

THE ROLE OF COMMUNICATIONS IN ECONOMIC DEVELOPMENT

by

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ABSTRACT

This study explores empirical relationships between communications sector development and economic development. Longitudinal data for 122 countries at different levels of national wealth are used to test hypotheses that communications system availability and access to information affect development performance varyingly (a) by per capita income levels (equated with a country's capacity for economic expansion), and (b) across time. Because the results of the analysis support these propositions, the study contributes to the literature by providing evidence that may help resolve the debate between those who consider communications development an outcome of economic growth and those who view it as a pre-condition to successful development strategies.

RESUME

Cette étude traite des relations empiriques existant entre le développement du secteur des communications et le développement économique. Des données portant sur une période de plusieurs années pour quelques 122 pays affichant une différence du niveau de richesse nationale sont utilisées afin d'appuyer certaines hypothèses. Celles-ci tentent de démontrer que la disponibilité des systèmes de communication ainsi que l'accès à l'information affectent substantiellement la performance économique du pays (a) selon le revenu per capita (indice de la capacité du pays pour l'expansion économique) ainsi (b) qu'à travers le temps. Etant donné que l'analyse en elle-même supporte ces propositions, cette étude contribue conséquemment à la recherche en y apportant l'évidence qui aiderait à résoudre le débat opposant ceux pour qui les communications sont un produit de la croissance économique de ceux avançant qu'elles sont une pré-condition à la réalisation des stratégies de développement.

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CHAPTER ONE

Overview

In this paper, we examine some of the ways in which communications infrastructure and access to information affect the rate of economic growth, whether that growth is sustained over time, and how equitably the resulting benefits are likely to be dispersed. To this end, we discuss the existing literature on communications and development and present a research design to be used to evaluate the performance of countries at different levels of wealth and development. On the basis of our findings, we then draw some conclusions about the role of communications in the development process.

First, though, let us briefly consider why it is important to examine the relationships between communications and other factors generally associated with development. In recent years, there has been increased debate in the international fora about how the critical problems confronting the poorer nations of the world might best be resolved. Those discussions reflect a growing concern about the widening gap between the rich and the poor within Third World societies, as well as between the wealthy and poorer countries. The blame for the broad discrepancies in the distribution of wealth has been tossed back and forth by those who, on one side, contend that the industrialized nations have permitted their multinational corporations to exploit the limited resources of developing countries and those who, on the other side, blame corrupt (national) elites in the less developed nations (LDCs) for that exploitation. However, regardless of who is really at fault, the plight of these countries is

likely to remain at the top of the international agenda for some time to come, particularly in light of a persistent world-wide economic recession.

One result of the increased vocalization of Third World concerns has been a growing resolve by representatives from the industrialized and developing countries alike to undertake investigative studies in the hope of finding more realistic solutions to some of their most urgent problems. Other outcomes of the 'North-South debate' include the United Nations General Assembly's declaration of an International Transportation Decade for Africa (the 1980's), International Communications Year (1983), and the publication of a global strategy to increase economic growth rates during the UN's Third Development Decade (1981-1991) -- one which places communications and transportation infrastructure in its highest priority category. In addition, there has been a call by the Group of 77 for the establishment of a New International Economic Order (NIEO) to improve the participation of the LDCs in world markets and to reduce protectionist economic policies in all countries. An essential aspect of the NIEO is the New International Information Order, the aim of which is to ensure access to the latest technology and the establishment of a network of information systems linking countries of the developing South with each other, as well as with their industrialized trade partners in the North. In very broad terms, then, there appears to be an emerging consensus that infrastructure, and especially that which facilitates the transfer of information, constitutes a crucial element of current and future development strategies.

Still, despite the increased recognition of the need for communications infrastructure, little action has been taken by international aid agencies and financial institutions or by developing country governments to allocate a greater portion of their capital resources towards communications development. This can be readily seen through a review of the

records of the World Bank and its affiliate, the International Development Agency. Together, they allocated an average of less than 3 per cent of their lending funds to communications-related projects during the 20 years between 1958 and 1978. And for the year 1980, the World Bank reports that only \$131 million (less than 1 per cent) of its project funds were spent in that sector. This can be compared with some \$1.4 billion (12 per cent) allocated to transportation; another \$422.5 million (4 per cent) to education-related projects, and \$348.8 million (3 per cent) to urbanization (World Bank, 1981:123-25). One explanation for the neglect of communications in development lending is the continued emphasis of many development economists on short-term 'return-on-investment' evaluation criteria. Since the contribution of communications is not always tangible (or immediate) that sector has traditionally received less attention than others (Blackman, 1977:130).

