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AN ANALYSIS OF THE DEVELOPMENT PROCESS OF LDC WITH
PARTICULAR REFERENCE TO IRAN

The University of Oklahoma

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AN ANALYSIS OF THE DEVELOPMENT PROCESS OF LDC
WITH PARTICULAR REFERENCE TO IRAN

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TO MY PARENTS

Dr. and Mrs. Javad Shoar-Ghafari

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AN ANALYSIS OF THE DEVELOPMENT PROCESS OF LDC
WITH PARTICULAR REFERENCE TO IRAN

CHAPTER I

INTRODUCTION

Development economists have long been aware of the strong interrelationship between the sociological¹ and political environments on one hand and the economic environment on the other in the development process of the less developed countries (LDCs). The standard neo-classical economic functions which have been defined for the more developed countries (MDCs) either dismiss such interrelationships as insignificant or are based on assumed patterns of associations. These patterns are entirely different than those observed in the LDCs. Based on this fact, the standard neo-classical economic models cannot be used in analyzing the development process of the

¹In order to avoid inconsistency, we have used the term "social" in the broad sense including all the economic, political, institutional, and cultural aspects of the society. The term "sociological" has been used in the strict sense of the word for indicators with purely social nature. In citations, we have adhered to the author's own terminology.

LDCs without some measure of adjustment.² This is implicit in the following criticism of Western economic models applied to the LDCs by Joan Robinson:

Western teaching pretends to be scientific and objective by detaching economic impact of human life from its political and social setting; this distorts the problem that it has to discuss rather than illuminating it.³

In recent years scholars from other branches of the social sciences have also addressed the issue of the inadequacy of the major economic models applied to the developing countries.⁴ The criticisms among sociologists and political scientists "as Meier and Baldwin put it, half humorously"⁵ center on that "economic development is much a serious topic

²See, for example, H. L. Mint, "Economic Theory and the Underdeveloped Countries," Journal of Political Economy 63 (October, 1965), pp. 477-97; B. F. Herelitz, Sociological Aspects of Economic Growth (Glencoe, Ill.: The Free Press of Glencoe, 1960), Chapter II; Irma Adelman and C. T. Morris, Society, Politics, and Economic Development: A Quantitative Approach (Baltimore: The Johns Hopkins Press, 1967), p. 3.; Joan Robinson, Aspects of Development and Underdevelopment (Cambridge: Cambridge University Press, 1979), p. 3.

³Joan Robinson, Aspects of Development and Underdevelopment (Cambridge: Cambridge University Press, 1979), p. 3.

⁴See, for example, Stanley A. Hetzler, Technological Growth and Social Change: Achieving Modernization (New York: Frederick A. Praeger, 1969), pp. 57-62; David C. McClelland, The Achieving Society (New York: Irvington Publishers, Inc. 1961), pp. 11-15; and R. J. Rummel, Dimensions of Nations (Beverly Hills: Sage Publications, 1972), various sections, especially Chapter 9.

⁵David C. McClelland, The Achieving Society (New York: Irvington Publishers, Inc., 1976), pp. 11-12.

to be left to the economists."⁶

It is time for this knowledge about the role of non-economic variables in the growth process of the LDCs to be incorporated into the mathematical models and the statistical analysis of the LDCs. Up until now, even in the modelling efforts specific to the LDCs, the role of non-economic variables in social transformation has been ignored. There exist two categories of models for the analysis of the development process in the LDCs. The first category of models, which dominated the body of thought in the 1950's and the 1960's, stressed the accumulation of capital as the main prerequisite for starting the process of development.⁷ The second category of models has prevailed since the late 1960's and has stressed "education" or "augmentation of human capital" as the main force behind development and growth. Both of these types of models have usually set a target for their critical variables (either capital or education) as both a necessary and a sufficient condition for a country to start a self-sustained development process. The feedback into and from the sociological and political spheres of the society on economic variables have been ignored.

It is time to incorporate the sociological and political

⁶ Ibid., pp. 11-12.

⁷ K. Dopfer, The New Political Economy of Development: Integrated Theory and Asian Experience (New York: St. Martin's Press, 1979), p. 2.

aspects of a society into the models which try to explain its development process. Adelman and Morris [A-M] believe that:

....efforts to extend growth analysis to include non-economic factors are hampered by the absence of empirical knowledge about the manner in which they operate.⁸

This study is aimed at deriving such empirical knowledge about the role of non-economic variables in the development process.

Our research is an interdisciplinary project which deals with sociological, institutional, and political as well as economic aspects of development. As such, we will treat development as "a total social process"⁹ of which economic development is a major part but not the entirety. The need to recognize development as a total process of social transformation or change has been recognized by many social scientists. As stated by Helio Jaguaribe:

The fact is that all social processes are structurally correlated, and if it is true that they proceed on levels vested with relative autonomy -- the economic level, the social level in the strict sense of the word "social" and the cultural and the political levels -- it is no less true that only by abstraction can any of these levels be conceived independently of the overall social process. Thus, whether economic development precedes political development and acts as spur to it, as in eighteenth-century England, or whether, on the contrary, political development precedes and provokes economic development, as in the case of the Soviet Union from the Revolution up to the period of the Five Year Plans, there is always

⁸Irma Adelman and Cynthia Taft Morris, Society, Politics, and Development: A Quantitative Approach (Baltimore: The Johns Hopkins Press, 1967), p.3.

⁹Helio Jaguaribe, Economic and Political Development: A Theoretical Approach and A Brazilian Case Study (Cambridge, Massachusetts: Harvard University Press, 1968), p. 4.

a structural interdependence between the different levels of the historicosocial process.¹⁰

Through this awareness of interrelationships among different spheres of social progress, the definition of underdevelopment has changed.

An underdeveloped society is literally an underdeveloped "society", not merely an underdeveloped "economy." Admittedly, the economic aspect of development is the one most studied and publicized, but there has been recently an increasing concern for its social, political, and psychological components.¹¹

An extensive number of economists, sociologists, political scientists, and psychologists have addressed the problem of developing countries as an interdisciplinary issue. But not much cooperative research incorporating all of these different bodies of knowledge has materialized. One of the major problems seems to be the lack of empirical knowledge and a unique route of research and analysis acceptable to different groups of social scientists.

In this study we hope to gain insight into the role, relationship, and magnitude of the sociological and political variables in the development process. Then the implicit assumptions of the neo-classical economic functions which are based on the specific psychology and institutional attitudes of the Protestant ethic of eighteenth-century Western Europe can be

¹⁰ Ibid., p. 4.

¹¹ Adam Curle, Education Strategy for Developing Societies: A Study of Educational and Social Factors in Relation to Economic Growth (London: Tavistock Publications, 1963), p. ix.

adjusted whenever they differ from that of the country under investigation. In this way, the theory of economic development may be able to derive its own body of theories and models for the countries which we call the LDCs and which are historically and sociologically composed of different norms, values, and propensities than the Western European and United States economies. In this study, we use historical data to investigate the interrelationships between economic and non-economic variables in the development process of one single country. We do not aim to postulate a whole new theory of development. Actually, this study is exploratory in nature. We hope that the empirical knowledge derived about the interrelationship of economic and non-economic variables will shed light on the process and some of the characteristics of economic development.

The pioneering works of Irma Adelman and Cynthia T. Morris in this line of thought have been proven a starting point.¹² They have shown, through the method of factor analysis, that an association among the economic and non-economic variables in the process of development exists and that it has extensive policy implications. Their analysis is based on a set of forty-one different indicators from sociocultural,

¹²Irma Adelman and Cynthia Taft Morris, Society, Politics, and Development: A Quantitative Approach (Baltimore: the Johns Hopkins Press, 1967) and also "A Factor Analysis of the Interrelationship between Social and Political Variables and Per Capita Gross National Product," Quarterly Journal of Economics 79 (November, 1965), pp. 555-78.

political, and economic spheres of seventy-four developing countries. Through the application of factor analysis, they have shown that 70% of inter-country variations in the level of economic development of the seventy-four countries, measured by their GNP, is associated with differences in their non-economic characteristics. The results of [A-M] research are mainly based on cross-sectional data of the seventy-four countries. The countries have been categorized into three different groups of "low," "intermediate," and "high" with respect to their level of economic development at the time of analysis. It has been shown that the association between economic and non-economic variables is greater for the countries in the "low" level of economic development than for the ones in the "high" stages of economic progress. This indicates that the economic and social spheres go through a process of differentiation as a nation advances to higher stages of development. This result is, of course, a generalization because it is based on the cross-sectional data of seventy-four countries at different levels of growth rather than the historical data of one country's progress through the different stages of its own development.

The country chosen for our analysis is Iran, which is one of the seventy-four countries included in the [A-M] analysis. This choice rests on the belief that:

Just as the research agenda for the 1970s was set by Nigeria and Pakistan, that for the 1980s will, I believe,

be set by Iran, South Korea, Chile, and Brazil.¹³

In [A-M] classification, Iran was categorized in the "intermediate" level of development. Factor analysis has been utilized to reduce and analyze the data. Through this analysis, the existence and pattern of interrelationships among economic and non-economic variables in the development process of Iran are tested. A summary of the methodology, the rationale for using the method of factor analysis, and the choice of country attributes included in the study are presented in Chapter II. In our efforts to reveal the association between the economic and non-economic variables in the development process, it will become clear, mostly through our references to the literature, that our methodology has gained some grounds with economists, sociologists, and political scientists in recent years. The use of factor analysis has been extensive in psychology and education. As a widely accepted and utilized tool of empirical analysis, this method promises to be acceptable as a common ground for cooperative research among the social scientists.

In Chapter III, a factor analysis is applied to data for 36 years (1941-76) incorporating 25 different variables from sociological, political, and economic spheres of Iranian economy. This part of the investigation will form our long-run analysis and will reveal the association of the economic

¹³Irma Adelman, "Economic Development and Political Change in Developing Countries," Social Research, Vol. No. 47, Iss. No. 2, (Summer 1980), p. 226.

and non-economic characteristics. According to [A-M] results, the long-run changes or differentiation of economic and non-economic spheres requires a "generation." We have taken this to be 36 years because it seems to be compatible with the [A-M] notion of a "generation" and also because data are simply not available for longer spans of time.

Another factor model will also be presented for our long-run analysis in Chapter III. In this model 12 purely political and sociological variables have been factor analyzed along with real per capita GNP. All other economic variables have been excluded from this factor analysis in order to evaluate the association between sociological and political variables on the one hand and per capita GNP on the other. If we accept real per capita GNP as an indicator of the level of economic development (which economists usually do), then the association and regularities revealed in this factor model are the sociological and political dimensions of economic development. The results of these factor analyses are discussed in the latter part of Chapter III.

In Chapter IV we will concentrate on short-run associations among economic and non-economic variables. The results of the [A-M] research show that though the factor patterns for the short-run are in line with the long-run results, some important deviations are observed. These discrepancies can only be analyzed through theoretical means, especially taking into consideration the level of economic development of the

group of the countries. In our short-run analysis we will run three different factor analyses for 13, 9, and 14 year periods respectively. The breakdown of our historical data follows two criteria. First, [A-M] study conclusion that the short-run differentiation of economic and non-economic spheres of development takes 10 to 15 years.¹⁴ Second, the three main sub-periods are marked by different rates of growth, different economic development planning, and severe political and social tensions towards termination of each sub-period. This historical categorization will become more obvious through our brief historical note on each sub-period.

The results of the factor analysis are expected to show a significant association among the economic and non-economic variables in our long-run analysis. On the other hand, it is expected that the degree of association among economic and non-economic variables will be declining in our three consecutive short-run factor analyses. If the expected results are observed, then the [A-M] conclusions can be generalized to the case of a single country. If, on the other hand, the results of our factor analysis are significantly different than those of [A-M], then it would be suggested that the interrelationships for single-country cases are different than the one for a cross-section of different countries,

¹⁴Irma Adelman and C. T. Morris, Society, Politics and Development: A Quantitative Approach (Baltimore: The Johns Hopkins Press, 1967), p. 172.

and therefore, in-depth knowledge of each single case is needed. One of the main conclusions of the [A-M] analysis is the process of differentiation that each country experiences with respect to its economic and non-economic variables. Accordingly, our three short-run analyses of the Iranian economy, as mentioned above, should reveal a diminishing degree of association between economic and non-economic variables as the country progresses through different stages of growth. But if the process of differentiation is not depicted in our analysis, it does not automatically violate the [A-M] conclusion. In this case, the country may have experienced a period of economic stagnation. The [A-M] results are relevant only for the cases where the country passes through different stages of growth and does not stagnate. We will investigate the compatibility of our results with theirs and explain the causes for any observed deviations.

As in the case of our long-run analysis, in Chapter IV two factor models are prepared for each of our three sub-periods. The first factor model for each sub-period includes real per capita GNP and 12 sociological and political variables. The results of these factor models have been called "the sociopolitical dimension of economic development." These models will give us a broad understanding of strong association of sociological and political variables with level of economic development. In a second model for each sub-period all 25 economic, sociological, and political variables have

been included. The results of these models give us inter-relationships of these three spheres of development, and the underlying regularities have been called the "dimensions of development."

Summary

The most important goal of this analysis as stated above is to estimate and analyze the association among diverse variables from different social spheres of the Iranian economy. The association and relationships will be put in a cultural and historical perspective and their significance for development policies investigated. With the knowledge gained, we should be better equipped to evaluate the development process of the country.

The two hypotheses to be tested in this study are that:

1. There is a strong association among economic and non-economic variables in the development process.
2. As a country advances to higher levels of economic development, the degree of association among non-economic variables on one hand and the economic variables on the other is reduced.

The first hypothesis is tested in Chapter III. The second hypothesis is tested in Chapter IV. Conclusions, and policy implications are discussed in Chapter V. Chapter II presents a summary on the methodology and the data sources.

CHAPTER II

METHODOLOGY

In this chapter we will discuss the methodology used in the analysis of this study, the choice of variables, the variable definitions, and the data sources. As stated previously, the statistical model used in this study is "factor analysis." A summary of this method, its advantages, and its applicability to the question under our investigation will be presented in the next part of this chapter. A short and condensed review of the mathematical basis of factor analysis is given in Appendix A.

The development process is a highly complex phenomenon incorporating transformation of all the social characteristics of the nation involved. This study hypothesizes that variables from diverse spheres of social life (economic, political, and sociological) are interrelated in the development process. As stated in the previous chapter, the goal of this dissertation is to verify the existence of this interrelationship. The second, and related objective is to show that the pattern

of these associations is not static but changes through the development process. As long as the development process is highly complex and embodies the whole domain of social life of a nation, the observance and detection of these patterns and their changes through time are incomprehensible to the human mind through simple observation. This task can only be accomplished through statistical methods which reduce the immense volume of data on a nation's socioeconomic and political variables and extract regularities of their interrelationships. Most commonly, this is done through regression analysis based on a theoretical reasoning that the changes in one aspect of social life (one variable) can be predicted by (is associated with the changes of) a set of other social indicators. Though regression analysis is useful in testing hypotheses or analyzing one specific subdomain of total development process, it is redundant when the complete course of development is under investigation. The complexity of this process and the inadequacy of a priori knowledge about the dependence structure of numerous variables will either cause omission of some of the critical variables or error on their "interdependence" structure.

Accordingly, we have chosen the method of "factor analysis" in our investigation of the interdependence of sociological, political, and economic variables in the process of development. Thurstone, who is one of the pioneers in the field of multiple factor analysis, states the difference

between regression and factor analysis in the following terms:

Whenever the investigator pivots his attention on one of the given variables which is central in importance and which is to be predicted by a set of independent variables, he is not talking about a factor problem. He is then talking about a customary problem, involving a regression equation and multiple correlation. If he looks upon the whole set of variables as representing a domain that is to be explained and if his object is to discover whether there is some underlying order among the variables, then he is talking about a factor problem. Of course it is possible to treat the same set of data successively by the two points of view.¹

The method of factor analysis is best suited to our objective stated in the previous chapter. The advantage of this method over regression analysis is a crucial point in cases of research dealing with underdeveloped economies. We believe that some very crucial sociological, political and even economic variables have historically been ignored in the economic functions applied to LDC. These variables were usually left out because they do not represent major influences in the economies of MDCs. Factor analysis allows us to overcome this problem by including a vast number of variables in the study without imposing a preconceived notion of which variables are "dependent" and which are "independent". Raymond B. Cattell states this advantage of factor analysis over regression as:

By arbitrary choice of variables . . . (in regression analysis), the experimenter selects on the basis of his own hunches the controlled or uncontrolled variables that will best test the hypothesis he has in mind These choices might be wrong, i.e., the variables might

¹L. L. Thurstone, Multiple Factor Analysis (University of Chicago Press, 1947), pp. 59-60.

be quite poor or misleading indicators of the condition, concept, or whole they are supposed to represent. The branch of statistics . . . , namely factor analysis, is a more radical departure from the statistics associated with the experimental tradition, in that it does not accept arbitrary choices as to what are the important variables in any field. Nor is it satisfied, as is analysis of variance, simply to answer yes or no to the question of whether a change in one variable is associated with a change in another. It goes further, both to determine the degree of the association and to pick out the essential wholes among the influences at work.²

In our quantitative analysis we will assume that developmental data do not justify the use of regression analysis to determine direction and amounts of causal influence or functional dependency in the growth process. Development involves many variables that are highly correlated with each other. But as long as the real structure of interdependence is not known, treatment of some of these variables as "dependent" and others as "independent" in statistical analysis is at best dubious.³

We have chosen the method of "factor analysis" as our best alternative in analyzing the development process in the LDCs. In "factor analysis" the association or auto-correlation among the variables is depicted without any notion of "causal effects" or "dependent-independent" variables being brought into the picture. This is done through a data reduction method where the variance of each variable is broken

² Raymond B. Cattell, Factor Analysis: An Introduction and Manual for the Psychologist and Social Scientists (Harper and Brothers, 1952), pp. 9-11.

³ Several studies, such as R. J. Rummel, The Dimensions of Nation and Irma Adelman and C. T. Morris, Society, Politics, and Economic Development: A Quantitative Approach, have referred to this point quite extensively.

down into variance components associated with the variation of a set of other quantities.

In regression analysis, the variable whose variations are decomposed in this manner is known as the dependent variable, and the variables that account for different portions of variations are the independent variables. In factor analysis, all variables are dependent and independent in turn.⁴

So, as regression analysis depicts patterns of dependence, factor analysis reveals patterns of interdependence.

In factor analysis we start with a set of indicators from the domain under our investigation. Each indicator is a specific social variable or a composite index of many social variables. The criteria for choosing these indicators will be discussed in the next section. In Chapters III and IV these indicators are analyzed to determine whether their variations can be adequately represented by a smaller number of clusters (factors) of the original set.⁵ Through this, the domain under investigation can be better comprehended and studied. The results of the factor analysis can neither be used as a "cause and effect" analysis nor a predictive model of the development process. The indicators clustered closely in one group to form a "factor" are closely associated in the development process.

⁴Irma Adelman and C. T. Morris, Society, Politics, and Economic Development: A Quantitative Approach (Baltimore: Johns Hopkins Press, 1967), p. 131.

⁵This part is adapted from Introduction to Factor Analysis by Benjamin Fruchter (New York: D. Van Nostrand Co., Inc., 1954), different sections.

There are basically two major categories of factor analysis: common factor analysis and component factor analysis.⁶ In common factor analysis the major concern is to define the pattern of common variations between a set of variables. The variations unique to one specific variable are ignored. In component factor analysis, on the other hand, both common variations of the variables and the unique variations of each variable are taken into consideration. This study follows the component factor analysis. It is usually asserted that for most practical uses both models should render similar results.

In component factor analysis, it is assumed that the observed variables are linear combinations of some underlying factors. As stated above, some of these factors are assumed to be common to two or more variables and some are assumed to be unique to each variable. In the model,⁷ let X_i stand for the i th variable and X_{ij} denotes the value assumed by the i th variable for the j th observation. In our model, the variables are the sociological, political and economic indicators and the observations are the years of the analysis. So X_{ij} represents the value of the i th indicator for the j th

⁶This discussion is based on Applied Factor Analysis by R. J. Rummel (Evanston, Illinois: Northwestern University Press, 1969).

⁷For a more detailed discussion on Factor Analysis see H. H. Harman, Modern Factor Analysis (Chicago: University of Chicago Press, 1960), Chapter VII; and Stanley A. Mulaik, The Foundations of Factor Analysis (New York: McGraw-Hill Book Co., 1972), Chapter V.

year. Each variable can be represented as a linear combination of several common factors (explaining the underlying association among the variables), a unique factor (explaining the portion of variance not explained by other variables), and an error term. So our basic model is:

$$X_i = a_{i1}F + \dots + a_{im}F_m + b_iU_i + C_iE_i ; i = 1, n$$

where:

F_m = mth common factor

U_i = ith unique factor

E_i = random error

So the model assumes that each variable is a linear combination of m common factors ($m < n$; where n = number of variables in the model), a unique factor, and an error term. Each common factor is actually a cluster of the original variables.

