 & r_{23} & \cdots & r_{2n} \\ r_{31} & r_{32} & h_3^2 & \cdots & r_{3n} \\ \vdots & & & & \\ r_{n1} & \cdots & \cdots & \cdots & h_n^2 \end{bmatrix}$$

The rank of R* is generally less than n.

The factor pattern to be determined may now be represented by:

(6) $X_i^* = a_{i1}F_1 + \ldots + a_{ip}F_p + \ldots + a_{im}F_m + c_iE_i \quad (i = 1, \ldots, n)$

with the unique factor omitted. The asterisk in (6) indicates that the value of the ith variable is that estimated from its factor pattern rather than the actual value. Successive factors are extracted in order of decreasing contribution to the total communality.

B. Estimation of the Factor Pattern*

To select the first factor coefficients a_{i1} we let:

$$X^* = \begin{bmatrix} X_1^* \\ \vdots \\ X_n^* \end{bmatrix} \qquad a_1 = \begin{bmatrix} a_{i1} \\ \vdots \\ a_{n1} \end{bmatrix}$$

The first factor F_1 is defined as the normalized** linear combination of X_i^* which accounts for the maximal variance. Thus, we write

(7) $F_1 = a_1' \cdot X^*$

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* The exposition in this section is adapted from the discussion of principal components given in T.W. Anderson, An Introduction to Multivariate Statistical Analysis (Wiley, 1958) Ch. 11 and T. Klock and R. Bannink, "Principal Component Analysis Applied to Business Test Data" Statistica Neerlandica 16 (1962) pp. 64-65. Several other techniques of factor estimation have been developed. These are discussed in detail in H.H. Harman, Modern Factor Analysis (University of Chicago Press, 1960) Ch. 7 - Ch. 11.

** The weights of the X_i^* have unit sum of squares.

The variance of F_1, $\sigma^2 F_1$, is

(8) $\sigma^2 F_1 = E(F_1 F_1') = E(a_1' \cdot X^*)(a_1' \cdot X^*)' = a_1' E(X^* X^{*\prime}) a_1$

Since it is desirable for the correlations reproduced from the factor equations (6) to represent the observed correlation matrix R^*, we require that

(9) $E(X^* X^{*\prime}) = R^*$.

(Recall that the variable x_i are in standard form.)

The ~~variable~~ of F_1, then becomes

(10) $\sigma^2 F_1 = a_1' R^* a_1$.

This quantity must be maximized subject to the normalization constraint that

(11) $a_1' = a_1 = 1$.

Using the method of Lagrange multipliers, the function to be maximized may be written as

(12) $V = a_1' R^* a_1 - \lambda (a_1' a_1 - 1)$

where λ is the Lagrange multiplier. The vector of partial derivatives of V with respect to the elements of a_1 is

(13) $\frac{\partial V}{\partial a_1} = 2 R^* a_1 - 2 \lambda a_1$.

Setting (13) equal to zero leads to the equations

(14) $R^* a_1 = \lambda a_1$.

~~or~~

(15) $(R^* - \lambda I) a_1 = 0$,

which implies that

(16) $/ R^* - \lambda I / = 0$.

The problem of finding the elements of a, thus reduces to that of determining

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* The weights of the X_i^* have unit sum of squares.

the characteristic roots and associated characteristic vectors of R^*. In view of (11), the substitution of (14) into (10) yields

$$(17) \quad \sigma^2 F_1 = a_1' R^* a_1 = a_1' \lambda a_1 = \lambda .$$

To maximize the variance accounted for by the first factor we must therefore set λ_1, the characteristic root corresponding to the first factor F_1, equal to the maximal characteristic root of R^*. Equations (15), with λ_1 replacing λ, can then be solved for the components of a_1.