The timeliness of the present study also becomes apparent from the extant social science research on communications and economic development. A review of that literature reveals several problems, a few of which are addressed in this paper. The first relates to the apparent rethinking that has taken place among development scholars regarding how development should be defined (and quantified). With a growing number of studies undertaken over the years on Third World development, some confusion has resulted from the terms 'development', 'modernization', and 'industrialization' being used interchangeably. It is therefore necessary to consider how each has been conceptualized in those studies in order to justify their operationalization in our analysis. A second problem, closely related to the first, has to do with the presumption that countries follow the same path in pursuit of their development objectives. Despite the fact that critical evaluations of the slow and occasionally even 'negative' growth experienced

by the less developed nations during the 1960's led to the demise of the dominant paradigm of Western development theory and stimulated social scientists to search for alternative approaches, many researchers continue to assume more or less universal trends in development patterns and the pursuit of common goals. The third problem concerns the debate over whether improvements in the development of a country's communications sector result from economic growth or, alternatively, whether successful development strategies are functions of the existence of adequate communication facilities. Indeed, it was the inability of earlier research to resolve this debate which provided the impetus for the present investigation.

The research design employed here uses longitudinal data for 122 independent polities which are grouped into three categories based on knowledge about their national wealth levels. A central part of the study involves consideration of the types and patterns of relationships which exist among variables used to measure different aspects of the development process, including communications, social modernization and economic development. The period for which data are available for the analysis covers the years from 1960 to 1973.

In addition, a number of hypotheses are tested with the aim of answering the questions outlined above. Perhaps the most important of these is the proposition that the availability of communications technology is a prerequisite to successful (i.e., equitable) and sustained economic growth. If our analysis provides evidence in support of this proposition, it could be concluded that it is more appropriate to treat communications as a determinant of economic development rather than a product of it. From this we could also infer that countries wishing to achieve optimal levels

of economic performance should place greater emphasis on developing their communications sectors.

Chapter Two reviews the literature on communications and economic development. It also discusses the conceptual distinctions used in the paper to differentiate between 'development', 'social modernization' and 'economic development'. In addition, it explains the rationale for separately evaluating the contribution of communications development, an aspect of social modernization. At the end of that chapter, the hypotheses to be tested are outlined.

Chapter Three deals with the operationalization of the concepts considered relevant for our purposes. It also provides the framework of analysis to be followed in our investigation, including the introduction of control variables used to determine the extent to which our findings can be generalized.

Chapter Four presents the results of the data analysis. The final part of that chapter examines the effects of introducing the control variables.

Chapter Five discusses the implications of the conclusions drawn from the evaluation of countries in the different wealth/development categories. It also makes some recommendations regarding the direction that future research should take.

CHAPTER TWO

Communications and Development

Information may be the key to development. In order to make choices and to plan intelligently, people must have information about the options available to them and the implications of their choices. They must also be exposed to new ideas and to the experiences of others facing similar problems. And to progress from awareness to action they need channels of information among themselves to plan, organize and act (Hudson, 1977: 29).

Introduction

This chapter reviews the literature on communications and economic development in order to clarify the areas of confusion and to point out some of the problems left unresolved by earlier research. It should be noted, however, that our review is by no means comprehensive. Instead, a number of studies are used to argue a particular position -- that the experiences of 20th-century developers ought to be analysed separately from those countries with greater investment resources, many of which undertook development long ago and in a very different international environment. We also discuss several issues which are considered to be particularly relevant to the investigation reported here. They include: (1) confusion over how development should be defined; (2) the presumption that countries have common development goals and that they follow similar paths toward their achievement; and (3) the ongoing debate between those who view communications development as a product of economic expansion and those who see it as a pre-condition for successful development strategies and sustained economic growth.

All of these issues are closely related, and they are therefore

discussed together. However, the third problem -- the debate over the direction of the causal arrow in the relationship between communications and economic development -- needs to be prefaced by a discussion of both the role of information in production and the link between changing communications technology and new development perspectives. Finally, in the light of the questions that emerge from the literature, the hypotheses to be tested are presented at the end of the chapter.

A new definition of development

According to the Western traditional or 'orthodox' school of economic theory that persisted throughout the 1960's, emphasis was placed on 'progress', which was operationally defined in terms of growth. The benefits of increased national wealth, it was assumed, would 'trickle down' to all levels of society. The introduction of innovative technology was expected to stimulate even the most tradition-bound members of society to 'mobilize' (Deutsch, 1961). Their attitudes were expected to change (McClelland, 1961), causing them to seek new opportunities in the 'modern' sectors of their economies (Schramm, 1964). Eventually, technological innovation would occur on a domestic level, a 'modernizing elite' would take over political and social institutions, and a large entrepreneurial middle class would emerge demanding greater participation in all spheres of national life (Pye, 1963; Huntington, 1965, 1968).

Orthodox theorists believed that literacy programmes and the mass media were the means by which the obstructing influence of traditional attitudes could be broken down. Once traditional perspectives and attitudes were put aside, it was contended, 'transitional' man or woman would be able to play a more active role in shaping his/her own destiny (Deutsch, 1966:583).

According to this approach, the development sequence was seen to lead from industrialization (measured by some in terms of urbanization and by others by per capita income or energy consumption) to literacy and mass communications. These two factors would in turn lead to sustained economic growth and, ultimately, to increased participation (Lerner, 1957, 1958). It was assumed that by emphasizing the industrial sector and introducing the most modern technology available, developing societies could achieve their growth objectives in a shorter span of time than it had taken those countries that undertook development in the pre-industrial period.

Walt Whitman Rostow, a representative of this school, has outlined the five stages of development through which he believes all modernizing societies must pass. They include: (1) traditional society; (2) the pre-conditions of take-off; (3) take-off; (4) the drive to maturity; and (5) the age of mass consumption.