The major purpose of factor analysis is to find the coefficients a_{ij} , . . . , a_{im} of the common factors. In this way, factor analysis is just like a regression of the observed X_i on the unobserved common factors, F_m , and finding the regression coefficients. These regression coefficients are called "factor loading." The higher the factor loading of one variable, X_i , on a common factor, F_m , the higher the percentage of total unit variance of that variable is explained by that common factor.

There are few different factoring methods. In this study we have chosen the method of alpha factoring. The major difference of this factoring method with the others is

in its assumption. In alpha factoring the assumption is that the variables included in the model are a representative sample of the universe of relevant indicators rather than the universe itself.⁸ This assumption is realistic when analyzing the development process. The development process includes all the social attributes of our universe (namely Iran). But only a limited number of these attributes are included in our factor analysis as a representative sample. The method of alpha factoring, based on its assumption, delineates factors that are most generalizable to a substantive domain.⁹ The factors with eigenvalues greater than one were retained and the rest were rejected. This is an accepted method of choice regarding the number of factors to be extracted.¹⁰ For a more detailed mathematical treatment of common factor analysis and alpha factoring refer to Appendix A.

Variables

Variables included in the analysis are of sociological, political, and economic nature. The list of variables and their classification is presented in Table II-1. One of the advantages of factor analysis is its capacity to analyze a vast number of variables from different domains of social

⁸See Stanley A. Mulaik, Foundations of Factor Analysis (New York: McGraw-Hill Book Co., 1972), pp. 207-214.

⁹R. J. Rummel, The Dimensions of Nations (Beverly Hills: Sage Publications, 1972), p. 34.

¹⁰*Ibid.*, p. 80.

development. But this same advantage poses judgmental difficulties at the actual time of choosing the variables. There are numerous variables which conceptually can enter the development process. The problem is to select a sample which will adequately "encompass as many attributes or behavior as possible without including too many variables related to a particular substantive domain."¹¹ Thus, one of the criteria in choice of variables is "catholicity." Sawyer claims that selection of the variables in his "Dimension of Nations: Size, Wealth, and Politics" are based on "conceptual relevance," "prior use," "representativeness," "availability," and "objectivity."¹² In the present study, we have chosen our variables on the basis of "parsimony," and "inclusiveness," "conceptual relevance" and "availability." It should be noted that the "availability" criteria has played a significant role in the choice of our variables. There are not simply many time series data available for a thirty-six year period for a developing country such as Iran. As a result, many of the variables primarily chosen as viable were dropped later because of lack of consistent data. Almost all of the variables included in the analysis have previously been used in related research areas.

¹¹Adelman and Morris in Society, Politics, and Economic Development: A Quantitative Approach calls this criteria "inclusiveness" and "parsimony," p. 15.

¹²Jack Sawyer, "Dimensions of Nations: Size, Wealth and Politics," American Journal of Sociology, 1967-68, Vol. 73: pp. 145-172.

TABLE II-1

ECONOMIC, SOCIOLOGICAL, AND POLITICAL VARIABLES

VARIABLE	LABEL
<u>I. ECONOMIC VARIABLES</u>	
1. Real per capita GNP	GNP
2. Gross domestic capital formation	GDC
3. Money supply	MSI
4. Wholesale price index of domestic goods	DWP
5. Wholesale price index of exported goods	EAP
6. Wholesale price index of imported goods	IMP
7. Wholesale price index of food products	FDP
8. Extent of government participation in economic activity	GOV
9. Non-oil exports	EAP
10. Imports	IMP
11. Oil revenue	OIL
12. Fiscal policy indicator	FPI
13. Agricultural production per capita index	AGR
<u>II. SOCIOLOGICAL VARIABLES</u>	
14. Education indicator	EDU
15. Health indicator	HLT
16. Tax structure modernization index	TAX
17. Social adaptation of technology index	SOC
18. Total population index	TPI
19. Urbanization index	URI
20. Domestic consumption of petroleum products	PET
<u>III. POLITICAL VARIABLES</u>	
21. Extent of leadership commitment to development planning	LED
22. Freedom of political expression	FRP
23. Extent of leadership commitment to military strength	DFS
24. Administration instability index	ADM
25. Political instability index	POL

Variable Definitions

1. Real Per Capita GNP: This variable represents the gross domestic product of Iran at factor cost in real 1959 prices. The total GNP figures have been divided by the population series to arrive at our real per capita GNP.

2. Gross Domestic Fixed Capital Formation: This series is representative of gross annual investment at constant 1965 prices.

3. Money Supply: This series is compiled as money supply equal to cash in circulation, demand deposits, and international reserves.

4 to 7. Wholesale Price Indices: Four different wholesale price indices for exports, imports, domestic goods (produced and consumed domestically) and food items have been reported from the United Nation Statistical Yearbook. All series have been converted to the common base year 1953 = 100.¹³

8. Extent of Government Participation in Economic Activity: During the period under our analysis, Iranian government grew in size and also diversified its functions as one of the major producers and distributors of goods and services. In order to analyze the impact of this growth we have included the annual government expenditure per capita.

¹³The method of transformation of price indices to the common base has been adapted from: C. William Morrill and A. Karl Fox, Introduction to Economic Statistics (New York: John Wiley and Sons, Inc., 1970).

9. Non-oil Exports: The value of total non-oil exports at market prices.

10. Imports: The value of total imports at market prices.

11. Oil Revenue: Iranian Government oil revenue from export of oil.

12. Fiscal Policy Indicator: Stated as government budget deficit or surplus in millions of current Rials. In evaluating this indicator in the next two chapters, positive changes in this variable would indicate either a decrease in deficit or an increase in surplus, and vice versa.

13. Agricultural Production Per Capita: We chose the production level of wheat, rice, and barley as representative of the total agricultural product of the country. These three crops are considered the major crops for Iran. We added the production of these three crops (in 1000 metric tons) together and then divided each year's production level by that year's population to get the indicator of agricultural production per capita.

14. Education Indicator: The annual budget per capita for education is used for this indicator. As long as the elementary and secondary education in Iran was public during the analysis, the per capita budget is a good proxy for this variable.

15. Health Indicator: Government budget allocated to improve medical facilities and personnel is used for this variable. The annual budget, however, is divided by population

series to give us health budget appropriation per capita.

16. Tax Structure Modernization Index: To compile this indicator we first compiled the series on total tax revenue of the Iranian Government and the total income tax. Then for each year, we calculated the percentage of total taxes which was in the form of income tax. It is broadly believed that in less developed countries, income taxes compose a lower percentage of total tax bill than in advanced countries. As a result any increase in this indicator signals advances in tax structure of the country. This variable can also be used as a good representative of the monetization of the market system.

17. Social Adaptation of Technology Index: The number of passenger cars in Iran is used as a proxy for this variable. This proxy measures the technical sophistication of consumers and their capability in maintenance and operation of products from Western Cultures newly introduced into the Iranian life-style.

18. Total Population: Total mid-year population reported for Iran.

19. Urbanization Index: We calculated the annual percentage increase in total population (above). Then we compiled the series for urban population (total population living in cities with 20,000 or more inhabitants). We calculated the annual percentage increase increase in urban population. Then:

$$\text{Urbanization index} = \text{percentage increase in urban population} - \text{percentage increase in total population}$$

20. Domestic Consumption of Petroleum Products: This

variable has been used as an indicator representing the spill-over effect of the modern sector (petroleum) on other less developed sectors of the society. This indicator is in itself a measure of dualism among the "center" and "periphery". Positive changes in this variable reveal diminishing dualism and negative changes signify increasing dualism in Iranian economy

21. Extent of Leadership Commitment to Military Strength: Annual defense budget appropriation has been used for this variable.

22. Freedom of Political Expression: For this variable we have added the average number of daily newspapers in Tehran and the number of open political parties (as opposed to underground) together for each year. It should be noted that traditionally in Iran, first signs of political repression appear with closing down of opposition newspapers and banning their political parties.

23. Extent of Leadership Commitment to Economic Development Planning: The total development budget appropriation for each year has been used as a representative of leadership commitment to development planning.

24. Administration Instability Index: For this index, we have used the number of cabinet members or changes in administration reported in both the London Times and the New York Times. The rationale behind the use of these newspapers was to reflect changes in administration (prime minister and his cabinet) that are politically motivated rather than personal retirements, sickness, and natural death. Almost all

of the changes in cabinet level reported in these two newspapers have political flavor and have been analyzed by foreign news correspondents. We have chosen a scale assigning different points to changes in cabinet members, the premier, and/or the whole cabinet. The following scale has been used.

<u>Change in Administration</u>	<u>Points</u>
1. Change of one cabinet member	5
2. Change of more than one cabinet member	10
3. Change of prime minister	20
4. Prime minister resigns but is reappointed	15

For each year a total administration instability index was obtained by adding the points of the changes recorded in the two above-mentioned newspapers.

25. Political Instability Index:¹⁴ This index was compiled by assigning appropriate points to all political incidents, instability, and political changes reported in the New York Times and the London Times. The following scale was utilized to assign weights to different political incidents.

<u>Political Incident</u>	<u>Points</u>
1. Attempted assassination of Shah	50
2. Assassination of government, army, or foreign nationals	35
3. Assassination attempt on government, army,	

¹⁴ Similar approaches have been used in political science to compile political and administration instability indices for different countries. For example, R. J. Rummel in Dimensions of Nations uses the New York Times index for several of his political indicators.

foreign, or royal family members	20
4. Arrest of political dissidents	15
5. Banned political party	15
6. Banned political newspaper or local elections	10
7. Censure (mentioned in any context)	10
8. Curfew, martial law	20
9. Curfew, martial law extended	15
10. Coup attempt	45
11. Dismissal of army, navy, or major government employees	5
12. Demonstrations, rebels, street gun-fights, strikes	20
13. Closing of universities or schools	10
14. Execution of political dissidents	30
15. Land confiscation	15
16. Political kidnapping	20
17. Rejection of major army or government post	15
18. Special session of Majlis (Parliament)	10
19. Political situation discussed	10
20. (Minor) political incident	5
21. Vote of confidence to administration denied	10
22. Foreign nationals evacuation	10
23. Dissolution of Majlis	20
24. Referendum or vote on dissolution of Majlis	10
25. Death or life sentence for political dissidents	20

26. Torture	10
27. Political prisoners -- human rights issues	15
28. Occupation of Iranian Embassies in other countries by dissident Iranians	20
29. Iranian student demonstrations outside Iran	5

For each year, a sum total of all the points for various re-reported incidents was calculated as the political instability index.

CHAPTER III

THE LONG-RUN DIMENSIONS OF DEVELOPMENT

Introduction

In this chapter we are concerned with a long-run analysis of the interrelationships between sociological, political , and economic variables for Iran. Two different factor analytic models are introduced in this chapter. Both of these factor models cover the total period under our investigation, namely, the thirty-six year period from 1941 to 1976. In the first part of this chapter, the results of a specific factor analysis incorporating only sociological and political variables with real per capita GNP are analyzed. Through this analysis we hope to gain some insight into the interrelationship between sociological and political variables and the level of economic development. We call these relationships the socio-political dimensions of development.

In the second part of this chapter, we will present the results of an alternative factor model including all the

economic, sociological, and political variables of our study. The results of this factor analysis should help us to evaluate various dimensions of the complete social transformation of the Iranian economy through its economic development path. We will call the extracted factors the dimensions of long-run economic development in Iran.

Long-Run Socio-Political Dimensions
of Iranian Economic Development

In this section, we seek to gain quantitative knowledge about the relationships between the non-economic variables and economic development of the country. The variable representing the development process is the level of real per capita GNP. The non-economic variables are from sociological and political spheres of the Iranian society. Table III-1 presents the variables included in this specific analysis and their labels. All the other economic variables have been excluded from this factor analysis in order to extract the degree of association between the development process and the sociological and political variables without the interference of other economic variables. The results of this factor analysis are shown in Table III-2.

Each entry a_{ij} of the common factor matrix in Table III-2 represents the total influence of factor j upon variable i . In other words, each a_{ij} , called factor loading, represents the net correlation between each factor and the

corresponding variable.¹ If we treat each common factor as an unobserved variable, then each factor loading can be regarded as a correlation coefficient. Moreover, each $(a_{ij})^2$ accounts for the proportion of the total unit variance of variable i explained by common factor j , after allowing for the contributions of the other common factors. In this way, it can be shown that total unit variance of per capita GNP explained by all the extracted common factors in Table III-2 is equal to $\sum (a_{ij})^2$. For example, the first common factor explains $(.98)^2$ or 96% of the variations in per capita GNP. The total unit standardized variance of per capita GNP explained by all common factors is called the communality (h_i^2) of GNP, and it is equal to:

$$(.98)^2 + (.19)^2 + (.04)^2 = .99$$

So the common factors extracted from factor analyzing twelve socio-political variables plus per capita GNP account for 99% of the total unit variance of per capita GNP in Iran. This is a very important result indicating the importance of socio-political variables in explaining the variations in per capita GNP. This result validates the argument that in developing societies economic development is a socio-political transformation and cannot be treated as a purely economic problem.

¹For a full explanation of factor loading refer to Chapter II, part 1 and also Appendix A.

TABLE III-1

VARIABLE LIST FOR SOCIO-POLITICAL
ANALYSIS

VARIABLE	LABEL
<u>I. Economic Variable</u>	
1. Real Per Capita GNP	GNP
<u>II. Sociological Variables</u>	
2. Education Indicator	EDU
3. Health Indicator	HLT
4. Tax Structure Modernization Index	TAX
5. Social Adaptation of Technology Index	SOC
6. Total Population	TPI
7. Urbanization Index	URI
8. Domestic Consumption of Petroleum Products	PET
<u>III. Political Variables</u>	
9. Extent of Leadership Commitment to Development Planning	LED
10. Freedom of Political Expression	FRP
11. Extent of Leadership Commitment to Military Strength	DFS
12. Administration Instability Index	ADM
13. Political Instability Index	POL

TABLE III-2

VARIMAX ROTATED FACTOR MATRIX FOR PER CAPITA GNP
AND 12 SOCIOLOGICAL AND POLITICAL
VARIABLES (36 YEARS)*

Political and Sociological Indicators		Factor Loadings			Communality h_i^2
		F ₁	F ₂	F ₃	
1.	GNP	.98	.19	.04	.99
2.	Extent of Leadership Commitment to Military Strength	.95**	.09	.25	.96
3.	Domestic Consumption of Petroleum Products	.89	.42	.12	.99
4.	Extent of Leadership Commitment to Development Planning	.91	.12	-.19	.88
5.	Education Indicator	.96	.08	.31	.99
6.	Social adaptation of technology index	.93	.00	.33	.97
7.	Health Indicator	.78	.60	-.07	.97
8.	Total Population	.62	.74	-.07	.93
9.	Tax Structure Modernization Index	.14	.45	.26	.29
10.	Freedom of Political Expression	.10	.86	.07	.76
11.	Political Instability Index	.05	-.33	.02	.11
12.	Administration Instability Index	-.28	-.78	.05	.68
13.	Urbanization Index	.07		.62	.39

*For Pearson Correlation Coefficients used in extracting the matrix of the common factors refer to Appendix C, Table C-I.

**Rectangles represent the factor to which each variable is assigned.

The communality of each variable in the factor analysis is given in the last column of Table III-2. The communality for the political instability index is only .11, which means that the other sociological and political variables along with per capita GNP explain only 11% of the total unit standardized variance of this variable. This suggests that variations in political instability are either associated with country characteristics not included in this study or cannot be explained in a long-run span. As we will see later, both of these hypotheses are rational explanations for low communality of political instability index in this analysis. In the next chapter we will note that the communality of the political instability index, though still lower than the communality of other variables, is higher for our three short-run analyses. This indicates that the political fluctuations can be better explained through short-run analysis of the economy rather than long-run investigation.

Another use of the matrix of factor loadings is to assign each variable to a specific common factor. In this factor analysis we have extracted three main factors. Each variable is assigned to the common factor in which it has the highest factor loading (at least $\pm .3$). In the instances where factor loadings for one variable are very close for two or more common factors, we have assigned it either to both (or more) factors or to the factor with which it is thought to form a more logical grouping of variables. This procedure

is acceptable and has been applied in other research.²

The grouping of variables in a common factor has frequently been called a dimension³ in this study. The significance of this terminology lies in the fact that each common factor represents a specific category of variables which associate with each other rather strongly through sociological, political, and economic transformation. As such, each group represents a unique dimension of the total transformation. In most cases we also have assigned "descriptive labels" for these dimensions in order to make their underlying association clear. "A descriptive interpretation of a dimension comprises selecting a concept that will reflect the nature of phenomena involved."⁴ Moreover, throughout the study, we have chosen only the factor loading above .3 as significant and have dropped any variable which did not load significantly on at least one factor from the analysis.

The first common factor in this analysis explains the major part of the variations in per capita GNP. The two other extracted factors may be dismissed as negligible in explaining the variations in per capita GNP. We are more interested in them as a tool to reveal the kind of variables which group

²Irma Adelman and C. T. Morris, Society, Politics, and Economic Development: A Quantitative Approach (Baltimore: The Johns Hopkins Press, 1967), p. 3.

³The term adapted from R. J. Rummel, The Dimensions of the Nations (Beverly Hills: Sage Publications, 1972).

⁴Ibid., p. 54.

together plus the underlying association among them. The first factor can be termed as a "modernization dimension" of development. It includes the variables: health, education, domestic consumption of petroleum, extent of leadership commitment to military strength, extent of leadership commitment to development planning, social adaptation of technology index and total population. The loadings on all the variables in the first factor are positively associated with the level of per capita GNP, as expected. This indicates that the social modernization and augmentation of human capital, as well as the leadership commitment to economic development, are directly associated with the level of per capita GNP. As stated earlier, no cause and effect relationship can be deduced from this association, but it is an important result in that any development planning effort should seriously consider this strong association between socio-political variables and the level of economic development. The first common factor explains a total of 57% of total standardized unit variance of all the variables in the analysis (Figure III-1). That is, through data on a few variables which load significantly on the first factor we could predict at least 57% of variations in other variables included in the study.

The second common factor extracted from the results in Table III-2 is a "political environment factor." This factor does not have a great deal of explanatory power in case of variations in the level of per capita GNP. Stated differently,

the level of per capita GNP does not seem to be so strongly associated with this group of variables as in the case of our first factor. The "political environment dimension" explains only 4% of total unit standardized variance of per capita GNP. This factor consists of the variables: total population, health indicator, tax structure modernization index, freedom of political expression, political instability index, and administration instability index. Three of these variables are purely political in nature, but the total population, tax structure modernization, and health indices are of a sociological nature. It can reasonably be assumed that the fast growth of population in Iran has had significant association with the political structure and its stability. Population explosion has long been regarded as one of the variables affecting and being affected by economic development. Our results show that although the total population variable loads significantly on the same factor as GNP (the first common factor), its loading is even higher on the political environment factor. The positive increments of total population are associated with negative increments of political instability and administration instability indices in this analysis. We strongly believe that the political turmoil during the first years of our analysis (1941-1952) when population was at its lowest level is responsible for this negative association between total population and political tension indicators. Had we been able to extend the analysis to the years 1977-1978, we might very

well have witnessed a positive relationship between these two variables. As we will see in the next chapter, the short-run pattern of association between these two variables is different than the pattern of association indicated by our long-run analysis. So, as much as a strong relationship between the two variables is verified by our factor analysis, the direction of the relationship indicated should be regarded as ambiguous. As stated in the previous chapter about the method of factor analysis, this method is not designed to reveal the pattern of causation among variables.

There is also strong association among the purely political variables with the modernization of tax structure indicator. The pattern of associations are as expected and indicate that the tax structure modernization variable is positively interrelated with negative changes in the political and administrative instability variables. This sociological variable does not load significantly on the first common factor along with other sociological variables. This may be due to the fact that though the modernization of tax structure (higher percentage of tax revenue in the form of income tax) indicates monetization of the economic system and should conceptually have significant association with per capita GNP, its impact is minimal because the total tax bill is in itself a negligible percentage of total per capita GNP. The main source of government revenue comes not from taxes, but from oil export. We think that the high loading of this variable

on political indicators signifies the relationship between modernization of social organizations and their impact on the political environment.

The third common factor in this analysis can be termed as the "urbanization dimension." This factor includes only the urbanization index. The social adaptation of technology and education variables are not included in this factor. But their loading on this factor is significant. The form of relationships, as expected, shows higher levels of urbanization related to increasing levels of education and social adaptation of technology. This factor reveals that, in the long run, though urbanization is interrelated with the level of economic development and other socio-political variables, it represents a unique dimension in itself. This dimension explains less than 2% of variations in per capita GNP (Table III-2) and 9% of variations of all the variables in the study (Figure III-1).