To obtain the second factor, F_2, we proceed in a similar manner except that the maximization is now subject to an additional constraint: We require also that the second factor F_2 be uncorrelated with the first. That is,

$$(18) \quad 0 = E(F_2 F_1) = E(a_2' X^*)(a_2' X^*)^1 = E(a_2' X^* X^{*\prime} a_1')$$

$$= a_2' E(X^* X^{*\prime}) a_1 = a_2 R^* a_1 = a_2 \lambda_1 a_1 = \lambda_1 a_2' a_1$$

Since $\lambda \neq 0$ (18) implies that

$$(19) \quad a_2' a_1 = 0.$$

To obtain F_2, we must therefore maximize

$$(20) \quad Q = a_2' R^* a_2 - \lambda (a_2' a_2 - 1) - \mu a_2^1 R^* a_1$$

where λ and μ are Lagrange multipliers. Taking partials as before yields

$$(21) \quad \frac{\partial Q}{\partial a_2} = 2 R^* a_2 - 2 \lambda a_2 - 2 \mu R^* a_1$$

or

$$(22) \quad R^* a_2 - \lambda a_2 - \mu R^* a_1 = 0.$$

If we premultiply (22) by a_1' we get

$$(23) \quad a_1' R^* a_2 - \lambda a_1' a_2 - \mu a_1' R^* a_1 = 0.$$

But the first two terms on the left hand side of (23) are zero by (18) and (19)*. Therefore (23) implies that

(24) $\lambda\, a_1' R^* a_1 = \lambda \lambda_1 = 0.$

Since $\lambda_1 \neq 0$, (24) states that $\lambda = 0$. If we substitute (24) into (22), the conditions to be solved to obtain the components of a_2 become

(25) $(R^* - \lambda I)\, a_2 = 0.$

It is thus apparent that if a_2 is the characteristic vector associated with the second largest characteristic root of R^*, the components of F_2 will satisfy all our constraints.** To find the lth factor, one merely extracts lth largest characteristic root of R^* and finds its associated characteristic vector. The components of this characteristic vector will be the coefficients a_{ci} $(i = 1, \ldots, n)$ or F_c.

One important question which arises in practical applications of factor analysis is that of determining the appropriate number of factors to be extracted. Unfortunately, no multiple decision procedure for which an adequate statistical theory exists, even asymptotically, has been developed for this purpose. At best, a sequence of tests could be applied. Thus one might test

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* From (18) we have $a_2^{\,1} R^* a_1 = 0$. Taking the transpose $a_1' R^{*\,1} a_2 = 0$. Since R^* is symetric $R^{*\,1} = R^*$, and therefore $a_1' R^* a_2 = 0$. Similarly transposing $a_2' a_1 = 0$ yields $a_1' a_2 = 0$.

** This procedure is also equivalent to finding the maximal of first factor residuals, R_1^*. This matrix may be defined as the $R_1^* = R^* - a_1 a_1'$, and consists of the residual correlations with the contribution of the first factor removed. For proof of this statement see H.H. Harman, <u>Modern Factor Analysis</u> (University of Chicago Press, 1960) pp. 158-159.

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the hypothesis that $M = M_0$ against the alternative that $M > M_0$; should this hypothesis be rejected, one would test the hypothesis that $M = M_0 + 1$ against the alternative that $M > M_0 + 1$, etc. Even if the significance level of each of these tests is known separately, the probabilities associated with the entire sequence of tests are not known. In addition, this is a computationally difficult procedure. Ad hoc rules are therefore frequently used in practice to determine M. The rule of thumb used in our computations was that $\lambda_m \geqslant 1$. Since λ_m represents the net contribution of F_m to the total variance of the x_i, this criterion is equivalent to requiring that the explanatory power of the factors included be at least $\frac{1}{n}$. *If n = 25, for example, each of the excluded factors accounts for less than 4% of the overall variance.

Up to now, the discussion has proceeded as if the communalities h_i^2 were known a priori. Since this is not the case in practice, iterative procedures are employed to estimate the h_i^2. Initial values of the communalities are guessed at and the a_{ic} estimated by the technique described above. The values of the communalities derived from the calculated a_{ic} are then compared with the initial guesses. If the agreement is reasonable, the calculated a_{ic} are used as final values. Otherwise, the calculation is repeated, using the communalities derived in the first iteration as new initial estimates. This process is repeated until satisfactory agreement between the calculated communalities and the communalities resulting from the previous iteration is obtained. While no proof of the convergence of this procedure exists, it appears always to converge in practice.