In order to achieve the goal of mass consumption (equated with 'modernity'), developing societies must become detached from tradition. They can then prepare for 'take-off' toward sustained economic growth by building up their social overhead capital, their agricultural sectors, and increasing foreign-exchange earning activities (Rostow, 1960:139). During the stage of 'take-off', industries expand rapidly, yielding profits which may be invested in new plant. 'Maturity' is that stage during which the economy moves beyond the original industries that triggered take-off to develop other sectors and resources. At this stage, per capita income rises sharply and the structure of the work force shifts to become increasingly urban and skilled. Those societies that have reached the stage of 'mass consumption' can afford to turn aside from emphasizing their technological capabilities and improve social welfare or provide for the expanded consumption of goods. Alternatively, they can seek external

opportunities for expansion commensurate with their increased power potential (Rostow, 1960:8-10).

However, the inadequacy of development models derived from the experiences of the advanced industrialized countries of the 'North' (primarily Anglo-America, Northern and Western Europe) became increasingly evident towards the end of the 1960's. An evaluation of nearly two decades of global development planning revealed that few if any of the less developed nations had even come close to achieving the social goals of improved quality of life, despite average annual economic growth levels of between 2 and 3 per cent (Pearson Commission, 1969; United Nations, 1970). These failures, together with a growing awareness of some of the negative effects of rapid industrialization (including environmental pollution, urban unemployment and underemployment, etc.), the world oil crisis, a prolonged period of world-wide economic recession, and the (comparatively speaking) miraculous successes of countries like China that applied alternative development approaches, all contributed to the eventual rejection of these traditional strategies (Rogers, 1976a:50-51).

One positive outcome of the disillusionment with Western development theory has been an increased effort by development researchers to identify the reasons why traditional approaches have proved inappropriate for the so-called 'latecomers' to development. Another positive result (closely related to this) has been the search for alternative models which are more cognizant of the environment in which today's developing countries are trying to modernize and diversifying their economies. Such models also attempt to be more realistic in view of the limited resources and capacities possessed by such countries.

Critics of the orthodox approach include a number of 'Dependency School' scholars, such as Wallerstein (1974), Gunder-Frank (1975, 1979),

Cardoso (1977), Cardoso and Faletto (1979), and Caporaso (1980). These authors contend that under the present 'world capitalist economy', today's developing countries have been relegated to the periphery. They are seen as being exploited by and prevented from competing on equal terms with those countries that make up the 'core' (i.e., the powerful capitalist countries that have dominated the international market-place since the last century) of that world economy.

Other critics of orthodox development theory have also sought explanations for the failures of traditional methods when applied in the context of 20th-century development. Among these are Eisenstadt (1973,1976), Pasquino (1970) and Oshima (1976a,b) -- all of whom argue against assuming that countries follow the same paths toward development. Instead, each of these authors provides persuasive arguments which favour a separate treatment of those countries that have undertaken development as independent polities in recent years <1>.

Pasquino's (1970) arguments are particularly relevant. He maintains that there are really four separate types of modernization which should be considered. The first type, called 'autonomous' or 'endogenous' modernization, takes place "when the process of transformation of the society begins through inventions and innovations produced by the society itself (1970:314)." The second type is "the typical outcome of the intrusion of colonial powers into countries having a less developed technology." It is called 'induced' or 'exogenous' modernization, and it commonly results in a situation of prolonged economic dependence on the former colonial ruler. In the third type, 'enclave' modernization, focusses on the industrial sector, creating islands of modernity without proceeding to a thorough modernization of the country. The fourth type is 'defensive', and it occurs in cases where (military) elites undertake modernization in an

effort to consolidate national support based on racial or cultural pride.

According to Pasquino, the Western countries and the Soviet Union experienced 'autonomous' modernization that began between the 17th and 19th centuries. They underwent social transformations and experienced the Industrial Revolution in relative isolation from each other. Furthermore, those transformations took place very slowly. For those societies, industrialization was seen as the key to modernization and economic growth, and technology and capital were used as a substitute for scarce labour.

By contrast, today's developing societies are characterized by the last three kinds of modernization -- 'induced', 'enclave' and 'defensive'. For these countries, technology and capital are the scarce commodities, while there is an over-abundance of labour. Furthermore, 20th-century development does not occur in isolation. From the day that most latecomers achieve political independence, they are forced by circumstance to first seek recognition from and then to participate in a global economy dominated by others. In addition, they are trying in the space of just a few decades to achieve levels of living similar to those attained by the 'developed' nations over several centuries.

The reaction of development specialists to criticisms launched against their traditional approaches and especially to their preoccupation with economic growth eventually led to the emergence of a new school of development theory -- known now as the 'Basic Needs' approach. According to followers of this new perspective, governments should focus on the development of human resources in the developing world. Members of this school also stress the need for multi-dimensional development strategies, and they place particular emphasis on the role of infrastructure in those processes.