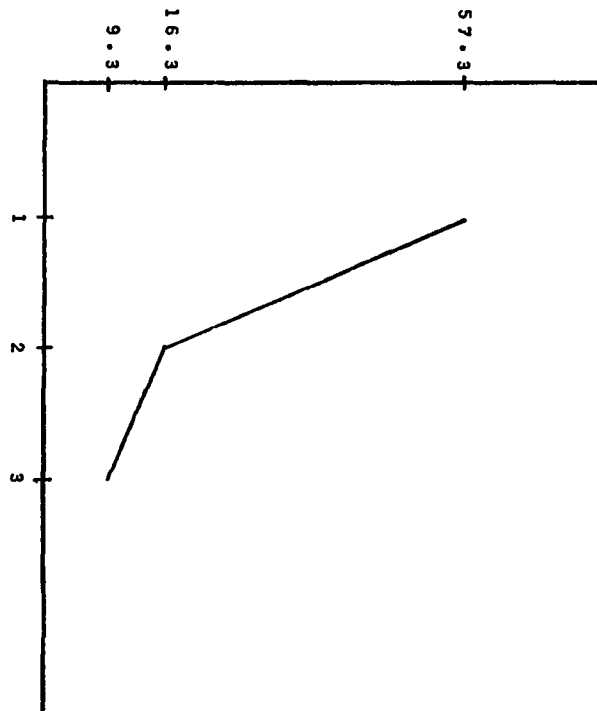
Our long-run analysis of twelve socio-political variables with per capita GNP has led to four main conclusions:

1. The major percentage of variation in the level of per capita GNP can be explained by purely sociological variables.
2. The association between per capita GNP and political variables is negligible in the long-run analysis.
3. Two dimensions, one political and the other urbanization, are extracted which reveal a distinct character of the

Iranian economy not significantly related to the levels or variations in per capita GNP.

4. The major trends depicted in this factor analysis are generally in agreement with Adelman-Morris results with some minor deviations. These results will be compared, and the differences between them will be explained in the concluding chapter of the study.

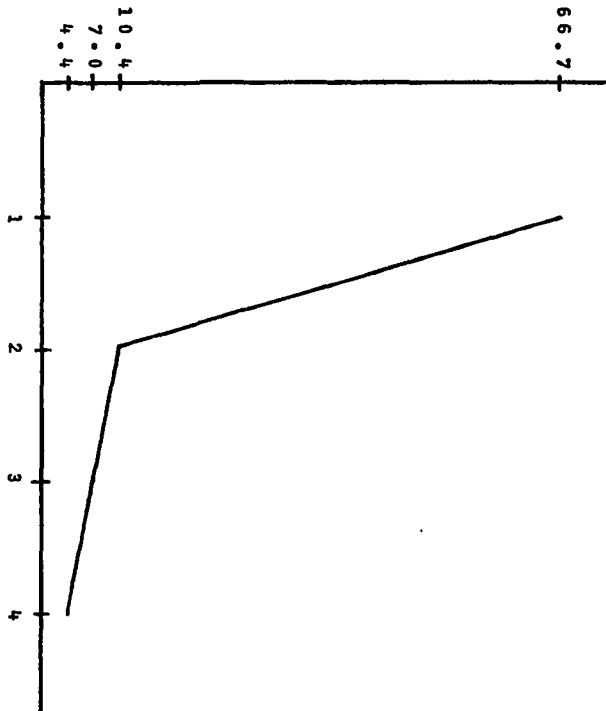
% of Total Variance Explained
by Each Extracted Factor



Extracted Factor

FIGURE III-1

% of Total Variance Explained
by Each Extracted Factor



Extracted Factor

FIGURE III-2

Long-Run Dimensions of
Economic Development

In this section we present the results of an alternative factor analysis incorporating all the twenty-five country attributes from economic, sociological, and political spheres for the total of the thirty-six year period (1941-1976). Through this analysis we hope to gain knowledge about the interrelationships of the three aspects of development (political, sociological, and economic) in general. Moreover, we will compare the results of this factor analysis to that of the previous one presented in the first part of the chapter.

The variables used in this part and their identification labels are presented in Table III-3. There are twenty-five variables representing different spheres of Iranian economy for the thirty-six year period between 1941-1976. The data for the analysis are presented in Appendix B. The results of the factor analysis are shown in Table III-4.

As shown in Table III-4, we have extracted four common factors or dimensions in this analysis. All twenty-five variables included have significant loading ($>.3$) on at least one common factor, so no variable was discarded from the analysis. The estimated communalities of the variables are very high, showing that the variables in the analysis explain a large percentage of each other's variations.

TABLE III-3
VARIABLE LIST FOR ECONOMIC
DEVELOPMENT ANALYSIS

VARIABLE	LABEL
<u>I. ECONOMIC VARIABLES</u>	
1. Real per capita GNP	GNP
2. Gross domestic capital formation	GDC
3. Money supply	MSI
4. Wholesale price index of domestic goods	DWP
5. Wholesale price index of exported goods	WPX
6. Wholesale price index of imported goods	WPM
7. Wholesale price index of food products	FDP
8. Extent of government participation in economic activity	GOV
9. Non-oil exports	EAP
10. Imports	IMP
11. Oil revenue	OIL
12. Fiscal policy indicator	FPI
13. Agricultural production per capita index	AGR
<u>II. SOCIOLOGICAL VARIABLES</u>	
14. Education indicator	EDU
15. Health indicator	HLT
16. Tax structure modernization index	TAX
17. Social adaptation of technology index	SOC
18. Total population	TPI
19. Urbanization index	URI
20. Domestic consumption of petroleum products	PET
<u>III. POLITICAL VARIABLES</u>	
21. Extent of leadership commitment to development planning	LED
22. Freedom of political expression	FRP
23. Extent of leadership commitment to military strength	DFS
24. Administration instability index	ADM
25. Political instability index	POL

TABLE III-4

VARIMAX ROTATED FACTOR MATRIX FOR 25 ECONOMIC,
SOCIOLOGICAL, AND POLITICAL VARIABLES
(36 YEARS)*

Political, sociological and economic indicators	Factor Loadings				Communality h_i^2
	F ₁	F ₂	F ₃	F ₄	
1. GNP	.98	.19	-.04	.03	.99
2. Agricultural production	.57	-.01	.40	-.07	.49
3. Non-oil exports	.87	.32	.03	.38	.99
4. Imports	.98	.09	.07	-.12	.99
5. Gross domestic capital formation	.97	.12	.10	.09	.97
6. Money supply	.98	.19	.01	.04	.99
7. Wholesale price index of domestic goods	.82	.43	.23	.24	.97
8. Wholesale price index of imported goods	.81	.16	.17	.41	.87
9. Wholesale price index of exported goods	.88	.23	.22	.27	.94
10. Wholesale price index of food	.81	.42	.25	.28	.97
11. Oil revenue	.95	.06	.12	-.12	.94
12. Extent of govern- ment participa- tion in economic activity	.98	.08	.05	-.10	.98
13. Education	.98	.03	.08	-.17	.99
14. Extent of leader- ship commitment to military strength	.98	.04	.08	-.14	.98
15. Health	.80	.49	.18	.22	.95
16. Domestic consumption of petroleum products	.89	.39	.02	.20	.99
17. Social adaptation of technology	.95	.03	-.07	-.21	.95
18. Extent of leader- ship commitment to development planning	.86	.12	-.10	.22	.81

TABLE III-4 (continued)

Political, sociological and economic indicators	Factor Loadings				Communality h_i^2
	F ₁	F ₂	F ₃	F ₄	
19. Total population	.65	.58	.28	.32	.99
20. Freedom of political expression	.17	.56	.61	.18	.75
21. Political instability index	.08	-.50	-.01	.08	.25
22. Administration instability index	-.33	-.73	-.13	-.07	.66
23. Fiscal policy indicator	.32	.07	-.58	.23	.50
24. Tax structure modernization index	.20	.22	.73	-.02	.62
25. Urbanization index	.15	.00	.11	-.59	.39

*For Pearson Correlation Coefficients used in extracting the matrix of the common factors refer to Appendix C, Table C-I.

The one variable with low communality compared to the others is the political instability index with a communality equal to .25. As indicated in the first part of this chapter, this variable also seems to be interrelated with other country attributes not included in our analysis. As expected, the communality of this characteristic has increased from .11 for our socio-political analysis to .25 in the present analysis which also includes economic variables. This increased explanation of total unit variance of political instability when economic variables are added indicates that this variable is sensitive to the economic indicators included in the analysis. Likewise, the comparison between Table III-2 and Table III-4 shows that most of the communalities have either increased or stayed the same as we added the economic variables to our analysis. The major increases in communalities are in the area of purely political variables.

Another important result of the comparison between Table III-2 and Table III-4 is the similarity of factor patterns and directions of association depicted in the two factor analyses. The factor loadings are almost the same for per capita GNP in both cases. The first common factor explains 96% of total unit standardized variance of per capita GNP. This common factor includes 92% of the economic variables in the study plus most of the sociological variables. Similar to the factor analysis of socio-political variables, the political variables do not load significantly

on the same factor with economic and sociological indicators. We can call this first common factor the socio-economic dimension of development. This factor signifies the strong relationship between sociological and economic variables throughout the development process. This factor explains 66.7% of total variance of the variables included in the analysis (Figure III-2). The first factor extracted in our socio-political analysis explained 57.3% of total variations in the variables included (Fig. III-1). The small increase in explanatory power of this major factor when economic variables are added to the analysis indicates the strength of the socio-political variables in explaining the bulk of variation in economic development through the years.

The second extracted factor in this analysis is the "political environment dimension" of development. This factor includes freedom of political expression, political instability index, and administration instability index along with a non-political variable, total population. With one exception, the grouping of the variables in this factor and the direction of associations are exactly the same as for the second common factor extracted for our socio-political analysis. The only variable which has shifted out of this factor into a third factor in this case is the tax structure modernization index. This index, previously loading significantly on the political variables, has shifted to form a new common factor called the "fiscal policy dimension" when economic

variables, one of which is the "fiscal policy indicator," are added to the analysis. The "political environment dimension" of economic development in this case explains 4% of the total unit variance of per capita GNP and a total of 10.4% of the total variance of all the variables included in the analysis (Table III-4 and Fig. III-2). Similarly, the same dimension explains 4% of the total unit variance of per capita GNP and 16.2% of the total variance of all the other variables included in our socio-political factor analysis.

The third common factor extracted in this analysis can be called the "fiscal policy dimension" of economic development. This factor explains 1.6% of the total variance in per capita GNP and a total of 7% of variations in the other variables in the sample. This factor represents a unique dimension of the development process when economic variables are introduced into the model.

The "fiscal policy dimension" reveals a negative association between fiscal policy indicator (government surplus or deficit) and tax structure modernization index. This association indicates that increased modernization of tax structure in the economy is in line with lower fiscal deficits or higher fiscal surplus. Though the relationship extracted is a rational and expected one, its presence as one of the four main dimensions in the economic development process is significant. This significance is underlined with the major role of government as an important force behind an economic

development drive in the economy.

The fourth common factor is composed of a single urbanization index. This urbanization dimension is the same as the one extracted in the previous factor analysis and represents a unique dimension in the social transformation of the economy through the thirty-six year study period. The factor loading, the total variance of other variables explained by this dimension, and its association with most of the other variables in the analysis, is very similar for both of the factor analyses presented in this chapter. The major deviation between the two analyses is the direction of association between this dimension and per capita GNP. In the socio-political factor analysis presented in the first part of the chapter, positive increments of per capita GNP were related to positive changes in urbanization index. For the present factor analysis the direction of association between the two variables is negative. This may be explained through the hypothesis that when urbanization is treated in a purely sociological and political environment, higher levels of per capita GNP show a positive relationship with urbanization dimension. When economic variables are introduced into the picture, then the urbanization dimension takes on a new form representing the economic aspects of urbanization as well. In that case, migration from agricultural rural areas into industrialized urban centers may not in fact represent higher income levels if the marginal productivity of released labor from agriculture

is lower in industry (it may be equal to zero in case of high unemployment or very close to zero in case of disguised unemployment prevalent in underdeveloped economies). As stated previously, this is a highly speculative explanation of the direction of this specific interrelationship, and its acceptance or rejection needs more confirmatory research.

Conclusion

The main conclusion emerging from this chapter is that there exists a strong interrelationship between social and economic variables, especially percapita GNP, in the Iranian economy. The development process in this case should be regarded as a social transformation of the economy. This conclusion makes it necessary for development planners to look into the problem of social bottlenecks to economic development as possible sources of underdevelopment. The only variable with possible political connotations which loads significantly along with other sociological variables in explaining the variations in income level, is the extent of leadership commitment to development planning. The position taken by this variable is as expected.

The political variables form a unique dimension in the Iranian economic development process. This dimension seems to be more interrelated with the economic atmosphere of the country rather than its sociological transformation. This conclusion is a unique finding in that in recent years the political

upheavals in Iran have been attributed by most analysts to abrupt social changes. In contrast, our findings show that the political tensions and instability are related more to the economic environment than to sociological changes. As we will see in the next chapter, the political variables show an increased association and explanatory power in our short-run analysis than in our present long-run analysis. This may be due to the fact that though economic and social development are the results of long-run transformations of the economy, political tensions are short-run phenomena.

For the Iranian economy a unique urbanization dimension evolves out of our analysis which does not significantly associate with other sociological and political variables. The explanatory power of this dimension is minimal and the direction of its association with the level of economic development (real per capita GNP) is not stable. As in the case of the political environment dimension, we will, in a later chapter, learn that this dimension shows more significant association with sociological and economic variables in our short-run analysis. In the short-run analysis the explanatory power of this variable also increases.

In the factor analysis including all economic, sociological, and political variables, a fourth dimension was added to those already extracted in our socio-political analysis. This factor, called the "fiscal policy dimension," signifies the major role of the government in economic and social

development in the LDCs. The tax modernization variable could also be taken as a proxy or a surrogate for country characteristics such as improvement in financial institutions or monetization of the economy. We then can conclude that these characteristics would probably show strong explanatory power and interrelationship with other variables if included in the analysis.

CHAPTER IV

THE SHORT-RUN DIMENSIONS OF DEVELOPMENT

Introduction

In this chapter we seek to gain quantitative insight into the interrelationships between sociological, political, and economic spheres of the Iranian economy through its development path. To accomplish this goal, we have applied our factor analytic model to three different sub-periods of the total thirty-six year period under our investigation: the first sub-period (1941-1953), the second sub-period (1954-1962), and the third sub-period (1963-1976). As stated earlier, two guidelines were followed in the break-down of the long-run period into these three different sub-periods. The first guideline was based on the conclusions derived by Adelman and Morris that short-run transformations of an economy require ten to fifteen years. The second guideline was the historical reality of the sociological, political, and economic changes in Iran during the last thirty-six years.

The first sub-period starts with the change of rulership from Reza Pahlavi to his son Mohammad-Reza Pahlavi along with the economic impacts of World War II on the economy. During this sub-period the first steps to launch an economic development plan were taken. This effort continued throughout the rest of the thirty-six year period. After World War II, oil production and its economic, political, and sociological impacts were introduced into the social atmosphere of Iranian economy and remained one of the controversial issues throughout the years. Towards the termination of this sub-period (1953), sociological and political tension was at a peak.¹ The cut-off point for this period represents the breakdown of the ruling regime (symbolized by the Shah's escape to Rome) and the introduction of a new political era (the Shah's come-back to the throne and changes in constitutional monarchy) in 1953.

The second sub-period in our analysis (1954-62) starts with a new concept of political reality exemplified with increased constitutional powers vested in the monarchy. Starting with this sub-period Iran witnessed an ever-increasing political reality of a one-man rule. The oil issue and the economic development planning efforts continued to exert their impact on the economy. The cut-off point for this period (1962) represents heightened political and social tension²

¹Consult the data on political instability index in Appendix B.

²Consult the data on political instability index in Appendix B.

along with economic problems for the government. To provide remedy, an extensive program of reform, starting with land reform was launched. The commencement of these reforms, which had substantial impacts on the economic, sociological, and political life-style of the nation in the next period, are used here as our dividing line.

The third sub-period (1963-1976) started with social and economic reforms such as land division and nationalization of some natural resources such as forestry. The main characteristic of this era was increased national income due to increased oil revenues as a result of higher production and prices. The role of agriculture as the major component of GNP and source of employment decreased throughout this period. In the political arena, the stability of the administration (Prime Minister and Cabinet members) was unprecedented.³ Towards the end of this period, political and social tension was at its height again.⁴ The cut-off point for this sub-period, however, is dictated more from lack of data for the years 1977-1978. Had data been available, we would have chosen the year 1978 as our termination point for this period because it would have represented the same type of change in the political atmosphere as the terminal years of the previous

³Refer to the administration instability index represented in Appendix B.

⁴Refer to political instability index represented in Appendix B.

two periods do. In line with our long-run analysis, for each of the three above sub-periods, we will present two factor analytic models. The first factor analysis for each sub-period would include only twelve sociological and political variables along with the real per capita GNP. The second factor analysis will include all twenty-five economic, sociological, and political variables. The two factor models of each sub-period will be compared to each other, and then the models of the three sub-periods will be compared to each other.

As stated earlier, the Adelman-Morris model has derived factor patterns for "low," "intermediate," and "high" income developing nations. To preserve comparability, we will treat our first sub-period as the "low" income period and the second sub-period as "intermediate" and the third sub-period as "high" income period. If the main results of each sub-period are in line with the Adelman-Morris results for the corresponding income level models, we shall be able to conclude that Iranian economy has advanced through a development route predicted by their model.

First Sub-Period (War and Oil Nationalization Period)

Socio-Political Analysis of Development

The factor model for the first sub-period (1941-1953), incorporating only twelve socio-political variables along with per capita GNP (excluding all the other economic variables), gives us the results shown in Table IV-1. The variables included are the same as listed in the Table III-1.

Ninety-seven percent of the total unit variance of per capita GNP is explained by the three extracted common factors. This demonstrates a strong association between per capita GNP and socio-political variables.

In this sub-period the association between per capita GNP representing the country's development level and the political variables is much stronger than their association depicted in our long-run analysis. The first common factor is composed of sociological variables: total population, education, health, tax structure modernization index, and social adaptation of technology along with the political indicators: freedom of political expression, extent of leadership commitment to development planning, extent of leadership commitment to military strength, and political instability index. The stronger interrelationship of political and sociological variables in this sub-period is in line with the [A-M] results that in low levels of development the different spheres of society are more interrelated. Since the first sub-period in this investigation represents a relatively lower level of economic development (indicated by the level of per capita GNP), then our results are in complete accordance with the major conclusions of the [A-M] analysis. Complete comparability is not possible between the two studies because the [A-M] analysis is based on cross-sectional data where our analysis is based on historical or time-series data. Moreover, the variables in the two studies are not the same and even for the same variable different types of information and compiling procedures have been

utilized. Taking these differences into consideration, it is significant to find a general comparability of the major patterns depicted in the two studies.

The first common factor explains 40% of the total standardized unit variance of per capita GNP. The variables in this common factor resemble the grouping and the direction of association of the first common factor extracted for the long-run (thirty-six year) analysis. This resemblance in itself is a positive indication for the validity of the results obtained. The only difference is the incorporation of political variables in the first factor. This factor explains a total of 67% of variations in the data set (Fig. IV-1).

The second common factor in this analysis explains 42% of the unit standardized variance of per capita GNP. The variables in this common factor are urbanization index, petroleum consumption and tax structure modernization index. Positive increments of GNP per capita are associated with positive changes in the urbanization index. It can be argued that migration of farmers with low marginal productivity to urban areas and their engagement in industrial activity with higher marginal productivity is associated with high levels of per capita GNP. There are, however, unexpected signs for the petroleum consumption and tax structure modernization indices. The positive increments of these two variables are associated with negative changes in GNP per capita. This type of negative association of per capita GNP on one hand, with social

TABLE IV-1

VARIMAX ROTATED FACTOR MATRIX FOR GNP AND
TWELVE SOCIOLOGICAL AND POLITICAL VARIABLES
(FIRST SUB-PERIOD:
WAR AND OIL NATIONALIZATION PERIOD)*

Political and Sociological Indicators	Factor Loadings			Communality h_i^2
	F_1	F_2	F_3	
1. GNP	.63	-.65	-.38	.97
2. Total population	.93	.24	.28	.99
3. Education	.95	.21	.25	.99
4. Extent of leadership commitment to mili- tary strength	.88	.27	.29	.92
5. Health	.93	.19	.32	.99
6. Social adaptation of technology index	.95	.18	.22	.98
7. Extent of leadership commitment to devel- opment planning	.94	.13	-.25	.96
8. Freedom of political expression	.73	-.03	.59	.88
9. Political instability index	.41	.05	.36	.30
10. Administration in- stability index	.11	.08	.58	.36
11. Urbanization index	-.10	-.66	-.14	.47
12. Domestic consumption of petroleum products	.28	.99	-.17	.99
13. Tax structure modernization index	.53	.68	.13	.96

*For Pearson Correlation Coefficients used in extracting the matrix of common factors refer to Appendix C, Table C-II.