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* It will be recalled that the x_i are standardized so that $\sigma^2 x_i = 1$. Therefore $\sum_i^n \sigma^2 x_i = n$.

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C. Rotation of Factor Matrix

The factor structure which corresponds to any correlation matrix R^* is not unique. For, any linear combination (rotation) of the factor structure also satisfies our condition (9) that $E(X^* X^{*\prime}) = R^*$.

Thus, the derivation of the previous section assumed that

$$(26) \quad X^* = A F + \mu ,$$

where X^*, F and μ have the same meaning as before and A is the (n x m) matrix of factor loadings. Instead of (26), we may however assume that

$$(27) \quad X^* = BF + \mu$$

where, for some non-singular (m x m) matrix T, B = AT and F = Tf. Then (27) becomes

$$(28) \quad X^* = A T T^{-1} F + \mu = A F + \mu . \quad \text{And}$$

$$\begin{aligned}(29) \quad E (X^* X^{*\prime}) &= E (Bf + \mu) (B f + \mu)' \\ &= E (B f f'B') + E \mu \mu' \\ &= E [A T T^{-1} F F'(T-1)' T' A'] + E \mu \mu' \\ &= E (A F F'A') + E \mu \mu' = R^*\end{aligned}$$

We are therefore unable to distinguish from our observations between postulate (26) and postulate (27). That is, any non-singular rotation of our original factor solution is also an admissible factor structure. This indeterminacy may be resolved by requiring that the factorial structure offer as simple a description as possible of the underlying regularities in the data. The criterion of simplicity chosen is, of course, to some extent arbitrary. The method of deriving a simpler factor structure used in our computations, the varimax technique, emphasizes the simplification of the description of the factors in terms of the original variables. It is readily apparent that a factor would be most easily interpretable if the loadings of each of the variables in that factor were either zero or unity. Such a description would

also maximize the variance of the loadings of the variable for each factor. The simplicity of a factor p, S_p, is therefore defined as the normalized variance of its squared loadings. That is,

$$(30) \quad S_p = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{b_{ip}^2}{h_i^2}\right)^2 - \frac{1}{n^2}\left(\sum_{i=1}^{n}\frac{b_{ip}^2}{h_i^2}\right)^2 \qquad p = 1, \ldots, m.$$

In (30) b_{ip} is the factor loading of the ith variable in the pth factor after rotation and h_i^2 is the communality of the ith variable. If the criterion for maximum simplicity of a complete factor matrix is taken to be the sum of the simplicities of the individual factors, the function to be maximized for the varimax rotation becomes

$$(31) \quad V = \frac{1}{n}\sum_{p=1}^{m}\sum_{i=1}^{n}\left(\frac{b_{ip}}{h_i}\right)^4 - \sum_{p=1}^{n}\left(\sum_{i=1}^{n} b_{ip}^2/u_i^2\right)^2 .$$

Factors are rotated two at a time for all possible pairs of factors. For any given rotation, that angle of rotation is chosen which makes the maximal contribution to V.

The normalized rotated loadings for a particular pair of factors p and q and a given angle of rotation ϕ in the plane of the factors p and q are given by:

$$(32) \quad \left(\frac{b_{ip}}{h_i} \quad \frac{b_{iq}}{h_i}\right) = \left(\frac{a_{ip}}{h_i} \quad \frac{a_{iq}}{h_i}\right)\begin{pmatrix}\cos\phi & -\sin\phi \\ \sin\phi & \cos\phi\end{pmatrix}$$

The angle of rotation ϕ is found by substituting (32) into (31) and maximizing (31) with respect to ϕ. This procedure leads to the following conditions upon the angle of rotation:

$$(33) \quad \tan 4\phi = \frac{2\sum_{i=1}^{n} u_i v_i - \frac{2}{n}\sum_{i=1}^{n} u_i \cdot \sum_{i=1}^{n} v_i}{\sum_{i=1}^{n}(u_i^2 - v_i^2) - \frac{1}{n}\left(\sum_{i=1}^{n} u_i\right)^2 \left(\sum_{i=1}^{n} v_i\right)^2}$$