Development strategies that are in line with the Basic Needs approach are specifically aimed at the alleviation of poverty. As a result, they tend to emphasize those programmes that are most likely to provide improved earning opportunities for the poor. They also stress the importance of expanding the availability of public services to reach the poor in even the remotest centres. In order to achieve these goals, such strategies concentrate on rural rather than urban development. And they encourage the provision and use of the two-way communications channels deemed essential for decentralized planning -- that is, for increased local participation in project design and the implementation of government policies aimed at improving living conditions.

Another consequence of the increased sensitivity of development scholars and strategists to criticisms of traditional development approaches has been a growing awareness of the need to redefine 'development' per se. The emerging consensus on its redefinition places much greater emphasis on the social goals of improved quality of life and on equitable, 'balanced' and 'self-reliant' growth <2>.

An integral part of this new definition of development is the recognition that clear conceptual distinctions must be made between development and other terms which have often been used interchangeably with it -- namely, 'modernization' and 'industrialization'. Apter (1965) has provided a helpful discussion on how to theoretically distinguish between these three closely related concepts:

Development, modernization and industrialization, although related phenomena, can be placed in a descending order of generality. Development, the most general, results from the proliferation and integration of functional roles in a community. Modernization is a particular case of development. Modernization implies three conditions: a social system that can constantly innovate without falling apart (and that includes among its essential beliefs the acceptability of change); differentiated, flexible social structures; and a social framework to provide the skills and knowledge necessary for living in a technologically

advanced world. Industrialization, a special aspect of modernization, may be defined as the period in a society in which the strategic functional roles are related to manufacturing (1965: 67).

Apter's distinctions among development, modernization and industrialization can also be indicated in a more concrete way. Keeping in mind the specific aims of our study, the following operational definitions are used in this paper:

The general term 'development' is used to refer to the overall process of social change, including modernization and economic development. It is defined in terms of its objectives, some of which include: (a) sustained improvements in living standards; (b) sustained increases in per capita production; and (c) increased equity in the distribution of the benefits of both.

'Social modernization' is used to describe the non-economic dimensions of the development process <3>. It includes all those processes that lead to the attainment of at least a functional level of literacy and education, which are considered vital to the development of new business and technical skills. It is also reflected in the widespread availability of health and sanitation services. Finally our conceptualization of social modernization includes urbanization, which is seen to provide an indication of the development of those social and political structures that are necessary to sustain industrialization <4>.

'Communications development', an aspect of social modernization, is treated separately in this study so that we can evaluate its unique contribution to the development process. It is conceived of here in very broad terms to include all those aspects of development related to the transfer of information and services, as well as goods and people (although the emphasis in our discussions is placed on information and services).

'Economic development' (equated here with Apter's 'industrializa-

tion'), on the other hand, is defined in quite narrow terms. It is used to refer to the economic outputs of development related to manufacturing and trade, a process that is expected to result in the accumulation of surplus finance capital as well as improved human capital (i.e., experienced and skilled manpower) that will be available for further industrial expansion.

Communications and new perspectives on development

Of the three problems mentioned that emerge from the literature, the first two have now been discussed at some length, and while they may not have been resolved, they at least have been clarified. The third problem, however, has the greatest relevance to our investigation. It involves the question of causality -- whether economic development ought to be treated as a function of communications development, or whether communications should be viewed as a product of economic expansion. In order to better understand its relevance here, we need to first consider the role of information in production, in particular, and in the development process in general.

According to traditional economic theory, the three principal factors of production are 'land', 'labour' and 'capital'. Land refers to all those natural resources that may be used for production. Labour is applied to these natural resources "to make them useful to meet human needs and desires." Information or 'human knowledge' may thus be subsumed under the definition of labour (Parker and Mohammadi, 1977:172-73). The third factor, capital, consists of that part of land and labour applied not to produce output for consumption or trade, but that is used instead to build tools and factories which in turn improve production output.

Recognizing, then, that information and the means by which it is transmitted are crucial aspects of production, we can see that the

availability of communications systems and access to information constitute one part of the social infrastructure commonly regarded as vital to successful development strategies <5>. The literature also suggests that changes in communications technology have had a significant effect on the perception of the relationship between communications and economic development.

Even before Lerner's first major study (1957), communications and development researchers were stressing the need for adequate communications to enable countries to achieve sustained levels of economic growth and increased political participation. However, social scientists who follow the orthodox school of economic theory have traditionally focussed on mass media communications (including broadcasting and printed materials), and on interpersonal, face-to-face exchanges (Lerner, 1957, 1958, 1963a,b; Schramm, 1964; Shapiro, 1967).

Lerner (1963b) has specified three phases of mobility that are associated with modernization. The first is geographic -- where men and women seek new opportunities through migration. The second is social mobility, where 'transitionals' take on occupational roles that differ from those conferred on them at birth (also Deutsch, 1966:583). Thirdly, psychic mobility or 'emphathy' (defined as the ability to identify with other people's lives), provides a stimulus for changes in attitudes. The mass media are viewed as the means by which empathy is spread (Lerner, 1963b:331).