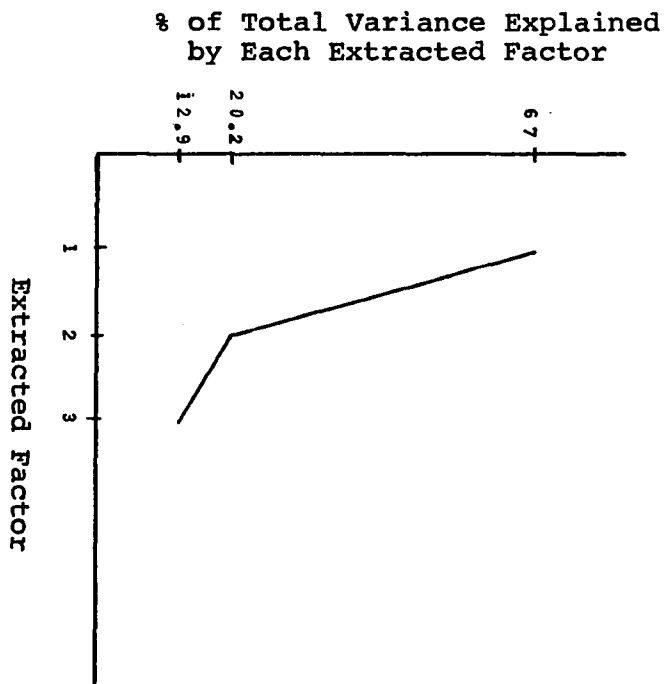


FIGURE IV-1

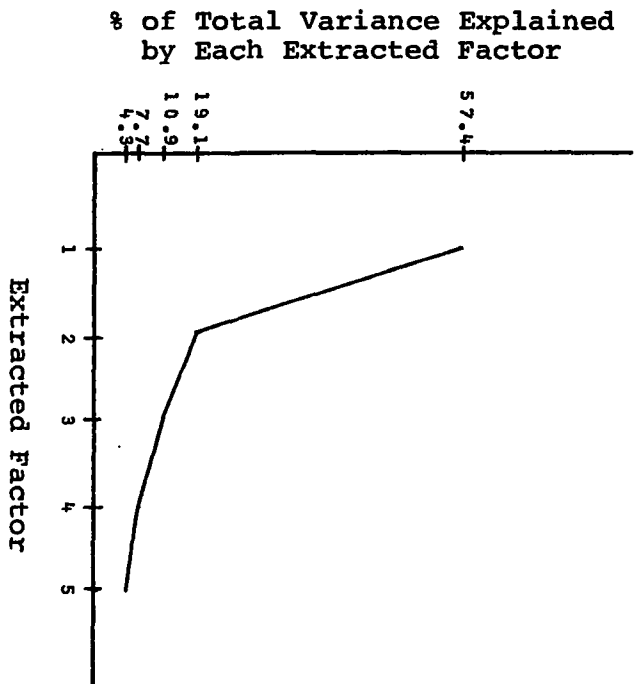


FIGURE IV-2

modernization indicators such as petroleum consumption and tax structure modernization on the other, has evolved only in this sub-period. This negative relationship may very well be due to the effects of World War II and, afterwards, the oil nationalization efforts on the economy. Both of these incidents (WWII 1942-1948 and oil nationalization efforts 1949-1953) disrupted the domestic distribution and consumption of petroleum products in the country. This reduction was due to exogenous pressures outside the domain of our analysis, but their impact is reflected in the present factor pattern. Likewise, during the years in this sub-period and because of the two above-mentioned pressures, the Iranian government had levied heavy sales and excise taxes on different commodities such as tobacco and sugar. The impact of these taxes was to lower the percentage of total taxes collected in the form of income taxes though the level of income taxes may very well have risen during the period. This factor explains a total of 20.2% of variations in the data (Fig. IV-1).

The third common factor for this sub-period explains approximately 14% of the total unit standardized variance of per capita GNP. The variables included in this common factor are purely political in nature, namely: freedom of political expression, political instability, and instability of administration. The positive changes in these variables are associated with negative changes in GNP. The direction

of association was expected for political and administration instability variables since growing political tension retards economic growth and development. This same type of results has been derived from the [A-M] analysis in their research incorporating per-capita GNP together with twenty-three social and political variables for twenty-eight African countries.⁵ In that instance, African countries are representative of the "low" income group of developing nations comparable to our first sub-period. In this specific case, [A-M] found out that positive changes in per capita GNP are associated with negative changes in "extent of political stability," "extent of leadership commitment to development," and "importance of indigenous middle-class." In our study the variable "leadership commitment to development planning" does not appear in this factor because it has been compiled on the basis of development budget allocated to planning and development purposes. But during this sub-period the development planning had not yet fully started and development budget for most of this period was zero. Other than this difference the main importance of this factor in showing that lower levels of income at early stages of development are associated with higher political instability is in line with the Adelman-Morris analysis. This factor explains 12.9% of variance in other variables incorporated in the model (Fig.

⁵Irma Adelman and C. T. Morris, Society, Politics, and Economic Development: A Quantitative Approach (Baltimore: The Johns Hopkins Press, 1967), pp. 158-165.

IV-1). It should be noted that a completely opposite pattern of association is indicated between the level of economic development (GNP) and the political stability indicators by the first extracted common factor. We believe that these two opposing patterns of association among the level of income and the political tension variables signify the domestic expansion and growth of political apparatus as economy grew on one hand and the political pressures of war and oil nationalization efforts on the other. This type of opposing interrelationship between political and economic environment is only indicated in this time period.

The main conclusions to be derived from this analysis are:

1. Sociological and political variables are strongly associated with the level of per capita GNP and the twelve sociological and political variables included in the study explain 97% of total unit standardized variance of per capita GNP.

2. Though political and sociological variables are strongly interrelated to each other during this time period, we still observe a unique political dimension in the Iranian economy. As a result of higher levels of association of political and sociological variables in this time period, the communality of the purely political variables (total explained variance) is much higher than that of the full thirty-six year sample.

3. A third dimension encompassing political variables emerges in this time period which is obviously the direct result of World War II and oil nationalization issues on the Iranian economy.

4. The major findings for this time period are in line with the [A-M] analysis for the "low" level countries (African countries) except for one specific sociological dimension explained above.

Economic Development Analysis

In this section we present a factor model incorporating all 25 economic, sociological, and political variables for the first sub-period (1941-1953). The results of the model are reproduced in Table IV-2. The list of variables and their labels are the same as in Table III-3. For this model, five common factors have been extracted. The first factor explains 57.4% of total variance in the data and the last factor explains 4.8% (Fig. IV-2). One of the main characteristics of this factor run is that it is the only one which gives us as many as five common factors. The communalities of most of the variables are high, and the least communality is reported for our urbanization index, which is equal to .58.

The second common factor is composed of real per capita GNP, urbanization, tax structure modernization index, domestic consumption of petroleum products and all the four wholesale price indices in the variable list. The main function

of this factor is to reveal the association of per capita GNP and some sociological variables with the four cost of living indices for this period. All the four cost of living indices have negative association with GNP and urbanization. As we will see later in the chapter, all four of these price indices tend also to load on the same common factor as GNP for our next two sub-periods. But in the two next periods their impact does not seem quite so overwhelming on income level and urbanization as it is for the present model. This unusually strong relationship between GNP and urbanization on one hand and the price indices on the other is thought to be the effects of World War II and the oil-nationalization effort on the economy. As a matter of fact, these indices also group with our "domestic consumption of petroleum products" and "tax structure modernization index" in the same factor. As mentioned in the first part of the chapter, these two variables are also thought to represent the impact of the World War II and oil-nationalization in this sub-period. So, it is our inclination to call the second common factor as the "dimension of war and oil issue" in the first sub-period. This factor explains a total of 19.1% of variance in the data (Fig. IV-2), and its explanatory power is less than the first common factor to be discussed next.

The first common factor includes a host of economic and social variables along with three political variables namely the extent of leadership commitment to military strength and economic development along with freedom of political expres-

TABLE IV-2

VARIMAX ROTATED FACTOR MATRIX FOR TWENTY-FIVE
ECONOMIC, SOCIOLOGICAL, AND POLITICAL VARIABLES
(FIRST SUB-PERIOD:
WAR AND OIL-NATIONALIZATION PERIOD) *

Economic, social and political indicators	Factor Loading					Communality h_i^2
	F ₁	F ₂	F ₃	F ₄	F ₅	
1. Urbanization index	-.09	-.75	-.04	-.04	.05	.58
2. Wholesale price index of im-ported goods	.23	.92	.14	-.16	.01	.95
3. Wholesale price index of do-mestic goods	.23	.88	-.11	.09	.08	.86
4. Wholesale price index of food	.18	.94	.06	.19	.09	.97
5. Domestic consump-tion of petrol-eum products	.26	.87	-.17	.01	-.34	.98
6. Tax structure modernization index	.54	.58	.10	.05	.09	.65
7. GNP	.53	-.68	-.33	.25	-.05	.91
8. Wholesale price index of ex-ported goods	.58	.57	.40	.26	.19	.92
9. Total population	.97	.25	.04	.03	-.06	.99
10. Exports (non-oil)	.91	.16	.14	-.31	.11	.99
11. Gross domestic capital formation	.91	.02	-.05	.36	-.10	.97
12. Money supply	.77	.56	.24	.10	.08	.98
13. Extent of govern-ment participa-tion in economic activity	.92	.12	.09	.21	-.21	.96
14. Education index	.97	.23	-.01	.04	-.00	.99
15. Extent of leader-ship commitment to military strength	.93	.23	.11	.09	-.23	.99
16. Health index	.97	.20	.12	.02	-.00	.99
17. Social adaptation of technology index	.98	.17	.03	-.05	-.11	.99

TABLE IV-2 (Continued)

Economic, social and political indicators	Factor Loading					Communality h_i^2
	F_1	F_2	F_3	F_4	F_5	
18. Extent of leadership commitment to development planning	.85	.12	-.27	.38	-.12	.96
19. Freedom of political expression	.78	.11	.25	.05	.07	.69
20. Imports	.68	.23	.06	.54	-.07	.81
21. Oil revenue	.11	.03	.10	.94	-.13	.91
22. Administration instability index	.22	.08	.88	.00	-.22	.87
23. Agricultural production	-.02	.00	.76	.11	.37	.73
24. Fiscal policy index	-.35	.07	-.01	-.10	.70	.62
25. Political instability index	.55	.10	.25	-.31	.60	.83

*For Pearson Correlation Coefficients used in extracting the matrix of common factors refer to Appendix C, Table C-II.

sion. Though most of the key economic variables such as money supply, gross domestic capital formation, exports, and imports load significantly on this factor, the significance of real per capita GNP in this dimension is less than in the second dimension discussed above. This shows that the level of per capita GNP in this period was more interrelated with the "World War II and oil-nationalization issue dimension" than the economic environment of Iranian economy. This first factor represents a "social and economic modernization dimension" during this sub-period. This dimension explains 57.4% of total variance in the data (Fig. IV-2).

The third factor in Table IV-2 loads significantly on agricultural production and the administration instability index. This dimension signifies the major role of agriculture in this sub-period and its impact on political leadership of the country. The negative increments of agricultural production are associated with higher levels of administration instability. This factor explains 10.9% of total variance in the data (Fig. IV-2).

The fourth factor in this model is called the "international trade dimension" of development. This factor shows that higher import levels are associated with higher oil-revenue (exports). This factor explains a total of 7.7% of variations in the data.

The fifth factor includes the variables fiscal policy index and the political instability index. This dimension

reveals that higher government deficit, in this sub-period, is related to higher political instability. This dimension is also thought to be the direct impact of the oil-nationalization issue on the Iranian economy. During the oil nationalization crisis, the oil exports were suspended, and large fiscal deficits were reported by the government. At the same time, the political tension was at a peak.⁶ This factor explains 4.8% of variations in data (Fig. IV-2).

The conclusions to be derived from this analysis are:

1. The impact of World War II and the oil-nationalization issue on the economic, sociological, and political spheres of Iranian economy during this sub-period were the dominant features reflected in the extracted factor pattern presented above.

2. Political variables had greater association with economic and social variables in this sub-period than in the long-run analysis.

3. Again, sociological and economic variables revealed a close affinity to each other in their variations.

4. A very strong interrelationship between sociological, political, and economic spheres in this sub-period is in line with the [A-M] conclusion that at "low" level of economic development, close association among different spheres of development is expected.

⁶Consult data on oil exports, fiscal policy indicator and political instability index represented in Appendix II.

5. Variables, such as urbanization and political instability, which were not quite adequately explained in the long-run analysis, showed closer association with the other variables in this short-run model.

Second Sub-Period (Social Modernization
Period)

Socio-Political Analysis of Development

The factor model for the second sub-period (1954-1962) incorporating twelve sociological and political variables along with real per capita GNP is presented in Table IV-3. The variable list and their labels are shown in Table III-1. Three common factors are extracted. The communality of most political variables and the urbanization index has increased. This reveals a more significant role of political variables in the total process of development. But there is much less interrelationship of political environment on one hand and sociological environment on the other in this period. This differentiation of sociological and political environments in the process of development is a significant result of [A-M] analysis which has also been revealed about the Iranian economy. This differentialization is shown by a smaller number of political variables loading significantly on the same factors with the sociological variables.

As indicated by Table IV-3, the first common factor represents a "social modernization dimension" of development. This factor includes all of the sociological variables

included in the model. As in the case of our long-run analysis, the sociological variables show greater association with the level of GNP than the political variables. This greater association is reflected in the fact that all of the sociological variables load significantly on the same factor which explains the bulk of the standardized unit variance of per capita GNP. Three of the political variables load on this factor but their factor loadings are significantly lower than the ones for sociological variables. This indicates that political variables represent a unique dimension in this sub-period (the second common factor). The "social modernization dimension" explains 76.7% of total variance in the data (Fig. IV-3).

The second common factor in Table IV-3 represents a "political environment dimension" of the development process during the present period. This factor includes the variables: political instability, freedom of political expression, and leadership commitment to development planning. This factor explains 5% of total unit standardized variance of per capita GNP. Quite expectedly, the positive changes in per capita GNP are associated with decreasing levels of political instability but positive changes of freedom of political expression and leadership commitment to development planning.

The third common factor gives us a high factor loading on the administration instability index. This factor explains 2% of variance in GNP. The positive changes in per capita GNP are interrelated with increasing instability in administration. This dimension may signify the political

TABLE IV-3

VARIMAX ROTATED FACTOR MATRIX FOR GNP AND
TWELVE SOCIO-POLITICAL VARIABLES
(SECOND SUB-PERIOD: SOCIAL MODERNIZATION
PERIOD)*

Social and political indicators	Factor Loading			Communality h_i^2
	F_1	F_2	F_3	
1. GNP	.95	.22	.14	.96
2. Total population	.95	.06	.26	.97
3. Urbanization				
index	.86	.36	-.17	.90
4. Education	.97	.04	.22	.98
5. Extent of leader- ship commitment to military strength	.93	.16	.20	.98
6. Health	.93	.14	.16	.91
7. Domestic consump- tion of petrol- eum products	.99	.04	.12	.99
8. Social adaptation of technology index	.98	.05	.20	.99
9. Tax structure modernization index	.69	.26	.37	.68
10. Extent of leader- ship commitment to development planning	.67	.51	-.42	.89
11. Political insta- bility index	.04	-.86	.13	.75
12. Freedom of political expression	.61	.74	.38	.99
13. Administration instability index	.18	-.07	.62	.42

*For Pearson Correlation Coefficients used in extracting the matrix of common factors refer to Appendix C, Table C-III.

transformation of the political elite in the face of increasing income levels. This factor explains a total of 8.1% of variations in data set (Fig. IV-3).

The conclusions emerging from this factor model are:

1. Again, a strong interrelationship between political and sociological variables with the level of economic development is indicated. The three common factors explain 97% of total unit variance of per capita GNP.

2. Though there is strong association between sociological and political variables, the political dimension in this sub-period shows increased differentiation from the social sphere of development than in the first sub-period. As a matter of fact, two purely political dimensions are extracted for present analysis including four variables from which only two are shared with the "social modernization" dimension. Moreover, the differentialization process of political forces from the economic sphere of development, also predicted by the [A-M] analysis, is revealed through smaller percentages of unit variance of per capita GNP explained by political variables than in the first sub-period. Though the process of differentiation through development is also obvious by the lower communality for GNP in this analysis than in Table IV-1. In the first sub-period the sociological and political variables explain a larger percentage of unit variance in GNP than in the second period.

3. A unique variable, namely the instability of

administration index, gives us a new dimension in Iranian economy for this sub-period. This is thought to be the result of the political elite's transformation and change to include members with more reciprocity towards economic development planning which in reality started in this sub-period. Moreover, the change in cabinet members towards the end of the period was a response to extensive land reform programs which were put into law (enacted in our third sub-period).

Economic Development Analysis

In this part we present the factor analysis model for the second sub-period (1954-1962) which incorporates all twenty-five economic, sociological, and political variables. The results of the model are shown in Table IV-4. The list of variables included is the same as in Table III-3. For this sub-period, we have extracted four common factors.

The first common factor loads significantly on almost "all" sociological variables, most economic variables and three political variables (Table IV - 4). This factor is a general dimension of development and explains 67.1% of variance in data (Fig. IV-4). All of the variables are directly related to each other and especially to the level of GNP except for wholesale price indices of domestic and imported goods. Higher domestic and imported goods prices seem to be related to lower levels of sociological and economic development. Unlike the dimensions derived for the first

% of Total Variance Explained
by Each Extracted Factor

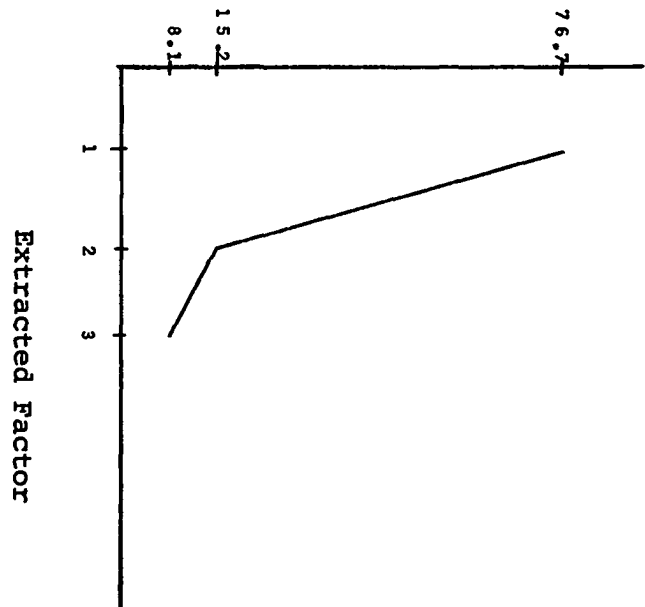


FIGURE IV-3

% of Total Variance Explained
by Each Extracted Factor

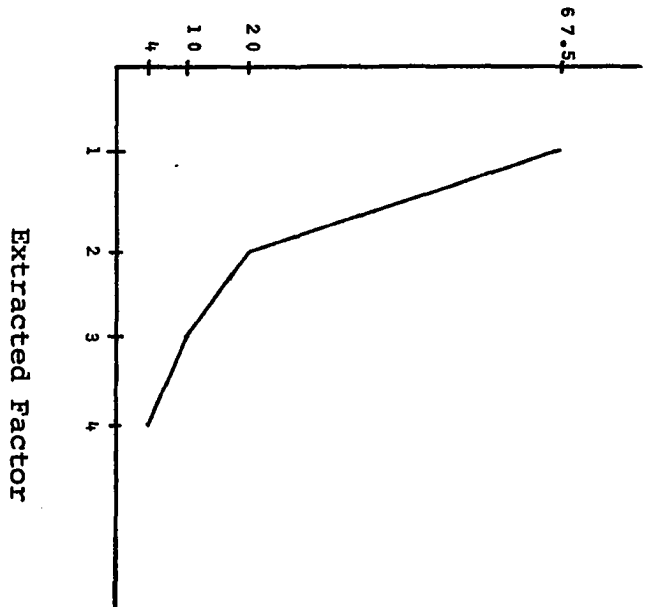


FIGURE IV-4

sub-period, the total impact of prices on other variables is not a dominant dimension in itself for this sub-period. This phenomenon justifies our speculation about World War II and the oil-nationalization issue as the major causes of an "inflation" dimension for the first sub-period.