In contrast, the objectives of Basic Needs development strategies require the development and expansion of two-way communications technology (including telephony, two-way radio and the like). In order for decentralized (grassroots) development planning to be possible, 'development support communications' are required to permit local leaders

and central government administrators to exchange ideas (Parker and Mohammedi, 1977:180). Furthermore, the more efficient these systems are, the more quickly messages can be transferred, thereby allowing central authorities more flexibility in responding to the changing needs of local communities. Efficient two-way communications technology thus enables governments to more effectively co-ordinate the implementation of national and regional development programmes, regardless of the distance between the capital and the areas where those projects are undertaken <6>.

Other effects of using two-way communication systems for decentralized planning lie in their role in human resource development. By participating at every stage of planning and project execution, local developers acquire new skills and valuable experiences. This training also constitutes an investment in the future, the social and economic returns of which may prove invaluable. In addition, the satellite telecommunications experiences among the Amer-Indians and Eskimos in the far North, and in rural Indian communities in Asia provide persuasive evidence that modern communications technology facilitates the satisfaction of basic human needs currently lacking in so many developing areas.

Finally, according to Hudson and Parker (1975), two-way communications technology may provide a powerful tool for socio-political organization. In their study of Northern Canadian communities, they find that access to two-way radio results in increased contacts between indigenous leaders. With time, these exchanges have become increasingly frequent and they have formed the basis for the co-ordination of regional development planning and increased indigenous participation in territorial politics <7>.

According to Karunaratne (1982), the alternative to the provision of community and social services through the use of dedicated two-way audio channels or teleconferencing, "would be to provide school buildings,

hospitals and transportation facilities, incurring prohibitive capital costs (1982:224)." To this, Hudson et al. (1979) add the expensive costs of travel and professional labour associated with management, supervision and continuing education in small and remote communities <8>. They include among the consequences of neglecting the communications sector the continued "low quality of rural education, unavailability of agricultural extension information... and poor or non-existent rural health care (1979:42)."

This brief overview of the literature suggests that the absence of interconnections with international information networks and limited domestic communications services in the LDCs will most likely result in slower growth, the perpetuation of urban-focussed development strategies and centralized development planning. In addition, the inequitable distribution of the benefits resulting from economic expansion will persist as governments fail to alleviate the suffering of the rural and urban poor in these countries. Also, many Third World nations will probably continue to lag behind those countries that have an adequate communications infrastructure in place. Without access to information on affordable technology, on new production techniques and on market prices and product demand, these countries will encounter considerable obstacles to expanding their export markets into new areas. Similarly, they will be unable to extend existing trade relationships since they cannot possibly compete on an equal footing with other better equipped, more informed producers.

In sum, the literature underscores the importance of communications infrastructure and suggests that it is essential for 'balanced' (sectoral and sectional) growth. It also recognizes that communications technology plays a crucial role in the development of human resources and provides the means by which wider-based participation in decision making can be

achieved.

The debate over causality

Followers of the orthodox and Basic Needs schools of development theory perceive the importance of communications infrastructure and industrialization strategies in quite different ways. This is reflected in their ordering of each in models used to examine countries at various stages of social, economic or political development. Through examining a few representative studies, we may be able to determine which approach is more appropriate for evaluating the economic performance of developing countries today.

Researchers of the traditional (Western) school usually treat some measure of industrialization as their exogenous variable. Where present, additional explanatory variables generally include measures of education or literacy rates and mass media use. Ultimately, however, most of these studies concentrate on trying to explain the variance in levels of one end-product of modernization and economic expansion -- 'political development' (associated with democratic institutions and increased popular participation). In their investigations, communications is often treated as just one of a number of intermediate variables. Consequently, while they have recognized that it is an important aspect of the development process, communications is considered to be a product or function of increased wealth, urbanization and the like.

One of the earliest quantitative studies testing a proposition relating communications to development is Lerner's (1957) research using cross-sectional data on 74 countries. In the study, he postulates that the development sequence proceeds from economic development or 'industrialization' (subsumed under his urbanization measure) to literacy,

mass media communications, and finally to political participation. This thesis is developed more thoroughly in his 1958 work entitled The Passing of Traditional Society -- a study which provides a classic statement of the orthodox approach <9>.

However, many of those who have tested and support Lerner's model generally, conclude that it is not necessarily appropriate for every situation. For instance, Schramm and Ruggels (1967), evaluating 84 countries, contend that the sequence proposed by Lerner varies by geographic region. McCrone and Cnudde (1967) and Schramm (1973), also examining cross-national data, have argued that the temporal sequence leads from communications to literacy rather than from literacy to communications -- although they do not question the prior position of economic development in the model.

On the other side of the debate, Basic Needs theorists, interested in underscoring the importance of infrastructure, have tested models that use communications as a determinant of economic performance. Among those who suggest that communications (instead of economic development) should be treated as the exogenous variable in development models is Winham (1970). Using longitudinal data for the United States (for the years 1780 to 1960), he concludes that instead of the sequence beginning with urbanization and leading to education, communications and political development, "the US data unequivocally suggest that the causal path between these variables is from communications to urbanization (Lerner's measure of economic development)(1970:816)."

In attempting to explain the apparent contradiction of his findings with those of Lerner, Winham argues that communications technology has rendered the earlier model inappropriate for the analysis of more recent development patterns. He explains that in the early years of American

history, communications may have acted as an agent of urbanization by providing information to rural populations about the opportunities available in urban centres. However, the development of the telephone and radio meant that communications no longer depended on either urbanization or literacy, and it was therefore able to usurp the position of urbanization in stimulating the adoption of new ways of life. In addition, communications technology could be (and was) used to spread literacy and improve education generally.

Winham's final remarks suggest that these conclusions may be particularly significant for the analysis of Third World nations because, today, low-cost communications technology will likely play an even larger role than it did in the United States (1970:818). Indeed, Winham's findings suggest that communications technology has so altered the development picture that it is no longer appropriate to give economic development the priority position in the causal sequence that it once held.

Also among those who advocate alternative approaches to development and give a predominant position to communications are authors who stress the need to distinguish between labour- and capital-intensive economies. One of the better known of these is Oshima (1976a,b) who contends that the labour-intensive developing economies should not be evaluated using Western-ethnocentric models. Oshima, like Winham, argues that for today's developing countries to improve social conditions while growing as quickly as possible, special emphasis must be placed on the development of adequate communications systems in order to stimulate rural development and local entrepreneurship. Similar arguments are made by Rogers (1971, 1976a,b), Rahim (1976a,b) and others who have investigated the diffusion of innovations.

Edeani (1977, 1980) has tested both orthodox and alternative approaches

by looking at data for various Asian and African countries. In his 1977 study, he introduces economic development (measured by per capita income) as the exogenous variable influencing mass communications, urbanization and literacy levels. He concludes that, "while economic development exerted a relatively strong influence on urbanization, its impact on mass communications and literacy were in each case close to zero (cited in 1980:65)."

In his 1980 study, Edeani again looks at labour-intensive developing economies (55 African countries and territories). This time his results lead him to conclude that the "development of communications channels and exposure to pertinent information stimulate economic development (1980:71)." From this he infers that economic performance is properly regarded as a function of communications, rather than the opposite.

The results of these empirical studies suggest that it may indeed be more appropriate to treat communications (instead of economic development) as the exogenous variable in models used to evaluate recent development patterns. They also reflect a growing awareness among development strategists that it is erroneous to assume that 20th-century developers will follow the same paths as their predecessors (or even each other) toward their social and economic goals. Furthermore, the results of a number of recent (1983) case studies sponsored by UN agencies support the suggestion that greater emphasis must be placed on 'equitable' growth, something which can only occur if the infrastructure and service sectors in Third World societies are developed as an integral part of their national industrial strategies.

This paper follows the perspective of those authors who favour a separate evaluation of the newcomers to development <10>. Therefore, for our purposes, the proposed development sequence places communications as the first variable in the model. Economic development is thus treated as

the dependent variable.

The Hypotheses to be tested

The model presented in Figure 2.1 summarizes the theorized relationships between communications development (C), social modernization (M) and economic development (D). Communications is treated here as an exog-

FIGURE 2.1
HYPOTHESIZED RELATIONSHIPS BETWEEN COMMUNICATIONS DEVELOPMENT
(C), SOCIAL MODERNIZATION (M) AND ECONOMIC DEVELOPMENT (D)



enous determinant of both social modernization and economic development performance. As the model suggests, its impact on economic performance is considered to be two-fold. First of all, economic development is assumed to be directly affected by communications through the provision of timely and pertinent information. Secondly, it is assumed to be indirectly affected by communications acting through other social modernization factors which support or facilitate economic expansion.

With regard to the direct link between communications and economic development, the connection can be theorized through a consideration of the role of communications in production. In order to optimize production outputs, the producer must rely on the most complete and accurate information available. Economic theory, however, assumes an ideal production environment in which knowledge is perfect. It also assumes that the transfer of information to that end is instantaneous and costless. In the real world, of course, producers work in an environment that is far removed from the theoretical ideal.

Existing international information transfers are usually seen to operate in a predominantly hierarchical fashion. That is, information is

available only to those countries with access to the international communications network. To obtain that access, they must first possess the advanced technology required to meet international standards for interconnection. Unfortunately, most countries of the Third World do not possess the necessary technology; nor do they even have access to the information that would enable them to decide whether or not they could afford to acquire it.

At the national level, unequal access to information also creates an asymmetric situation (O'Brien and Helleiner, 1982). Incomplete information about new technology and inaccurate market information may increase the cost of risk taking in production to an unacceptably high level.—The uncertainty that results could in turn lead to depressed levels of production output (Tyler, 1977:98). In addition, if some members of a society have access to more complete and/or more accurate information than others, it is likely that those who have it will experience greater profits at the expense of those who do not <11>.

Moving on to consider the indirect impact of communications on economic development performance, the model suggests that part of its influence may result from the relationship between communications technology and other social modernization factors, such as urbanization and the availability of public services. Concerning urbanization, communications infrastructure may be particularly important because it facilitates the transfer of members of a centralized labour pool from one place to another. It also permits management personnel at different locations to exchange information. With regard to public services, the availability of communications facilities may be essential for rural education and health care.