The second common factor includes both key economic and political variables. Again, no social variable entered this factor. This dimension reveals the political impacts of such economic activities as the level of agricultural production and non-oil exports. Higher levels of non-oil exports are associated with lower agricultural production. This suggests that for this period, increase in non-oil exports should have come from the industrial sector rather than agriculture. On the other hand, this dimension reveals that lower levels of agricultural production were interrelated with higher political instability. Many observers have concluded that the decrease in agricultural production and the decline of this sector were the main causes of political tension towards the end of this era which forced the government to initiate the land reform programs in the 1960's. This extracted dimension provides quantitative proof to this hypothesis. This dimension explains 20.0% of variations in the data (Fig. IV-4), but its loading on per capita GNP is negligible. The reason may very well be that the oil revenue had already become the main source of income in Iran, and agricultural sector and non-oil exports (the main employment sectors) were losing

TABLE IV-4

VARIMAX ROTATED FACTOR MATRIX FOR TWENTY-FIVE
ECONOMIC, SOCIOLOGICAL, AND POLITICAL VARIABLES
(SECOND SUB-PERIOD: SOCIAL MODERNIZATION PERIOD) *

Social, political and economic indicators	Factor Loading				Communality h_i^2
	F_1	F_2	F_3	F_4	
1. Total population	.96	.06	-.01	.22	.97
2. Urbanization index	.87	-.18	.36	-.04	.93
3. GNP	.96	-.05	.19	.20	.99
4. Imports	.94	-.19	.20	-.15	.98
5. Gross domestic capital for- mation	.92	-.35	-.02	-.17	.99
6. Money supply	.99	-.11	.00	-.08	.99
7. Wholesale price index of domes- tic goods	-.97	.18	.07	-.04	.99
8. Wholesale price index of im- ported goods	-.78	.30	-.42	.23	.93
9. Wholesale price index of food	.91	.20	-.05	.31	.97
10. Oil revenue	.97	.01	-.12	.16	.98
11. Extent of govern- ment partici- pation in econ- omic activity	.98	-.15	-.01	.11	.99
12. Education index	.97	.05	-.03	.16	.98
13. Extent of leader- ship commitment to military strength	.97	-.10	-.13	.03	.97
14. Health index	.97	-.10	-.13	.03	.97
15. Domestic consump- tion of petrol- eum products	.99	.07	.06	.11	.99
16. Social adaptation of technology	.99	.05	-.03	.13	.99
17. Tax structure modernization index	.78	-.33	-.36	.08	.86
18. Freedom of poli- tical expres- sion	.71	-.59	.20	.27	.97

TABLE IV-4 (continued)

Political, social and economic indicators	Factor Loading				Communality h_i^2
	F_1	F_2	F_3	F_4	
19. Political insta- bility index	-.03	.97	-.29	.12	.85
20. Fiscal policy index	-.02	.91	.05	-.37	.96
21. Non-oil exports	-.06	.94	-.19	.13	.95
22. Agricultural production	-.15	-.57	.67	-.33	.90
23. Wholesale price index of ex- ported goods	-.18	-.22	.89	-.11	.88
24. Extent of leader- ship commitment to economic development	.67	-.22	.70	-.12	.99
25. Administration instability index	.17	-.04	-.26	.91	.92

*For Pearson Correlation Coefficients used in extracting the matrix of common factors refer to Appendix C, Table C-III.

their share of GNP.

The third common factor includes the variables: agricultural production, the wholesale price index of exported goods, and the extent of leadership commitment to development planning. The major trend depicted by this last dimension is the efforts by the Iranian government, through development planning, to increase agricultural production in face of massive migration of labor out of agricultural periphery to urban industrialized centers. These efforts are reflected in development plans for this era which included water and dam projects as their main emphasis. This factor also loads significantly (.36) on the urbanization index showing the interrelationship of this social variable with our key economic indicators (Table IV-4).

The fourth common factor is composed of a unique variable: administration instability index. This factor explains 4% of variations in the data (Fig. IV-4). The loading of this factor on per capita GNP is relatively high (.20), which means that the changes in administration were correlated to the level of per capita GNP (Table IV-4). This same result was obtained from our socio-political analysis for this period and represents the large impact that these two variables (GNP and administration instability) had on each other.

The major conclusions to be derived from this factor model are the same as the conclusions derived from the socio-political analysis of this sub-period presented above.

Third Sub-Period (Political Instability Period)Socio-Political Analysis

The results of factor model including per capita GNP and twelve sociological and political variables for the third sub-period (1963-1976) are presented in Table IV-5. There are three common factors for the present period. The major attribute of the extracted factors is that instead of differentiation of sociological, political, and economic spheres of the economy for this sub-period representing the highest economic development level, we observe that the interrelationship of political, sociological, and economic variables increases. This increased association is shown through greater number of political variables loading significantly on the same factors with the sociological variables. Moreover, political and sociological spheres of development explain a larger percentage of the unit variance of per capita GNP for the sub-period (GNP's communality has increased to .99). As a result, the [A-M] conclusion concerning "differentiation" of spheres of development as a country advances to higher stages of growth does not apply to this period. This conclusion represents two alternative hypotheses. The first hypothesis is that, instead of economic development, the Iranian economy has experienced backward growth during this period, and the integration of the political sphere with economic and sociological forces is a result of that backward growth. The

second hypothesis is that the Iranian economy has experienced economic development, but [A-M] conclusions are not simply generalizable to this specific single country case. Both of these hypotheses will be discussed further in the concluding chapter.

The first factor in our analysis represents a "socio-political" dimension of development and explains 65.7% of total variations in data (Fig. IV-5). This dimension actually explains the total unit variance of per capita GNP. The direction of associations for sociological variables are as primarily expected, showing higher levels of income interrelated with increased social modernization and leadership commitment to economic development. But, higher levels of per capita GNP are interrelated with greater political tension and instability.

The second common factor includes the variables: total population, urbanization index, tax structure modernization index and administration instability index. Increased urbanization is shown to be interrelated with the modernization of tax structure. This association is justified because the tax modernization indicator is a strong representative of monetization of the economy which is related to urbanization. This dimension can be called the "political dimension of urbanization." Higher levels of urbanization and monetization of the economy are shown to be associated with increased instability of administration.

The third common factor represents a unique "freedom

of political expression" dimension for the third sub-period. One other political variable, political instability index also loads significantly on this factor (.35). Thus, the third common factor can be termed a "political environment of development." This dimension reveals that less freedom of political expression in this period has been associated with increased political and administrative instability. Though this dimension explains only 10.6% of total variance in the data, its significance lies in the grouping of the political variables (Fig. IV-5).

The main conclusions to be derived from this analysis are:

1. Instead of further "differentiation" of political, sociological, and economic spheres, in this period we observe higher association among the three.
2. Sociological variables continue to have a more significant association with the level of GNP.
3. Even though political variables such as political instability load significantly on the same dimension as sociological variables, we still observe a unique political dimension in Iran. As discussed earlier, this political dimension is a short-run phenomenon and does not seem to be sensitive to the long-run level of economic development.

TABLE IV-5

VARIMAX ROTATED FACTOR MATRIX FOR GNP AND
TWELVE SOCIAL AND POLITICAL VARIABLES
(THIRD SUB-PERIOD: POLITICAL INSTABILITY PERIOD)*

Social and Political Indicator	Factor Loading			Communality h_i^2
	F_1	F_2	F_3	
1. GNP	.99	-.01	.11	.99
2. Total population	.87	-.51	-.11	.99
3. Education	.97	.28	.14	.99
4. Health	.97	-.17	-.13	.99
5. Domestic consumption of petroleum products	.97	-.26	.06	.99
6. Extent of leadership commitment to military strength	.96	.23	.04	.99
7. Social adaptation of technology	.93	.27	.11	.96
8. Extent of leadership commitment to development planning	.81	-.17	.15	.70
9. Political instability index	.66	.26	.35	.62
10. Urbanization index	.19	.53	-.03	.32
11. Tax structure modernization index	.07	.79	-.07	.63
12. Administration instability index	-.44	.56	.53	.78
13. Freedom of political expression	-.34	.20	.99	.99

*For Pearson Correlation Coefficients used in extracting the matrix of common factors refer to Appendix C, Table C-IV.

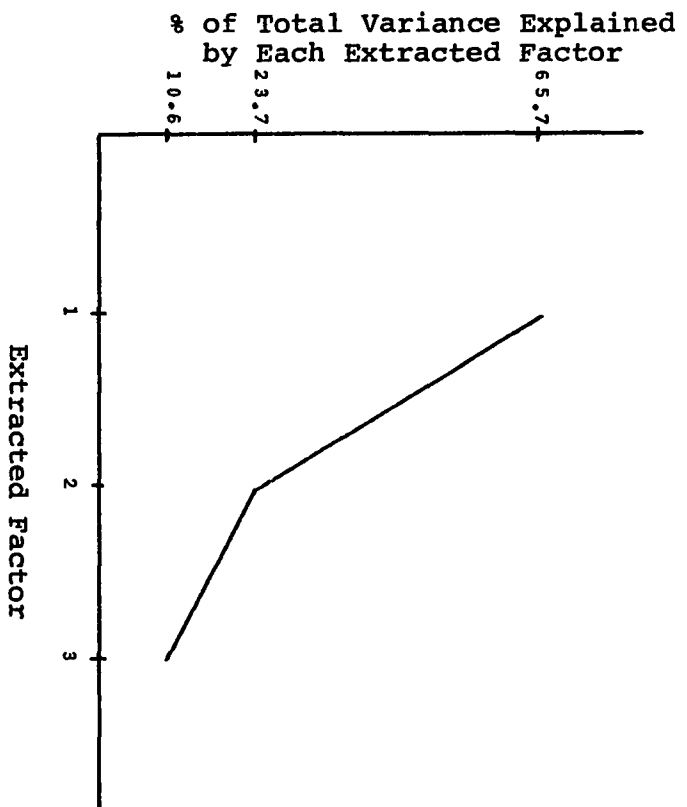


FIGURE IV-5

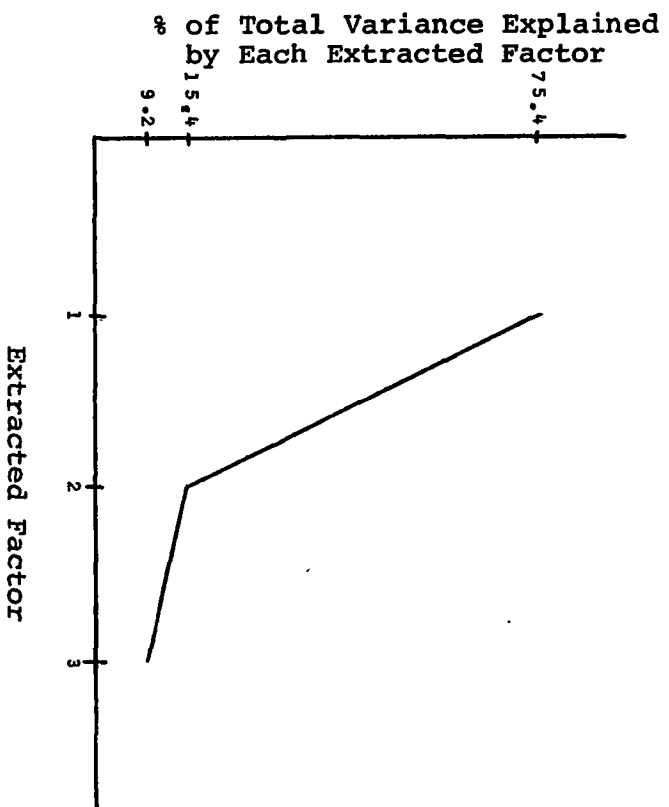


FIGURE IV-6

Economic Development Analysis

The results of the factor analysis for this case is shown in Table IV-6. The first factor is a general development factor explaining the bulk of variance in the level of income. The direction of association between sociological variables and economic indicators is generally as expected. Higher income levels and social modernization are, once again, associated with increasing political tension. Moreover, the significant loading of political instability on this dimension reveals a "reversed" differentiation process as indicated in our socio-political analysis. This dimension explains 75.4% of total variations in data (Fig. IV-6).

The second factor is a dimension illustrating urbanization process in this sub-period. Higher levels of urbanization and tax structure modernization are associated with lower levels of government deficit spending. This can be expected as the economy goes through monetization, and urban population pay higher rates of taxes than the rural population.

The third common factor in this study includes the following variables: agricultural production, freedom of political expression, and administration instability index. In the analysis of our second period (Table IV-4) agricultural production was shown to load significantly on the same dimension with political variables. This association is important because as the nation passes through social modernization and urbanization, the role of the agricultural sector as a major

contributor to GNP and as the single largest employer declines. The released agricultural labor, and the landlords whose share of total income has decreased, pose potential political dissident groups. This process has been reflected in the composition of our third dimension.

The major conclusions for this analysis are the same as presented above for the socio-political analysis of this sub-period. The major conclusions will be discussed more extensively and compared to the results of other research in this area in the next chapter.

TABLE IV-6

VARIMAX ROTATED FACTOR MATRIX FOR 25 ECONOMIC,
SOCIOLOGICAL AND POLITICAL VARIABLES
(THIRD SUB-PERIOD: POLITICAL INSTABILITY PERIOD)*

Economic, social and political indicator	Factor Loading			Communality h_i^2
	F ₁	F ₂	F ₃	
1. GNP	.99	.13	.03	.99
2. Total population	.78	.54	.32	.99
3. Non-oil exports	.86	.50	.08	.99
4. Imports	.99	-.10	.02	.99
5. Gross domestic capital formation	.98	-.08	.05	.97
6. Money supply	.99	.10	.05	.99
7. Wholesale price index of domestic goods	.99	.13	.00	.99
8. Wholesale price index of imported goods	.96	.25	.01	.98
9. Wholesale price index of exported goods	.96	.19	-.01	.95
10. Wholesale price index of food products	.98	.14	.03	.99
11. Oil revenue	.95	-.15	.04	.93
12. Extent of govern- ment participa- tion in economic activity	.98	-.06	.02	.97
13. Education index	.99	-.17	-.02	.99
14. Extent of leader- ship commitment to development planning	.82	.29	.01	.77
15. Political insta- bility index	.75	-.19	-.24	.66
16. Extent of leader- ship commitment to military strength	.98	-.13	.02	.98
17. Health index	.92	.25	.29	.99
18. Domestic consump- tion of petroleum products	.93	.35	.11	.99

TABLE IV-6 (continued)

Economic, social and political indicator	Factor Loading			Communality h_i^2
	F_1	F_2	F_3	
19. Social moderniza- tion index	.95	-.10	-.08	.92
20. Urbanization index	.24	-.48	.05	.28
21. Fiscal policy indicator	.25	.54	-.32	.46
22. Tax structure modernization index	.01	-.89	.05	.79
23. Agricultural production	.62	-.26	.66	.89
24. Freedom of political ex- pression	-.44	-.30	.82	.96
25. Administration instability index	-.30	-.49	-.70	.82

*For Pearson Correlation Coefficients used in extracting the matrix of common factors refer to Appendix C, Table C-IV.

CHAPTER V

SUMMARY AND CONCLUSIONS

Development economists have long been aware of the strong interrelationship between the sociological and political environment on one hand and the economic environment on the other in the development process of the less developed countries. But the magnitude and pattern of associations among these three different dimensions of social development has rarely been investigated statistically. This study examines the association among diverse variables from different social spheres of a less developed country.

The two hypotheses are tested in this study:

- 1) There is a strong association among economic and non-economic variables in the development process.
- 2) As a country advances to higher levels of economic development, the degree of association among non-economic variables on one hand and the economic variables on the other is reduced

The country chosen as our case study is Iran. The method of factor analysis is employed for data reduction and analysis. Twenty-five indicators representing economic, po-

litical, and sociological spheres of the Iranian economy are generated for the thirty-six year period from 1941 to 1976. In Chapter II the method of analysis, the choice of variables, and the variable definitions were discussed.

In Chapter III the long-run patterns of association among the economic and non-economic variables were tested through the analysis of factorial structure for the entire thirty-six year period. In this long-run analysis two different factorial structures were extracted. In the first one, the non-economic variables were factor analyzed along with the real per capita GNP omitting the rest of the purely economic variables. This analysis reveals the long-run socio-political dimensions of development. In the second factor analysis, all the twenty-five indicators were incorporated. This analysis reveals the long-run pattern of association among the three dimensions of growth.

In Chapter IV the short-run factorial structures were tested for three sub-periods each representing thirteen, nine, and fourteen years of Iranian social development, respectively. For each sub-period two factor analyses were presented. The first factor analysis includes only sociological and political variables along with the real per capita GNP. These factorial structures are called the short-run socio-political dimensions of growth. The second factor analysis for each sub-period includes all thirty-six economic, sociological and political variables. These factorial structures are called the economic

development dimensions of growth.

In this Chapter we discuss the results of the last two chapters in order to understand the development process. In all the models presented in this study, the main economic variables show the highest explanatory power. These variables usually load on the first extracted factor, which explains the highest percentage of variance in the data set. This is in line with the conclusion by R. J. Rummel, that:

With the contemporary interest in economic development and its relationship to society, it is difficult to overstate the importance of this dimension. Since it came out not only as the strongest dimension, but as one accounting for one-fifth of the variation in the widest possible selection of diverse variables, the emphasis given economic development in the literature appears to be justified.¹

In each of the four factor analyses including all the twenty-five economic, sociological, and political variables (economic development analysis in Tables III-4, IV-2, IV-4, and IV-6), 54 to 92 percent of the economic variables load on the first extracted factor. Moreover, the first extracted common factor explains at least 50 percent of the total variance in all the variables. This shows that, at least in the case of the Iranian economy, the economic variables have the strongest explanatory power in the process of social change and development.

¹Rummel, R. J. The Dimensions of Nations. Beverley Hills: Sage Publications, 1972. p. 220.

Given the strong position of economic variables in the developmental process, the whole transformation of the economy can yet be better understood through the analysis of the pattern of associations among the different spheres during the social change. First we analyze the following hypothesis stated in Chapter I: "There is a strong association among economic and non-economic variables in the development process." A strong interrelationship among sociological, political, and economic forces in the developmental process has been shown in the analyses presented in Chapters III and IV. In both the "economic development" analyses, including all the 25 economic, sociological, and political variables, and the socio-political analyses, including the 12 socio-political variables plus real per capital GNP, 71 to 100 percent of the sociological variables load significantly on the first common factor (Table V-1). This high percentage of sociological variables in the first common factor, along with most of the economic variables, shows a strong correlation between the economic and sociological dimensions of development. Moreover, as indicated by the percentage distribution of the sociological variables on different factors in Table V-1, these variables show a stable factor pattern. In all the cases, the sociological variables load mostly on the first and then the second extracted common factor. Their percentage distribution in the third common factor is always substantially lower. In all the "socio-political analyses," the percentage

distribution of the sociological variables among the first three extracted factors is almost the same as their distribution in their respective "economic development analyses" of the same time-period. It can be concluded that the sociological and economic dimensions have a strong direct feedback on each other, and progress in one is associated with developments in the other. This strong association is of stable nature and is relevant for both short-run and long-run analyses of the economy.

The pattern of this strong association between the sociological and economic dimensions is clearly positive. In the four socio-political analyses the factor loadings for sociological variables have the same sign as the real per capital GNP in twenty-nine out of thirty two cases (90 percent of the cases). This direct feedback indicates that social attitudes and modernization of life style have accommodated changes in the economic domain. There is not any indication that sociological variables have acted as a bottleneck to the economic development or vice versa. This is in contrast to the conclusions derived by some of the "modernization" studies.² Some "modernization" researchers, on the other hand, have arrived at our conclusion that sociological transformation of the economy is not a prohibiting factor in its economic growth. They have empirically shown

²Aleyandro Portes, "The Factorial Structure of Modernity: Empirical Replications and a Critique" American Journal of Sociology, 1972, Volume 79, Number 1, July, p. 17.

that a "modernity" dimension exists in some of the LDCs.³

The political variables, on the other hand, reveal a less strong feedback to and from the economic domain. In the long-run analysis, the "political dimension" of development explains only 4 percent of the unit variance in real per capita GNP and 16 percent of the variance in all the other variables included in the analysis. In the short-run analyses due to the disbursement of political variables amongst different extracted factors, the explanatory power of the political variables in the case of real per capita GNP cannot be measured. But it is obvious that their explanatory power is much less than the sociological variables.

The political variables do not also reveal any stable pattern of association with sociological or economic dimensions of growth. In all the factor analyses, the percentage of political variables loading significantly on the first, second, or third common factor shifts from one case to another (Table V-1). Both in the "socio-political analyses" and the "economic development analyses" 40 to 80 percent of the political variables load significantly on the first common factor.

In the short-run analyses, the political variables gain more significance and explanatory power in subsequent sub-periods. In the first sub-period, the political variables, especially the "political instability" index, show am-

³Ibid, p. 17.

TABLE V-1

PERCENTAGE DISTRIBUTION OF ECONOMIC, SOCIOLOGICAL,
AND POLITICAL VARIABLES AMONG THE EXTRACTED
COMMON FACTORS

FACTOR ANALYSIS	ECONOMIC VARIABLES			SOCIOLOGICAL VARIABLES			POLITICAL VARIABLES		
	F ₁	F ₂	F ₃	F ₁	F ₂	F ₃	F ₁	F ₂	F ₃
I. Socio-Political Analysis	%	%	%	%	%	%	%	%	%
1. Table III-2	NA*	NA	NA	71	43	14	40	60	0
2. Table IV-1	NA	NA	NA	71	43	0	80	0	60
3. Table IV-3	NA	NA	NA	100	0	0	60	60	20
4. Table IV-5	NA	NA	NA	71	43	0	60	20	40
II. Economic Development Analysis									
5. Table III-4	92	0	8	71	14	14	40	60	20
6. Table IV-2	54	38	8	71	43	0	80	0	20
7. Table IV-4	69	23	15	100	0	0	60	40	20
8. Table IV-6	92	15	7	71	43	0	60	0	40

*Not Applicable

biguous and very weak patterns of association with economic variables, especially GNP. The "political instability index" loads significantly on more than one dimension with conflicting patterns of association implied with the level of economic welfare. In the second sub-period, the communality of the political variables is substantially higher, showing a stronger interrelationship among the political and socio-economic dimensions of social transformation. In this sub-period, the increased level of social welfare is clearly associated with less political tension and disturbance. The political variables have their strongest impact on the economic domain in the third sub-period. In this sub-period, the "political instability index" loads significantly on the first common factor which explains the bulk of the variance in real per capita GNP. The pattern of association is clearly positive, indicating that higher levels of economic welfare are associated with higher levels of political instability and tension.