To summarize this discussion on the ways that communications develop-

ment could affect economic performance, the model suggests basically two things: First, that communications development is temporally prior to both social modernization and economic development. Second, that modernization acts as an intermediate agent between communications and economic development through which some of the effects of the former on the latter are channelled. With regard to the first, we are concerned about establishing the temporal priority of communications development. Specifically, we expect that changes in the level of communications availability will precede changes in the levels of social modernization and economic development. The second statement suggests that, together, adequate levels of communications and social modernization may lead to more rapid economic expansion and more equitable growth than would otherwise be the case. Thus we expect at least some portion of the influence of communications on development performance to be channelled through or mediated by other factors related to modernization. It is also hoped that by considering some of the ways in which communications and those other factors are related, we will be in the position to draw conclusions regarding how and why countries vary in their development performance.

However, in testing these suppositions we must keep in mind our earlier arguments that universal goals and uniform paths toward development cannot be assumed. Twentieth-century developers are exposed to a myriad of technologies, many of which have only recently become available. This makes it extremely difficult to compare their performances with those of countries which began developing in an earlier time. Similarly, many of the LDCs have severely limited capital resources; consequently, they should not be evaluated alongside of their oil-rich neighbours who, because of their ability to buy the most sophisticated technology on the market, may be able to achieve high levels of economic development in a short period of

time, despite the absence of the modern social institutions and infrastructure usually required to sustain growth. Therefore, in order to compare those nations most likely to have similar development experiences, the countries considered here are divided into different groups based on national wealth levels (related to their capacity to expand and diversify their economies). In this way we try to avoid some of the pitfalls encountered by those earlier studies that assumed that countries have roughly equivalent (or even adequate) resources for sectoral development.

We also need to be more specific as to how and why the relationships between the variables will vary, as well as with regard to the types of countries for which the model is expected to be the most and the least useful. It is suggested that access to information could be especially vital to the newcomers to the market-place. It is further suggested that should these countries be denied that access, the losses incurred as a result of failing to meet delivery dates or because of inadequate information about market conditions, may prove disastrous to their long-term competitiveness. Similarly, countries which lack experience in international markets and those with limited capital resources are likely to reap the greatest benefits from low-cost communications technology. Access to that technology should enable these less developed nations to expand their economies in a shorter time span and with greater returns (financial and social) than ever before.

In contrast, the model will probably not be as appropriate for evaluating the development performance of the wealthier nations. This is because, for the most part, the advanced industrialized countries undertook development long before the advent of modern technology and underwent it over a much longer period of time. In a similar way, the model is not expected to be very helpful to understanding the experiences of the OPEC

nations whose economies are almost entirely based on the exportation of petroleum products and whose economic development has thus been highly idiosyncratic.

In addition to these considerations, we do not expect the contribution of communications to development to remain constant over time. Rather, it is expected that as countries develop their social, political and economic institutions, and as they diversify their economies and increase their per capita wealth, the relative importance of communications technology vis-a-vis other development support factors will begin to level off as a threshold level is approached. It is also expected that with the passage of time it may become increasingly difficult to disentangle their separate influences as they become more and more interdependent.

Finally, a couple of additional variables are used to see whether the results based on the examination of countries in the different national wealth groups hold when they are considered. The first of these, political regime type, provides an indication of other internal (structural) factors that could affect a country's economic performance. The second, colonial heritage, exemplifies the kind of external (environmental) influences that may play a role in their development. A more extensive discussion of the ways in which the introduction of these two additional variables could affect our conclusions is provided later in the paper.

Conclusion

In this chapter we have discussed in both theoretical and practical terms some of the ways that communications technology could affect economic development performance. The need to evaluate the recent experiences of countries at various levels of development in the light of innovations in technology has been particularly stressed. We have also underscored the

necessity of separately evaluating the poorer Third World countries.

As has been noted, one of our primary aims is to compare countries with similar economic characteristics in order to draw some general conclusions about the varying trends and patterns of relationships among communications, social modernization and economic development. It is ultimately hoped that the results of our analysis will suggest some ways in which planners and policy makers can be guided to design more appropriate development strategies.

It has also been suggested that the only solution to the series of critical problems confronted by some governments may be to maximize investment returns. Thus, social science research should attempt to demonstrate (as the present study does) how capital resources could be better allocated in order to promote rapid growth in the LDCs -- societies that comprise some four-fifths of the total world population and within whose borders virtually all of those who live in 'extreme' or 'absolute' poverty dwell (Brandt Commission, 1980:113,51).