It can be concluded that the political domain of development is better comprehended through short-run analysis of the developing country rather than its long-run analysis. Moreover, as a country advances into higher stages of growth and development, the nature and pattern of the interrelationship among political variables on one hand and sociological and economic variables on the other changes continuously. In the third sub-period of our analysis, the political dimen-

sion has acted as a bottleneck to economic and sociological progress.

In this section we analyze the second hypothesis stated in Chapter I:

"As a country advances to higher levels of economic development, the degree of association among non-economic variables on one hand and the economic variables on the other is reduced."

The cross-sectional study of [A-M] concludes that:

In the long transition during which a society evolves from tribalism to self-sustained economic growth, the closely woven political, social, and economic strands of the social fabric change their pattern and their relationships. Our research suggests that one may look at the entire process of national modernization as the progressive differentiation of the social, economic, and political spheres from each other and the development of specialized institutions and attitudes within each sphere. . . . During this process of successive differentiation, the economic aspects of the society become increasingly more important and more explicit until, at the fully developed stage, economic considerations become a powerful force in shaping national behavior. This is the essence of the picture of economic development which emerges.⁴

Such a differentiation is observed between the first and second sub-periods of our study. But for our third sub-period this process is not indicated in our model. The percentage of the standardized unit variance of real per capita GNP explained by sociological and political variables decreases from the first sub-period to the second sub-period, but increases from second to third sub-period. Moreover, more of the sociological and political variables load on the

⁴Adelman, Irma and Morris, Cynthia. Society, Politics, and Economic Development: A Quantitative Approach. (Baltimore: The Johns Hopkins Press, 1967), pp. 267-269.

same factor with the economic indicators in the third sub-period. If the level of real per capita GNP had been used as a proxy of total social development, then the Iranian economy would have signaled the false indication of modernization and progress in our third sub-period. But the integration of the sociological and political spheres with economic aspects shows that a reverse process of social modernization has taken place between the years 1963 to 1976.⁵ This reverse process should not be interpreted as a worsening of the economic position of the country but as a deterioration of the total social process called development. This deterioration may very well be due to the disequilibrium in the rates of modernization in economic and non-economic spheres. From the comparison of Tables IV-1, IV-3, and IV-5, it is obvious that the political variables have gained more significance in each subsequent sub-period. The relative explanatory power, variance explained, and the cluster of sociological variables have not changed much in the three sub-periods. For all the models presented for the first and second period, political instability is inversely associated with the level of real per capita GNP. Only for the third sub-period are higher levels of per capita GNP associated with increased po-

⁵In this line Joan Robinson concludes that: "For several of the Arab states, GNP per capita suddenly jumped to levels which exceeded that of the richest Western states. Yet in these countries are found some of the poorest and least-developed economies in the world." Robinson, Joan. Aspects of Development and Underdevelopment, (Cambridge: Cambridge University Press 1979) p. 5.

litical instability. Even for the entire period (presented in Chapter III), an inverse relationship between per capita GNP and political instability is indicated.

With respect to the two hypotheses discussed in Chapter IV above, all the economic variables indicate towards economic growth in the third sub-period. The second hypothesis that either slower or backward progress of political institutions has acted as bottlenecks to economic development is suggested by this analysis. Though a causal explanation of the results is erroneous, the above results suggest that instead of concentrating on the sociological variables, future predictive models of the Iranian economy should concentrate on revealing the basic dependence structure of political and economic variables.

In our analysis of economic, political, and sociological variables, the clustering of all economic variables is stable except for two cases. The first case is in our first sub-period. In this instance, the economic variables load significantly on two different dimensions instead of one. This is the direct result of the WWII and oil-nationalization efforts. From this analysis, it can be concluded that in times of war or national crisis, economic variables representing the cost of living and the availability of key commodities generate a new dimension in development process. This dimension is inversely related to real per capita GNP (Table IV-2). In this dimension, the cost of food index has the single highest factor loading (.94).

The second case is for the agricultural production indicator. This key economic variable clusters with other economic variables only in our long-run analysis. In the short-run analysis this variable shifts to different dimensions, mostly political in nature. The fact that the communality and factor loading of this variable in our long-run analysis is relatively small (.49 and .58, respectively, in Table III-4) indicates that this variable does not explain and is not itself explained by other economic development forces in our long-run analysis. The relative deterioration of the agricultural sector as the main contributor to GNP may very well have been the reason behind this lack of explanatory power.⁶ This deterioration can also explain the grouping of this indicator with the political variables in the short-run. The release of huge numbers of agricultural employees from this sector had to be accommodated by other sectors of the economy. This transition has posed problems for the political elite in Iran. In all of the short-run analyses, the agricultural production loads significantly on the same factor with administration instability indicator (even for the second period where they are not in the same factor). So, the second hypothesis suggested by our analysis is that the changing productive character of a less-developed economy generates political tensions to the extent that the transition of the major part of the work force has to be guided by political

⁶Agricultural sector accounted for 90% of the total GNP for the year 1941, and only 9.1% for the year 1976.

leadership to new modes of production. A priori knowledge about the imperfections in the market system in less-developed economies, the lower level of education of the transient labor force, and the greater role of government in these economies are contributors to this hypothesis.

With the critical role of oil exports for Iranian economic and political development, a closer look at this variable is warranted. In our long-run analysis and also in two of our short-run analyses this indicator loads significantly on our main socio-economic dimension. There is no indication that the changes in this variable are associated with the political tension variables. Only in the first sub-period (the war and oil-nationalization period), oil revenue shifts out of the socio-economic dimension to another factor. This new factor is composed of the level of imports and oil revenue (exports). This "international trade" dimension also loads significantly on two political variables in this period. The above suggests that though oil revenue (export) is a main source of GNP, it cannot be regarded as a "specific" dimension in Iranian development process. This variable acts in the same manner as any other economic indicator in the model.

Conclusion and Policy Implications

The major conclusion derived from our study is that sociological and political environments are highly interwoven with the economic sphere in the process of development. All these three dimensions of development have to progress

hand-in-hand. Otherwise, the ones which progress less will act as a bottleneck to economic development.

In the case of Iran, sociological variables seem to have been positively associated with economic progress all through analysis. The analysis of political variables, on the other hand, suggests that in our third sub-period, uneven progress in this domain has acted as a bottleneck for social and economic progress. The [A-M] analysis has led to the conclusion that the countries in the "intermediate" level of development are characterized by high social tension. The implication is that these countries have to reduce their level of social and political tension before significant increase in economic development can be achieved.⁷

The above analysis shows that our hypothesis with regard to our sub-periods corresponding to the [A-M] classification of less-developed countries as "low," "intermediate," and "high" development levels, respectively, is rejected. Though a strong correspondence is suggested between our first sub-period and their "low" income countries, there are marked distinctions as well. The only positive indication is that the Iranian economy in the third sub-period (1963-1976) was most similar to their "intermediate" level countries. Since the [A-M] analysis categorized Iran in their "intermediate" level of development in the 1960's, the future research

⁷Adelman and Morris, p. 272.

on Iranian economy should explore the reasons why this country has not been able to transform its social system into a higher level of development in the last fifteen years. As indicated above, our analysis suggests that the role of political institutions should be analysed in this context.

Moreover, in the economic domain, our analysis suggests that the vast transformation of the economy from an agricultural mode of productions to other sectors as the main source of GNP has had increasing association with political tension variables in subsequent sub-periods. This indicates that the release of agricultural labor from this sector poses political difficulties for the ruling class. The association of this variable mainly with sociological and political variables reveals such a tendency in countries at their intermediate level of development. This pattern of association is also an indicator of economic dualism in Iran. The agricultural production indicator represents the backward sector of the Iranian economy. It also shows greater association with political tension indicators than with the oil-revenue which is representative of the growth sector. The two indicators (oil revenue and agricultural production) seldom load on the same factor, especially in our short-run analyses. This disassociation between these two economic variables is significant since they represent the two largest contributing sectors to GNP. Though the existence of economic dualism is a direct conclusion of our factor analysis, we cannot measure

its extent or detect its causes through the preceding analyses. Thus it can be concluded that in addition to political tension variables, the Iranian economy was faced with economic dualism as a bottleneck to its development.

APPENDIX A

FACTOR ANALYSIS

Factor analysis is a model about hypothetical component variables which account for the relationships that exist between observed variables. To apply factor analysis, there should be non-zero correlations between the variables.

"If such correlations do not exist, then the variables are themselves the only sufficient set of variables to account for their relationships. However, if definite correlations exist among some of the observed variables, then a hypothetical set of component variables can be derived mathematically from the observed variables that may make it possible to explain their interrelationships."¹

The hypothetical component variables can be divided into two basic kinds of components:

1. Common components or common factors
2. Unique components or factors

The common factors which are necessary to explain the inter-correlations among the variables are distinguished by having more than one variable with a non-zero weight associated with the factor. Hence two or more observed variables depend upon

¹Mulaik, Stanley, A. The Foundations of Factor Analysis, (McGraw Hill Book Company, 1972), p. 96.

a common factor. In other words, the common factor explains a portion of the variance of each observed variable. The unique factors have only one variable with a non-zero weight or factor loading associated with them. Hence, only one variable depends upon a unique factor.

Mathematically we may write:

$$x_i = a_{i1}F_1 + \dots + a_{im}F_m + b_iU_i + C_iE_i \quad (1)$$

where:

- x_i : observed variables, $i = 1, n$
- a_{ij} : factor loading of i^{th} variable on j^{th} factor
- F_m : m^{th} common factor
- U_i : i^{th} unique factor
- E_i : random error

It is apparent from equation (1) that the system is under determined because it contains more parameters than observations. In order to overcome this problem it is assumed that:

1. Common factors are uncorrelated
2. Unique factors are mutually uncorrelated
3. X_i , F_m , U_i , and E_i have unit variances

As long as it is assumed that the X_i has a normal distribution, the correlation coefficients r_{xx} are not dependent on the scale of measurements.

Variance of X_i , according to equation (1) is:

$$\sigma_{xi}^2 = \frac{\sum x_i^2}{N} = a_{i1}^2 \frac{\sum F_1^2}{N} + \dots + a_{im}^2 \frac{\sum F_m^2}{N} + b_i^2 \frac{\sum U_i^2}{N} + \dots$$

$$+ 2a_{i1}a_{im} \frac{\sum F_i F_m}{N} \quad (2)$$

Since all the terms $r_{im} = \frac{\sum F_i F_m}{N} = 0$ (all common factors have been assumed to be orthogonal) and also all factors are in standard form, thus we can write:

$$1 = a_{i1}^2 + a_{i2}^2 + \dots + a_{im}^2 + b_i^2 \quad (3)$$

Equation (3) may be written as:

$$1 = h_i^2 + b_i^2$$

$$\text{where: } h_i^2 = a_{i1}^2 + a_{i2}^2 + \dots + a_{im}^2$$

h_i^2 is called communality of a variable and shows the portion of the total unit variance of the variable explained by the m common factors.

In matrix notation we can show equation (3) as:

$$H^2 + B^2 = I \quad (4)$$

where I is the identity matrix.

B^2 is the diagonal matrix of uniqueness (variance of the unique parts of a variable not explained by common factors).

Equation (1) may be written as:

$$X = AF + BU \quad (5)$$

where the error term has been assumed to be specific to each variable and hence treated as a part of U .

The objective is to estimate the A and F matrices.

According to the assumptions 1 to 3, the correlation matrix can be shown as:

$$R = E(XX') \quad (6)$$

Actually, the correlation matrix R is the only input into the factor analysis model. We have used the first moment Pearson Correlation Coefficients in this study. The Pearson Correlation matrix is presented in Appendix C (for the total period and each sub-period respectively).

Algebraically, the number of factors included in the model is equal to the rank of observed values X . The rank of X is usually equal to the rank of correlation matrix R (we assume that none of the observed variables is completely dependent on any other variable). To the extent that the rank of correlation matrix is n , the n observed variables cannot be described with less than n factors. Since we aim to represent the n observed variables by a smaller number of factors, we substitute the diagonal of the correlation matrix R (which is $r_{ii} = 1$) with the communalities (discussed above). The rank of correlation matrix with communalities in its diagonal is usually less than n . This new correlation matrix will give us less than n factors.

It can be shown that:

$$R = AA' + B^2$$

so we can write:

$$AA' = R - B^2$$

$$\text{if } AA' = R_c \text{ then } R_c = R - B^2 \quad (7)$$

R_c is called the residual correlation matrix because the matrix of unique-factor variance (B^2) has been subtracted from the correlation matrix R to get it. Hence the correlation among the variables in R_c are due to the common factors.

Let matrix of observations that corresponds to the residual correlation matrix R_c be X_c . X_c is different from X if there are any variables in X which do not share any common variance with other variables and hence are dropped from the common factor analysis.

It can be shown that the equation (1) or (5) can be written as:

$$X_c = aF \quad (8)$$

after the effect of the error term and the unique factor has been eliminated through the above reduction method. Equation (8) expresses that each column of X_c is equal to some scalar multiple of F . We can show that:

$$F = a'X_c \quad (9)$$

we want to estimate both F and a .

According to the assumption that the common factors are orthogonal, we can write the variance of the first extracted common factor (or principal component) as:

$$F_1^2 = a_1'R_c a_1 \quad (10)$$

where a_1 is the coefficient vector of the first common factor.

Principal Component Solution

If the factoring method of Principal Components is

utilized, then to find the elements in a_1 the magnitude F_1^2 in (10) must be maximized subject to the normalization constraint that:

$$a_1' a_1 = 1 \quad (11)$$

This maximization is carried out using the langrange multiplier technique. The function to be maximized is:

$$V = a_1' R_C a_1 - \lambda_1 (a_1' a_1 - 1) \quad (11)$$

It can be shown that equation (11) is maximized by:

$$\frac{\partial V}{\partial a_1} = 2R_C a_1 - 2\lambda_1 a_1 = 0 \quad (12)$$

or

$$2R_C a_1 - 2\lambda a_1 = 0$$

$$R_C a_1 = \lambda a_1$$

$$(R_C - \lambda I) a_1 = 0 \quad (13)$$

since $a_1 \neq 0$, then:

$$[R_C - \lambda I] = 0 \Rightarrow R_C = \lambda I \quad (14)$$

So for finding the elements of a_1 in equation (13) we have to determine the characteristic root (eigenvalue) and associated characteristic vector (eigenvector) in equation (14).

The factor loadings for the second common factor (a_2) are derived with a similar maximization process. In this case we want to maximize the variance explained by the second factor (a_{i2}^2) given that the (a_{i1}^2) is already maximized. We also require that the second factor, F_2 , be uncorrelated to

the first common factor, F_1 , or:

$$a_2' a_1 = 0$$

The maximization problem will give us the following condition to be solved for components of a_2 :

$$(R_c - \lambda I) a_2 = 0 \quad (15)$$

as $a_2 \neq 0$, then:

$$R_c = \lambda I \quad (16)$$

The process of factor extraction can continue until all the common variance of the variables are accounted for by the extracted factors. But usually, a minimum value for λ is specified. In that case all the factors with λ (eigenvalue) greater than the specified magnitude are retained and the rest are rejected.

Alpha Factor Solution

In our study we would like to extract the factors which account for the overlap or association of the sociological, economic, and political variables. To do so, we factor analyzed a sample of 25 observed variables from these 3 spheres. If we had used the principal component solution, the resulting factor pattern would have been for the specific set of variables included in the analysis. Generalizing the inferences made from this particular analysis to the universe of a larger number of variables (total developmental attributes of the country) would have posed a problem. To avoid this problem,

we have utilized another factoring method namely alpha factoring. Hotelling has put the difference between the two factoring methods as:

Instead of regarding the analysis of a particular set of tests as our ultimate goal, we may look upon these merely as a sample of a hypothetical larger aggregate of possible tests. Our aim then is to learn something of the situation portrayed by the large aggregate.²

Our problem in alpha factor analysis, then, is to extract the common factors which would be found in the large aggregate of variables from a specific sample of variables. This problem has been referred to as domain reliability and validity. The factors extracted through this method are the most generalizable to the domain under investigation.

The principle under which this method is based is that common factors F_m are to be determined which have maximum correlation with corresponding original variables U_1 . This coefficient has been called generalizability or alpha coefficient. It has been shown that this alpha coefficient may be written as³:

$$\alpha = \frac{n}{n-1} \left(1 - \frac{a'H^2a}{a'(R_c)a} \right) \quad (17)$$

where: n = number of observed variables

H^2 = diagonal matrix of communalities

In order to maximize α (and hence, generalizability) it is

²Hotelling, H. "Analysis of a Complex of statistical variables into principal components." Journal of Educational Psychology, 1933, p. 504.

³Mulaik, p. 210.

sufficient to maximize the following equation:

$$\lambda^2 = \frac{a' (R_c) a}{a' H^2 a} \quad (18)$$

Taking the derivative with respect to (a) and setting the result equal to zero we obtain:

$$[H^{-1}(R_c)H^{-1} - \lambda^2 I]Ha = 0 \quad (19)$$

Now the problem of finding the elements of (a) reduces to that of determining the characteristic roots λ^2 and its associated characteristic vector. All the factors for which $\lambda^2 > 1$ are retained and the rest rejected. If $\lambda^2 < 1$, then α becomes negative.

In equation (19) the values of the communality matrix H is not known. For evaluating this matrix a method called iteration has been used. In this method, initially an estimate based on the reduced correlation matrix R_c is generated and used. Then through consecutive iterations, the estimates are improved and substituted for the last communality estimates. This procedure is continued until reasonable agreement is observed between two consecutive communality estimate. At that time the last calculated (a) components are accepted as the final solution.

APPENDIX B

TIME SERIES DATA USED IN THE ANALYSIS

In this appendix we present the raw data used in the analysis. For many of the indicators in our factor models, we have manipulated the raw data. For a full explanation of the final form of data in our factor model refer to Chapter II. The time series list, their labels, and the units of measurement are shown in Table B-I. The raw data are presented in Table B-II.

All the figures shown with an asterik have been estimated. We estimated the data figures using interval method if data for the years before and after it was available. For the end years we have estimated the figures applying the last annual percentage change. Out of a total of 1044 data cases, 51 cases or less than 5 per cent are estimated.

TABLE B-I

RAW DATA LIST

Times Series	Label
1. Total Population (mill. population)	TP
2. Urban Population (mill. population)	UP
3. Gross National Product (bill. Rials at 1965 prices)	GNP
4. Total non-oil exports (mill. Rials)	EAP
5. Total Imports (mill. Rials)	IMP
6. Gross Domestic Fixed Capita Formation (bill. Rials at 1965 Prices)	GDFC
7. Wholesale Domestic Price Index of Domestic Goods	DWPI
8. Wholesale Price Index of Imported Goods	IMPI
9. Wholesale Price Index of Food Products	FDPI
10. Wholesale Price Index of Exported Goods	EAPI
11. Wheat Production (1000 metric tons)	WT
12. Barley Production (1000 metric tons)	BRLY
13. Rice Production (1000 metric tons)	RICE
14. Money Supply (bill. Rials) ,	MS
15. Oil Exports (mill. Rials)	OILX
16. Fiscal Deficit or Surplus (mill. Rials)	FPI
17. Government Expenditure (mill. Rials)	GOVE
18. Educational Budget (mill. Rials)	EDU
19. Annual Defense Budget (mill. Rials)	DFS
20. Annual Health Budget (mill. Rials)	HCT
21. Domestic Consumption of Petroleum Products (mill. Long Tons)	PETC
22. Number of Passenger Cars Registered	SOCI
23. Total Tax Revenue	TTAX
24. Income Taxes	ITAX
25. Number of Daily Newspapers in Teheran	NEWS
26. Number of Open Political Parties in the Country	PTY
27. Political Instability Index	POLS
28. Administration Instability Index	ADMS
29. Annual Development Budget Allocation (mill. Rials)	LEAD

TABLE B-II

TIME SERIES DATA^a

Year	(1) TP	(2) UP	(3) GNP	(4) EAP	(5) IMP
1941	14.76	3.33	185000	826	791
1942	14.98	3.48	175000	570	2393
1943	15.21	3.68	160000	709	1963
1944	15.43	3.79	150000	799	2586
1945	15.66	3.96	150000	1707	3724
1946	15.93	4.13	170000	2589	4954
1947	16.43	4.31	180000	2366	5777
1948	16.73	4.49	200000	1867	5478
1949	17.15	4.69	205000	1785	9275
1950	17.58	4.89	212000	3563	6974
1951	18.02	5.11	213000	4391	7228
1952	18.47	5.33	215000	5832	5172
1953	18.93	5.56	219000	8426	5676
1954	19.40	5.80	220000	10288	7726
1955	19.88	6.05	232000	8034	10058
1956	20.38	6.32	249000	7931	25122
1957	20.96	6.65	260000	8353	31388
1958	21.57	7.00	270000	7941	45255
1959	22.19	7.37	282553	7701	49078
1960	22.83	7.67	296066	8360	49219
1961	23.48	8.17	309589	9593	46062
1962	24.15	8.60	323075	8604	41818
1963	24.85	9.05	339155	9617	39224
1964	25.56	9.53	364633	11485	50664
1965	66.30	10.03	408674	13559	65152
1966	27.07	10.56	433304	11815	70324
1967	27.86	11.14	484626	13633	85245
1968	28.65	11.76	569400	16268	104800
1969	29.50	12.41	621600	18533	115700
1970	30.35	13.10	689700	21192	125900
1971	30.70	13.30	757900	26270	141900
1972	30.82	13.40	909500	33862	182500
1973	31.92	13.50	1167200	42840	233020
1974	32.14	14.02	1571800	39248	367400
1975	33.02	14.69	1856700	40723	700300
1976	33.40	15.59	2425763*	49937*	970000

TABLE B-II (continued)

TIME SERIES DATA

Year	(6) GDCF	(7) DWPI	(8) IMPI	(9) FDPI	(10) EAPI
1941	10.0	26 ^b	23 ^b	22 ^b	23 ^b
1942	10.9	50	44	42	36
1943	8.5	105	90	105	54
1944	8.9	99	100	111	66
1945	9.9	88	85	93	69
1946	19.9	78	68	84	80
1947	19.0	55	74	85	88
1948	20.5	93	73	94	92
1949	24.5	94	70	105	79
1950	24.0	77	64	80	66
1951	23.7	86	77	83	76
1952	23.2	88	86	92	76
1953	24.4	100	100	100	100
1954	29.2	124	107	114	117
1955	39.8	117	105	114	116
1956	43.8	124	96	121	136
1957	50.3	131	88	126	134
1958	65.4	133	82	120	125
1959	76.8	146	85	135	121
1960	75.8	99 ^b	93 ^b	147	100 ^b
1961	61.3	100	96	133 ^b	99
1962	66.6	101	98	135	99
1963	60.1	100	100	136	100
1964	79.1	106	101	93 ^b	103
1965	100.9	111	102	96	103
1966	110.1	109	103	95	103
1967	137.7	108	104	97	104
1968	154.9	109	104	97	105
1969	159.4	112	108	99	106
1970	171.8	117	112	100	108
1971	226.5	126	115	107	115
1972	276.6	131	126	116	134
1973	304.1	125 ^b	129 ^b	124	170
1974	375.4	148	145	144	184
1975	654.0	157	151	161	191
1976	1139.6*	182	161	172	231

TABLE B-II (continued)

TIME SERIES DATA

Year	(11) WT	(12) BRLY	(13) RICE	(14) MS	(15) OILX
1941	1528507	667345	320*	3.57	1011
1942	1528507	667345	320	6.65	3483
1943	1528507	667345	320	9.27	3278
1944	1528507	667345*	385	10.61	3918
1945	1528507	1250000	423	11.08	5612
1946	2215000	866000	420	11.40	8049
1947	2175000	770000	350	12.25	9993
1948	2170000	850000	450	12.44	17140
1949	1631000	650000	480	12.27	15389
1950	2000000	800000	450	13.83	22184
1951	1800000	720000	360	13.31	6843
1952	2040000	840000	420	14.16	12
1953	2240000	820000	499	18.17	263
1954	2100000	820000	526	18.51	2008
1955	2313000	880000	322	20.22	9405
1956	2700000	1000000	440	23.59	15909
1957	2800000	980000	485	27.69	19298
1958	3040000	950000	435	36.33	22859
1959	2840000	990000	559	39.96	49450
1960	2923657	808571	472	39.30*	55391
1961	2869119	802343	400	38.63	56451
1962	2754740	765292	566	41.51	60845
1963	2468140	740442	574	45.15	67286
1964	2622578	718439	615	50.56	74850
1965	3647713	935454	681	71.1	89215
1966	4380982	1080400	700	82.4	92066
1967	4618368	1034733	941	96.9	133434
1968	4194000	1160000	980	105.1	135509
1969	4029000	1143000	1020	119.9	193000
1970	4004000	1083000	1056	128.3	167000
1971	3804000	901000	1046	154.9	176000
1972	4545000	1009000	1200	214.3	234000
1973	4600000	923000	1334	278.1	288000
1974	4700000	863000	1373	381.5	311251 ^a
1975	5570000	1438000	1430	458.2	1205245
1976	6044000	1487000	1566	668.0	1246799

TABLE B-II (Continued)

TIME SERIES DATA

Year	(16) FPI	(17) GOVE	(18) EDU	(19) DFS	(20) HLT
1941	-16	2732	195	485	65
1942	-560	3760	177	593	83
1943	+81	2663	252	700	54
1944	-2102	3993	306	1000	99
1945	+156	4419	380	1117	139
1946	+100	4312	508	1096	155
1947	-531	5995	566	1545	178
1948	-2462	8021	675	1477	211
1949	+250	6904	934	1651	216
1950	-2902	10687	961	2478	251
1951	-9000	10060	1141*	2495*	297*
1952	-599	10152	1321*	2511*	344*
1953	-555*	11304*	1501*	2527*	391*
1954	-512	12456	1681	2544	438
1955	-10860	22154	2328	3978	519
1956	-6092	23445	2531	5298	529
1957	-6860	30829	4219	6457	617
1958	-6766	39660	5284*	8278	837*
1959	-7327	47920	6352*	13992	1129
1960	-7221	52594	7420*	16174	1129
1961	-4974	54761	8488*	13084	1129
1962	-4887	54667	9596*	14488	1129
1963	+980	55743	10624*	14064	2760
1964	-160	64151	11692*	14604	2760
1965	-5606	74725	12760*	17163	2760
1966	-10700	106900	13800	24400	4500
1967	-24400	134000	15000	33300	4800
1968	-33400	162800	15900	41900	5100
1969	+15483	268038	16400	46800	5000
1970	+2248	426182	17800	58200	5200
1971	-2089	397005	19700	65500	5700
1972	+36733	452621	23200	92100	6500
1973	0	519430	54165	91060	7412*
1974	+42581	731752	90895	134929	8453*
1975	-73	1902967	175445*	372648	9640*
1976	+1	2310234	259996	475959	10993*

TABLE B-II (continued)

TIME SERIES DATA

Year	(21) PETC	(22) SOCI	(23) TTAX	(24) ITAX	(25) NEWS
1941	0.269	1205*	1585	211	5
1942	0.388	1592*	1962	304	5
1943	0.717	2104*	1632	200	7
1944	1.267	2780*	930	310	4
1945	0.842	3673*	2837	900	5
1946	0.494	4853*	2449	659	5
1947	0.604	6413*	2996	587	5
1948	0.702	8475*	2504	696	6
1949	0.828	11200*	3195	849	6
1950	0.884	14800	3827	1160	6
1951	0.913	18400	4036*	1275*	6
1952	0.885	19500	4244*	1390*	7
1953	0.920*	22400	4453*	1505*	6
1954	0.960*	24300	4662	1620	5
1955	1.000	28600	2475	1114	9
1956	1.600	39000	2869	1214	9
1957	1.900	49300	4295	1593	9
1958	2.40	63400	5327	2241	8
1959	2.800	78300	7281	4198	8
1960	3.100	91800	8022	4235	8
1961	3.600	96400	8813	4459	9
1962	3.300	102900	8926	4548	9
1963	3.300	107800	8913	4716	8
1964	4.500	122100	10004	5585	9
1965	4.900	135000	10262	5562	10
1966	5.400	142400	13102	7900	21
1967	6.100	164200	16100	9100	21
1968	7.600	191700	21500	12200	21
1969	8.200	250300	56122	13064	12
1970	10.700	278200	65550	16853	12
1971	11.800	331200	80067	24442	12
1972	13.100	393900	90447	27592	12
1973	14.400	969300	120859	38849	12
1974	17.200	589200	143546	48008	12
1975	19.800	720400	271000	144000*	12
1976	22.800*	1040500	342000	177000*	11

TABLE B-II (continued)

TIME SERIES DATA

Year	(26) PTY	(27) POLS	(28) ADMS	(29) LEAD
1941	0	205	15	0
1942	0	535	30	0
1943	0	5	53	0
1944	0	0	30	0
1945	1	260	50	0
1946	1	2815	75	0
1947	2	725	108	0
1948	1	325	43	500
1949	1	750	13	500
1950	1	275	63	500
1951	2	3120	73	500
1952	2	1785	63	500
1953	2	3580	45	500
1954	1	1130	8	500
1955	1	305	40	500
1956	1	150	15	10700
1957	1	235	20	10700
1958	3	265	8	10700
1959	3	140	8	10700
1960	3	365	30	10700
1961	2	1095	38	10700
1962	2	435	28	10700
1963	4	560	28	46000
1964	4	220	23	46000
1965	9	510	23	46000
1966	10	245	3	46000
1967	10	95	3	46000
1968	8	55	5	96000
1969	5	175	0	96000
1970	5	185	0	96000
1971	5	375	0	96000
1972	5	430	0	96000
1973	5	355	0	1659000
1974	5	200	5	1659000
1975	1	580	8	1659000
1976	1	1210	0	1659000

* estimated

a source: Data for the columns (1), (2), (7), (8), (9), (10), (11), (12), (13), (14), (16), (17), (19), (22), (23), (24) are taken from United Nations Statistical Yearbook and United Nations Demographic Yearbook, various issues.

Figures for column (3) are from Aresvick, Oddvar. The Agricultural Development of Iran, (Praeger Publishers, Inc., 1976).

Figures for columns (4) and (15) are from Bhariar, Julian, Economic Development in Iran, (Oxford University Press, 1971) and also Statistical Yearbook of Iran, various issues.

Figures for Column (6) are from Bhariar, Julian, Economic Development in Iran, (Oxford University Press, 1971) and also Bank Markazi Iran, Annual Report and Balance Sheet, various issues.

Figures for columns (18) and (20) and (29) are from United Nations Statistical Yearbook, various issues and, Statistical Yearbook of Iran, various issues.

Figures for columns (25) and (26) have been taken from "The Political Handbook of the World," different issues.

Data regarding columns (27) and (28) are gathered, and weighted from the London Times Index and the New York Times Index, different issues. For information regarding the

the compiling procedures for these two indicators refer to Chapter II.

- b The figures for the years 1941-1959 were on the basis 1953 = 100. The figures for the years 1960-1972 were based on 1963 = 100. The figures for 1973-1976 were based on 1970 = 100. The two last series were converted to the common base 1953 = 100 using the method recommended in Introduction To Economic Statistics, by: C. Merrill and Karl A. Fox, (New York: John Wiley and Son, Inc., 1970).

APPENDIX C

THE PEARSON CORRELATION COEFFICIENT MATRIX

In this appendix we present the correlation coefficient matrix used in our factor analysis. Table C-I includes the list of variables in the analysis and their labels. Tables C-II through C-V show the first-moment Pearson Correlation Coefficient matrix for the total period and each subsequent sub-period. In each table, N represents the number of observations or in this case the number of years in each subsequent analysis.

TABLE C-I

THE VARIABLE LIST FOR
PEARSON CORRELATION COEFFICIENT
MATRIX

VARIABLE	LABEL
<u>I. ECONOMIC VARIABLES</u>	
1. Real per capita GNP	GNP
2. Gross domestic capital formation	GDC
3. Money supply	MSI
4. Wholesale price index of domestic goods	DWP
5. Wholesale price index of exported goods	WPX
6. Wholesale price index of imported goods	WPM
7. Wholesale price index of food products	FDP
8. Extent of government participation in economic activity	GOV
9. Non-oil exports	EAP
10. Imports	IMP
11. Oil revenue	OIL
12. Fiscal policy indicator	FPI
13. Agricultural production per capita index	AGR
<u>II. SOCIOLOGICAL VARIABLES</u>	
14. Education indicator	EDU
15. Health indicator	HLT
16. Tax structure modernization index	TAX
17. Social adaptation of technology index	SOC
18. Total population	TPI
19. Urbanization index	URI
20. Domestic consumption of petroleum products	PET
<u>III. POLITICAL VARIABLES</u>	
21. Extent of leadership commitment to development planning	LED
22. Freedom of political expression	FRP
23. Extent of leadership commitment to military strength	DFS
24. Administration instability index	ADM
25. Political instability index	POL

TABLE C-II

PEARSON CORRELATION COEFFICIENT MATRIX
 (TOTAL PERIOD: 1941-1976)
 N = 36

	(1) GNP	(2) GDC	(3) MSI	(4) DWP	(5) WPX
1. GNP	1.0000				
2. GDC	0.9685	1.0000			
3. MSI	0.9972	0.9773	1.0000		
4. DWP	0.8680	0.8453	0.8861	1.0000	
5. WPX	0.8968	0.8683	0.9085	0.9492	1.0000
6. WPM	0.8090	0.7767	0.8269	0.9059	0.9102
7. FDP	0.8582	0.8310	0.8768	0.9918	0.9389
8. GOV	0.9632	0.9780	0.9631	0.8166	0.8407
9. EAP	0.9266	0.8693	0.9317	0.9238	0.9294
10. IMP	0.9737	0.9901	0.9764	0.8341	0.8640
11. OIL	0.9333	0.9563	0.9338	0.7946	0.8153
12. FPI	0.3539	0.2211	0.3341	0.2547	0.2690
13. AGR	0.5548	0.5977	0.5765	0.4981	0.5752
14. EDU	0.9567	0.9800	0.9592	0.8039	0.8459
15. HLT	0.8800	0.8331	0.8905	0.9247	0.8666
16. TAX	0.1961	0.2710	0.2342	0.5052	0.4481
17. SOC	0.9227	0.8895	0.9102	0.7405	0.7944
18. TPI	0.7471	0.7029	0.7630	0.9246	0.8429
19. URI	0.1268	0.2111	0.1237	0.0213	0.0000
20. PET	0.9522	0.9024	0.9556	0.9300	0.9018
21. LED	0.9081	0.8145	0.8952	0.7677	0.8474
22. FRP	0.2795	0.2572	0.3080	0.5310	0.4028
23. DFS	0.9532	0.9802	0.9551	0.7982	0.8274
24. ADM	-0.4574	-0.4336	-0.4687	-0.6395	-0.5293
25. POL	-0.0167	0.0187	-0.0174	-0.1316	-0.0308

TABLE C-II (continued)

PEARSON CORRELATION COEFFICIENT MATRIX
 (TOTAL PERIOD: 1941-1976)
 N = 36

	(6) WPM	(7) FDP	(8) GOV	(9) EAP	(10) IMP
1. GNP					
2. GDC					
3. MSI					
4. DWP					
5. WPX					
6. WPM	1.0000				
7. FDP	0.9095	1.0000			
8. GOV	0.7682	0.8088	1.0000		
9. EAP	0.8600	0.9185	0.8453	1.0000	
10. IMP	0.7777	0.8223	0.9928	0.8515	1.0000
11. OIL	0.7410	0.7928	0.9901	0.8064	0.9800
12. FPI	0.2934	0.2578	0.2330	0.3832	0.2319
13. AGR	0.4578	0.5023	0.5833	0.4978	0.5948
14. EDU	0.7577	0.7890	0.9812	0.8106	0.9940
15. HLT	0.7979	0.9344	0.8081	0.9411	0.8149
16. TAX	0.3900	0.5001	0.2262	0.2506	0.2660
17. SOC	0.7303	0.7268	0.9189	0.7446	0.9341
17. TPI	0.7689	0.9310	0.6692	0.8917	0.6749
19. URI	-0.1207	-0.0128	0.1967	-0.1113	0.2268
20. PET	0.8344	0.9314	0.8929	0.9758	0.8936
21. LED	0.7658	0.7582	0.8259	0.8564	0.8450
22. FRP	0.3613	0.5556	0.1914	0.4428	0.2145
23. DFS	0.7515	0.7895	0.9965	0.8192	0.9945
24. ADM	-0.4423	-0.5960	-0.3949	-0.5783	-0.4033
25. POL	0.0100	-0.1333	0.0254	-0.0460	0.0201

TABLE C-II (continued)

PEARSON CORRELATION COEFFICIENT MATRIX
 (TOTAL PERIOD: 1941-1976)
 N = 36

	(11) OIL	(12) FPI	(13) AGR	(14) EDU	(15) HLT
1. GNP					
2. GDC					
3. MSI					
4. DWP					
5. WPX					
6. WPM					
7. FDP					
8. GOV					
9. EAP					
10. IMP					
11. OIL	1.0000				
12. FPI	0.1630	1.0000			
13. AGR	0.5941	-0.0830	1.0000		
14. EDU	0.9720	0.2009	0.5738	1.0000	
15. HLT	0.7853	0.2685	0.5388	0.7695	1.0000
16. TAX	0.2780	-0.4019	0.3081	0.2811	0.3584
17. SOC	0.9029	0.3382	0.5102	0.9442	0.7012
18. TPI	0.6470	0.2140	0.4454	0.6212	0.9465
19. URI	0.1971	-0.0785	0.1947	0.2609	0.0129
20. PET	0.8584	0.3637	0.5251	0.8512	0.9648
21. LED	0.8029	0.3496	0.4425	0.8456	0.7643
22. FRP	0.1982	-0.2016	0.4574	0.1672	0.6516
23. DFS	0.9913	0.2025	0.5915	0.9884	0.7833
24. ADM	-0.3735	-0.1049	-0.2267	-0.3553	-0.6348
25. POL	0.0214	0.0606	0.0763	0.0468	-0.1575

TABLE C-II (continued)

PEARSON CORRELATION COEFFICIENT MATRIX
 (TOTAL PERIOD: 1941-1976)
 N = 36

	(16) TAX	(17) SOC	(18) TPI	(19) URI	(20) PET
1. GNP					
2. GDC					
3. MSI					
4. DWP					
5. WPX					
6. WPM					
7. FDP					
8. GOV					
9. EAP					
10. IMP					
11. OIL					
12. FPI					
13. AGR					
14. EDU					
15. HLT					
16. TAX	1.0000				
17. SOC	0.1994	1.0000			
18. TPI	0.4761	0.5379	1.0000		
19. URI	0.1643	0.3177	-0.0396	1.0000	
20. PET	0.2466	0.7987	0.8920	0.0016	1.0000
21. LED	0.1330	0.8603	0.6291	-0.0782	0.8439
22. FRP	0.5414	0.0926	0.7152	0.0042	0.4612
23. DFS	0.2496	0.9209	0.6363	0.2265	0.8669
24. ADM	-0.3402	-0.2820	-0.6859	-0.0098	-0.5787
25. POL	-0.0895	0.0425	-0.1888	-0.0262	-0.1113

TABLE C-II (continued)

PEARSON CORRELATION COEFFICIENT MATRIX
 (TOTAL PERIOD: 1941-1976)
 N = 36

	(21) LED	(22) FRP	(23) DFS	(24) ADM	(25) POL
1. GNP					
2. GDC					
3. MSI					
4. DWP					
5. WPX					
6. WPM					
7. FDP					
8. GOV					
9. EAP					
10. IMP					
11. OIL					
12. FPI					
13. AGR					
14. EDU					
15. HLT					
16. TAX					
17. SOC					
18. TPI					
19. URI					
20. PET					
21. LED	1.0000				
22. FRP	0.1846	1.0000			
23. DFS	0.8105	0.1757	1.0000		
24. ADM	-0.3570	-0.5375	-0.3703	1.0000	
25. POL	-0.0188	-0.2596	0.0408	0.3495	1.0000

TABLE C-III

PEARSON CORRELATION COEFFICIENT MATRIX
 (1st SUB-PERIOD: 1941-1953)
 N = 13

	(1) GNP	(2) GDC	(3) MSI	(4) DWP	(5) WPX
1. GNP	1.0000				
2. GDC	0.5188	1.0000			
3. MSI	-0.0411	0.7565	1.0000		
4. DWP	-0.4232	0.2299	0.6639	1.0000	
5. WPX	-0.1369	0.6870	0.8998	0.6181	1.0000
6. WPM	-0.5986	0.1651	0.7300	0.8832	0.6883
7. FDP	-0.5139	0.2717	0.7038	0.9302	0.7368
8. GOV	0.4341	0.8765	0.8226	0.3035	0.6432
9. EAP	0.2471	0.7169	0.8181	0.3081	0.6062
10. IMP	0.2856	0.8833	0.7120	0.3627	0.7020
11. OIL	0.2514	0.4408	0.2123	0.1067	0.2961
12. FPI	-0.2213	-0.3373	-0.2481	-0.0960	-0.1583
13. AGR	-0.2590	0.1120	0.2084	-0.0684	0.4279
14. EDU	0.3720	0.8954	0.8666	0.4138	0.6834
15. HLT	0.3340	0.8844	0.8796	0.3604	0.7282
16. TAX	-0.2004	0.5583	0.7640	0.5668	0.6733
*17. SOC	0.4001	0.8505	0.8325	0.3688	0.6066
18. TPI	0.3389	0.8835	0.8899	0.4227	0.7066
*19. URI	0.4001	-0.1910	-0.4658	-0.6982	-0.5018
20. PET	-0.4074	0.2144	0.6365	0.7686	0.5008
21. LED	0.5840	0.8408	0.6671	0.3913	0.5253
22. FRP	0.3043	0.7767	0.7157	0.3672	0.6195
23. DFS	0.3163	0.8644	0.8618	0.3706	0.6534
24. ADM	-0.2103	0.3178	0.4095	0.0126	0.4656
25. POL	0.0673	0.5013	0.5572	0.1797	0.5112

TABLE C-III (continued)

PEARSON CORRELATION COEFFICIENT MATRIX

(1st SUB-PERIOD: 1941-1953)

N = 13

	(6)	(7)	(8)	(9)	(10)
	WPM	FDP	GOV	EAP	IMP
1. GNP					
2. GDC					
3. MSI					
4. DWP					
5. WPX					
6. WPM	1.0000				
7. FDP	0.9197	1.0000			
8. GOV	0.3116	0.2944	1.0000		
9. EAP	0.4282	0.2651	0.8045	1.0000	
10. IMP	0.2646	0.4630	0.7406	0.4572	1.0000
11. OIL	-0.1127	0.1888	0.3584	-0.1644	0.6169
12. FPI	-0.0986	-0.0476	-0.4912	-0.2207	-0.3489
13. AGR	0.0582	0.0461	0.0390	0.1124	0.0020
14. EDU	0.4168	0.3970	0.9209	0.9037	0.7458
15. HLT	0.4062	0.3554	0.9406	0.9172	0.7209
16. TAX	0.6050	0.5677	0.6568	0.6035	0.5538
17. SOC	0.3896	0.3238	0.9325	0.9206	0.6748
18. TPI	0.4545	0.4193	0.9426	0.9066	0.7369
19. URI	-0.6908	-0.7611	-0.1520	-0.1876	-0.2513
20. PET	0.8257	0.7916	0.4386	0.3425	0.3742
21. LED	0.2039	0.3048	0.8820	0.6186	0.7560
22. FRP	0.3481	0.3579	0.7099	0.7435	0.6043
23. DFS	0.4184	0.3830	0.9665	0.8525	0.7460
24. ADM	0.2785	0.2105	0.3061	0.2999	0.2577
25. POL	0.2603	0.1550	0.3487	0.7386	0.2351

TABLE C-III (continued)

PEARSON CORRELATION COEFFICIENT MATRIX
 (1st SUB-PERIOD: 1941-1953)
 N = 13

	(11) OIL	(12) FPI	(13) AGR	(14) EDU	(15) HLT
1. GNP					
2. GDC					
3. MSI					
4. DWP					
5. WPX					
6. WPM					
7. FDP					
8. GOV					
9. EAP					
10. IMP					
11. OIL	1.0000				
12. FPI	-0.2025	1.0000			
13. AGR	0.1783	0.2536	1.0000		
14. EDU	0.1367	-0.3452	-0.0405	1.0000	
15. HLT	0.1352	-0.3564	0.1009	0.9887	1.0000
16. TAX	0.1593	-0.3457	0.1684	0.6693	0.7203
17. SOC	0.0782	-0.4245	-0.0968	0.9868	0.9691
18. TPI	0.1496	-0.3827	-0.0154	0.9952	0.9839
19. URI	-0.0927	0.1691	-0.0087	-0.2757	-0.2080
20. PET	0.0896	-0.3475	-0.2535	0.4541	0.4245
21. LED	0.4330	-0.4401	-0.1937	0.8552	0.8213
22. FRP	0.0928	-0.2172	0.1674	0.8203	0.7910
23. DFS	0.2451	-0.4837	-0.0095	0.9578	0.9531
24. ADM	0.1275	-0.2524	0.5680	0.2376	0.2999
25. POL	-0.2834	0.2489	0.3847	0.5506	0.5763

TABLE C-III (continued)

PEARSON CORRELATION COEFFICIENT MATRIX
 (1st SUB-PERIOD: 1941-1953)
 N = 13

	(16) TAX	(17) SOC	(18) TPI	(19) URI	(20) PET
1. GNP					
2. GDC					
3. MSI					
4. DWP					
5. WPX					
6. WPM					
7. FDP					
8. GOV					
9. EAP					
10. IMP					
11. OIL					
12. FPI					
13. AGR					
14. EDU					
15. HLT					
16. TAX	1.0000				
17. SOC	0.6410	1.0000			
18. TPI	0.6851	0.9887	1.0000		
19. URI	-0.5317	-0.2170	-0.2834	1.0000	
20. PET	0.7474	0.4494	0.4897	-0.7008	1.0000
21. LED	0.5404	0.8442	0.8485	-0.1783	0.3855
22. FRP	0.3477	0.7954	0.8147	-0.1703	0.1465
23. DFS	0.6971	0.9648	0.9742	-0.2674	0.5211
24. ADM	0.1433	0.2344	0.2888	-0.1422	0.0341
25. POL	0.3754	0.5101	0.5221	-0.1596	-0.0230

TABLE C-III (continued)

PEARSON CORRELATION COEFFICIENT MATRIX
 (1st SUB-PERIOD: 1941-1953)
 N = 13

	(21) LED	(22) FRP	(23) DFS	(24) ADM	(25) POL
1. GNP					
2. GDC					
3. MSI					
4. DWP					
5. WPX					
6. WPM					
7. FDP					
8. GOV					
9. EAP					
10. IMP					
11. OIL					
12. FPI					
13. AGR					
14. EDU					
15. HLT					
16. TAX					
17. SOC					
18. TPI					
19. URI					
20. PET					
21. LED	1.0000				
22. FRP	0.6634	1.0000			
23. DFS	0.8254	0.7730	1.0000		
24. ADM	-0.0441	0.4993	0.3784	1.0000	
25. POL	0.2049	0.4959	0.3933	0.1979	1.0000

TABLE C-IV

PEARSON CORRELATION COEFFICIENT MATRIX
 (2nd SUB-PERIOD: 1954-1962)
 N = 9

	(1) GNP	(2) GDC	(3) MSI	(4) DWP	(5) WPX
1. GNP	1.0000				
2. GDC	0.8496	1.0000			
3. MSI	0.9360	0.9527	1.0000		
4. DWP	0.9290	0.8268	0.9305	1.0000	
5. WPX	0.0039	-0.0955	-0.1613	-0.2587	1.0000
6. WPM	-0.7757	-0.8742	-0.8378	-0.6575	-0.2826
7. FDP	0.9194	0.7082	0.8368	0.9562	-0.2366
8. GOV	0.9544	0.9376	0.9759	0.9247	-0.1772
9. EAP	-0.1332	-0.3941	-0.1754	0.1143	-0.4068
10. IMP	0.9020	0.9572	0.9591	0.8519	0.0506
11. OIL	0.9428	0.8539	0.9299	0.9727	-0.2587
12. FPI	-0.1025	-0.2824	-0.0894	0.1353	-0.0834
13. AGR	-0.0759	0.1258	-0.0542	-0.3227	0.7732
14. EDU	0.9622	0.8465	0.9548	0.9662	-0.2445
15. HLT	0.8822	0.9429	0.9665	0.9356	-0.3100
16. TAX	0.7111	0.8232	0.7795	0.7449	-0.3705
17. SOC	0.9663	0.8647	0.9600	0.9790	-0.2283
18. TPI	0.9716	0.8145	0.9322	0.9557	-0.2137
19. URI	0.8934	0.8792	0.8994	0.7924	0.1872
20. PET	0.9698	0.8603	0.9576	0.9667	-0.1532
21. LED	0.7597	0.6942	0.6840	0.5666	0.6025
22. FRP	0.7996	0.8031	0.7554	0.5674	0.1381
23. DFS	0.9109	0.9280	0.9488	0.9535	-0.2461
24. ADM	0.2852	0.0377	0.0982	0.2097	-0.3569
25. POL	-0.1215	-0.3461	-0.1330	0.1299	-0.5090

TABLE C-IV (continued)

PEARSON CORRELATION COEFFICIENT MATRIX
 (2nd SUB-PERIOD: 1954-1962)
 N = 9

	(6) WPM	(7) FDP	(8) GOV	(9) EAP	(10) IMP
1. GNP					
2. GDC					
3. MSI					
4. DWP					
5. WPX					
6. WPM	1.0000				
7. FDP	-0.5196	1.0000			
8. GOV	-0.8042	0.8775	1.0000		
9. EAP	0.4049	0.1600	-0.1719	1.0000	
10. IMP	-0.9399	0.7401	0.9407	-0.2643	1.0000
11. OIL	-0.6380	0.9622	0.9538	-0.0270	0.8470
12. FPI	0.2193	0.0788	-0.2105	0.7671	-0.1417
13. AGR	-0.4672	-0.4208	-0.0757	-0.6522	0.1952
14. EDU	-0.7030	0.9431	0.9634	0.0041	0.8671
15. HLT	-0.7413	0.8485	0.9686	-0.1162	0.9150
16. TAX	-0.4920	0.7112	0.8214	-0.2953	0.7092
17. SOC	-0.7059	0.9536	0.9688	-0.0027	0.8851
18. TPI	-0.6606	0.9595	0.9468	-0.0026	0.8382
19. URI	-0.9531	0.7073	0.8903	-0.2812	0.9440
20. PET	-0.7562	0.9324	0.9696	0.0198	0.9166
21. LED	-0.8769	0.5123	0.6615	-0.4055	0.8181
22. FRP	-0.7649	0.5770	0.8204	-0.5937	0.7875
23. DFS	-0.7117	0.9026	0.9616	-0.1303	0.8947
24. ADM	0.1550	0.4367	0.2882	0.1424	-0.0017
25. POL	0.3915	0.1637	-0.1248	0.9849	-0.2302

TABLE C-IV (continued)

PEARSON CORRELATION COEFFICIENT MATRIX
 (2nd SUB-PERIOD: 1954-1962)
 N = 9

	(11) OIL	(12) FPI	(13) AGR	(14) EDU	(15) HLT
1. GNP					
2. GDC					
3. MSI					
4. DWP					
5. WPX					
6. WPM					
7. FDP					
8. GOV					
9. EAP					
10. IMP					
11. OIL	1.0000				
12. FPI	-0.0546	1.0000			
13. AGR	-0.2966	-0.4056	1.0000		
14. EDU	0.9667	-0.0278	-0.2690	1.0000	
15. HLT	0.9517	-0.1195	-0.1556	0.9279	1.0000
16. TAX	0.8518	-0.3560	-0.1851	0.7371	0.8835
17. SOC	0.9822	-0.0108	-0.2542	0.9928	0.9457
18. TPI	0.9696	-0.0267	-0.2917	0.9926	0.9013
19. URI	0.7865	-0.1817	0.2474	0.8445	0.8089
20. PET	0.9628	0.0046	-0.1630	0.9769	0.9395
21. LED	0.5680	-0.1193	0.5265	0.5862	0.5608
22. FRP	0.6924	-0.6466	0.3032	0.7035	0.7086
23. DFS	0.9738	-0.1113	-0.1925	0.9367	0.9862
24. ADM	0.3311	-0.4254	-0.4525	0.3159	0.1814
25. POL	0.0038	0.7081	-0.6652	0.0325	-0.0563

TABLE C-IV (continued)

PEARSON CORRELATION COEFFICIENT MATRIX
 (2nd SUB-PERIOD: 1954-1962)
 N = 9

	(16) TAX	(17) SOC	(18) TPI	(19) URI	(20) PET
1. GNP					
2. GDC					
3. MSI					
4. DWP					
5. WPX					
6. WPM					
7. FDP					
8. GOV					
9. EAP					
10. IMP					
11. OIL					
12. FPI					
13. AGR					
14. EDU					
15. HLT					
16. TAX	1.0000				
17. SOC	0.7710	1.0000			
18. TPI	0.7359	0.9898	1.0000		
19. URI	0.5524	0.8322	0.8118	1.0000	
20. PET	0.7426	0.9870	0.9697	0.8626	1.0000
21. LED	0.3720	0.6110	0.5931	0.8486	0.6736
22. FRP	0.7028	0.7004	0.7107	0.7879	0.7135
23. DFS	0.8675	0.9619	0.9256	0.8038	0.9393
24. ADM	0.2982	0.2933	0.3547	0.0409	0.2564
25. POL	-0.2136	0.0271	0.0215	-0.2840	0.0524

TABLE C-IV (continued)

PEARSON CORRELATION COEFFICIENT MATRIX
 (2nd SUB-PERIOD: 1954-1962)
 N = 9

	(21) LED	(22) FRP	(23) DFS	(24) ADM	(25) POL
1. GNP					
2. GDC					
3. MSI					
4. DWP					
5. WPX					
6. WPM					
7. FDP					
8. GOV					
9. EAP					
10. IMP					
11. OIL					
12. FPI					
13. AGR					
14. EDU					
15. HLT					
16. TAX					
17. SOC					
18. TPI					
19. URI					
20. PET					
21. LED	1.0000				
22. FRP	0.7087	1.0000			
23. DFS	0.5915	0.7039	1.0000		
24. ADM	-0.1647	0.3511	0.2411	1.0000	
25. POL	-0.4402	-0.5403	-0.0960	0.1763	1.0000

TABLE C-V

PEARSON CORRELATION COEFFICIENT MATRIX
 (3rd SUB-PERIOD: 1963-1976)
 N = 14

	(1) GNP	(2) GDC	(3) MSI	(4) DWP	(5) WPX
1. GNP	1.0000				
2. GDC	0.9559	1.0000			
3. MSI	0.9977	0.9697	1.0000		
4. DWP	0.9959	0.9445	0.9930	1.0000	
5. WPX	0.9801	0.9116	0.9772	0.9825	1.0000
6. WPM	0.9845	0.8952	0.9951	0.9873	0.9884
7. FDP	0.9926	0.9341	0.9873	0.9945	0.9774
8. GOV	0.9532	0.9708	0.9554	0.9426	0.9003
9. EAP	0.9237	0.8328	0.9179	0.8225	0.9347
10. IMP	0.9691	0.9870	0.9747	0.9605	0.9227
11. OIL	0.9111	0.9409	0.9139	0.8992	0.8608
12. FPI	0.3230	0.1599	0.3013	0.3401	0.3347
13. AGR	0.5933	0.6466	0.6164	0.5754	0.5337
14. EDU	0.9557	0.9793	0.9628	0.9498	0.9249
15. HLT	0.9536	0.8898	0.9499	0.9401	0.9269
16. TAX	-0.0949	0.0336	-0.0715	-0.0806	-0.0718
17. SOC	0.9366	0.8798	0.9259	0.9423	0.9092
18. TPI	0.8498	0.7499	0.8359	0.8370	0.8116
19. URI	0.1943	0.3070	0.2054	0.1810	0.0811
20. PET	0.9654	0.8916	-0.9563	0.9603	0.9358
21. LED	0.8814	0.7471	0.8653	0.8906	0.9456
22. FRP	-0.4317	-0.4019	-0.4145	-0.4379	-0.4372
23. DFS	0.9458	0.9785	0.9519	0.9344	0.8944
24. ADM	-0.3859	-0.3502	-0.3906	-0.3563	-0.3246
25. POL	0.7080	0.8303	0.7385	0.7123	0.6825

TABLE C-V (continued)

PEARSON CORRELATION COEFFICIENT MATRIX
 (3rd SUB-PERIOD: 1963-1976)
 N = 14

	(6) WPM	(7) FDP	(8) GOV	(9) EAP	(10) IMP
1. GNP					
2. GDC					
3. MSI					
4. DWP					
5. WPX					
6. WPM	1.0000				
7. FDP	0.9897	1.0000			
8. GOV	0.9082	0.9486	1.0000		
9. EAP	0.9463	0.9220	0.8225	1.0000	
10. IMP	0.9224	0.9897	0.9906	0.8275	1.0000
11. OIL	0.8656	0.9165	0.9867	0.7610	0.9731
12. FPI	0.4006	0.3393	0.1700	0.4387	0.1731
13. AGR	0.5365	0.5960	0.6341	0.4735	0.6451
14. EDU	0.9084	0.9448	0.9769	0.7927	0.9945
15. HLT	0.9474	0.9484	0.8914	0.9258	0.8982
16. TAX	-0.1436	-0.0708	0.0193	-0.3436	0.9644
17. SOC	0.9242	0.9440	0.9095	0.7600	0.9314
18. TPI	0.8612	0.8458	0.7727	0.9263	0.7515
19. URI	0.0815	0.1567	0.2807	-0.1568	0.3180
20. PET	0.9652	0.9626	0.9052	0.9679	0.8998
21. LED	0.9334	0.8906	0.7639	0.8771	0.7911
22. FRP	-0.4452	-0.4273	-0.4502	-0.4410	-0.4217
23. DFS	0.8938	0.9402	0.9961	0.7997	0.9943
24. ADM	-0.3704	-0.3584	-0.3190	-0.5166	-0.2977
25. POL	0.6347	0.6858	0.7774	0.5927	0.7932

TABLE C-V (continued)

PEARSON CORRELATION COEFFICIENT MATRIX
 (3rd SUB-PERIOD: 1963-1976)
 N = 14

	(11) OIL	(12) FPI	(13) AGR	(14) EDU	(15) HLT
1. GNP					
2. GDC					
3. MSI					
4. DWP					
5. WPX					
6. WPM					
7. FDP					
8. GOV					
9. EAP					
10. IMP					
11. OIL	1.0000				
12. FPI	0.0852	1.0000			
13. AGR	0.6555	-0.1848	1.0000		
14. EDU	0.9638	0.1395	0.6259	1.0000	
15. HLT	0.8473	0.2821	0.6892	0.8872	1.0000
16. TAX	0.1199	-0.6267	0.2293	0.1327	-0.1691
17. SOC	0.8880	0.2993	0.5479	0.9370	0.8532
18. TPI	0.7067	0.3736	0.5550	0.6939	0.9237
19. URI	0.2771	-0.0827	0.2917	0.3511	0.0840
20. PET	0.8470	0.3907	0.5598	0.8630	0.9655
21. LED	0.7346	0.3087	0.4203	0.7975	0.8439
22. FRP	-0.4185	-0.5415	0.3482	-0.4207	-0.2277
23. DFS		0.1355	0.6518	0.9852	0.8783
24. ADM	-0.2494	-0.1219	-0.5688	-0.2278	-0.6063
25. POL	0.7638	0.1252	0.3838	0.8052	0.5463

TABLE C-V (continued)

PEARSON CORRELATION COEFFICIENT MATRIX
 (3rd SUB-PERIOD: 1963-1976)
 N = 14

	(16) TAX	(17) SOC	(18) TPI	(19) URI	(20) PET
1. GNP					
2. GDC					
3. MSI					
4. DWP					
5. WPX					
6. WPM					
7. FDP					
8. GOV					
9. EAP					
10. IMP					
11. OIL					
12. FPI					
13. AGR					
14. EDU					
15. HLT					
16. TAX	1.0000				
17. SOC	0.0897	1.0000			
18. TPI	-0.4797	0.6900	1.0000		
19. URI	0.3811	0.4075	-0.1070	1.0000	
20. PET	-0.2888	0.8523	0.9494	0.0368	1.0000
21. LED	-0.0987	0.8307	0.7574	-0.0826	0.8477
22. FRP	0.3422	-0.4035	-0.2740	0.0298	-0.4196
23. DFS	0.0860	0.9082	0.7338	0.3125	0.8810
24. ADM	0.5205	-0.1736	-0.7318	0.1621	-0.5358
25. POL	0.1544	0.6343	0.3929	0.2429	0.6043

TABLE C-V (continued)

PEARSON CORRELATION COEFFICIENT MATRIX
 (3rd SUB-PERIOD: 1963-1976)
 N = 14

	(21) LED	(22) FRP	(23) DFS	(24) ADM	(25) POL
1. GNP					
2. GDC					
3. MSI					
4. DWP					
5. WPX					
6. WPM					
7. FDP					
8. GOV					
9. EAP					
10. IMP					
11. OIL					
12. FPI					
13. AGR					
14. EDU					
15. HLT					
16. TAX					
17. SOC					
18. TPI					
19. URI					
20. PET					
21. LED	1.0000				
22. FRP	-0.3885	1.0000			
23. DFS	0.7472	-0.4249	1.0000		
24. ADM	-0.2647	-0.2798	-0.2864	1.0000	
25. POL	0.4845	-0.5484	0.8002	0.0240	1.0000

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