- Chapter Two Notes -

1. Eisenstadt (1973:362) argues that it is incorrect to assume that modernization is either irreversible or that it moves toward a fixed end-result. Rather, it evokes "a variety of responses that depend on the broad sets of internal conditions of the developing societies, on the situation in which they are caught, and on the degree to which the international system fosters 'dependency' or 'competition' (Eisenstadt, 1976:44)."
2. Among the earliest advocates of a shift away from purely economic measures of development were Adelman and Morris (1967,1973). One of their theses is that comparisons of development performance based on purely economic measures are misleading because they fail to address differences in economic welfare and the availability of social services in different areas of national societies (1967:85).
3. "Modernization changes can be observed in the demographic situation, in social relations and in welfare. To the extent that quantification is feasible they may be made measurable by means of indicators specific to each of these aspects (Drewnowski, 1972:88, f.n.6)."
4. "The positive association of urbanization with industrialization and economic growth is well known. Cities provide concentrations of population from which industrial labour may be drawn; they also contain a greater variety of skills and resources than do rural areas. Even more important perhaps, urbanization promotes values favourable to entrepreneurship and industrial growth; in particular, cities typically tend to favour a propensity to analyze traditional institutions and to innovate and accept change ... (Adelman and Morris, 1967:25)."
5. Together, they include communications, electrification, transportation, education, health services and adequate water supplies for both safe drinking and power production.
6. For this reason, studies published during the past five years or so have placed much greater emphasis on the role of telecommunications (rather than mass media) in optimizing development performance. See ITU, CCITT (1976:3) for a complete definition of 'telecommunications'.
7. Hudson and Parker's conclusions concerning the importance of effective two-way communications in increasing political participation are not new. The relationship between communications and political development has been one of the most often studied by communications and development theorists alike.
8. For other studies on the telecommunications/media/transportation trade-off, see Shapiro (1967); Nilles et al. (1976); and Miller (1980).
9. According to Pool (1977:69), over 30 studies undertaken between 1958 and 1978 that set out to test Lerner's hypothesis on the relationship between exposure to media (radio) and modernization found evidence to support it.

10. However, unlike the earlier studies which were ultimately interested in political development as the end-result of development, in this research we do not go beyond evaluating economic development performance. Practically speaking, it is beyond the scope of this paper to try to resolve the numerous contradictions in the literature on the subject of political development. Furthermore, theorists have yet to reach agreement on how political development should be defined so as to remove the Western bias apparent in most discussions on the subject.
11. Clippinger's (1976) comparative look at Algeria and El Salvador leads him to conclude that groups with access to two-way communications systems acquire increased economic and political power in relation to those without such access. Consequently, social and economic disparities are accentuated since the principal users are government and local elites (1976:21).

CHAPTER THREE

Methodology

The data

The model presented in the last chapter summarizes the hypothesized relationships between communications (C), social modernization (M), and economic development (D). The proposed developmental sequence leads from C (as the exogenous independent variable) to M (an intervening variable) and to D (the dependent variable). Justification for the temporal sequence suggested by the model is based on the conclusions of earlier research. However, it has been noted that we do not expect the patterns of relationships among the variables to be the same for all countries. Rather, it is suggested that those patterns will vary depending on the extent of a country's capital investment resources and with the passage of time (due to technological advances).

In order to test these propositions, the countries included in the analysis are divided into separate categories based on common economic criteria measuring national wealth levels. In this way, we have a general indication of the amount of capital resources available for sectoral investment and we can evaluate the experiences of the poorer countries in the Third World separately from the others.

The classification scheme employed in our study is derived from the World Bank tables (1980). However, because of the small N-sizes of some of the World Bank's country groups, their five categories are collapsed here into three. The countries examined are therefore classified as either: (1) 'low' income countries (having per capita national incomes of less than

US\$360 in 1978); (2) 'middle' income developing countries (with per capita incomes between \$360 and \$3500); and 'high' income countries (whose per capita incomes were greater than \$3500 in 1978) <1>.

Some 93 per cent of the countries falling into the low category and 69 per cent of those in the middle group achieved political independence in this century. Most of the countries in these groups can thus be considered 'latecomers' to the development process. In addition, these countries -- along with others in the two lower income categories -- have in all likelihood only recently begun playing a more or less active role in the international market-place. Certainly they have all been exposed to a great variety of intermediate and high technology which carries with it the potential of dramatically altering the way in which they proceed toward their development goals. As a result, in the discussions which follow, much of our attention focusses on these groups of countries. However, summary data are provided for the high income nations, as well as for all the countries grouped together. In this way the differences in the patterns of relationships among communications, modernization and economic development for each income category will become apparent. The inclusion of the results for all the countries together should also be useful for underscoring the problems associated with over-generalization that arise in more orthodox evaluations.

Most of the data used in this investigation are taken from a data set entitled "Cross-National Time Series: 1815-1973" (Banks, 1976). The units of analysis used by Banks are nation-years, and the data include information for 167 countries on 169 variables that report demographic, economic, communications and domestic political information (Banks, 1976:iii). Since a number of countries in Banks' list no longer existed in 1960 (the beginning of the period studied here), we limited our analysis to the comparison

of those 122 countries that had acquired political independence prior to or during the early 1960's (Appendix I). Other countries were excluded from the analysis because they had populations of less than one million (Appendix II) <2>.

The data sources used by Banks include the United Nation's Statistical Yearbook and Demographic Yearbook, as well as UNESCO's Statistical Yearbook, and they are thus among the most widely employed by social scientists in cross-national research. Several of Banks' indicators were considered for inclusion in the indices used to measure the items in the model. A total of 11 variables from that data set were finally included in the analysis (Appendix III).

Annual data on the social and economic indicators are available for almost every country of interest for the years from 1960 to 1973. This 14-year period was chosen primarily because it was during that time that global development strategies were first seriously and systematically undertaken. In addition, only scanty information and data of questionable reliability are available for many of the LDCs prior to that time. Furthermore, it is only since the advent of space technology, and especially with the introduction of satellites, that the production costs of electronic technology have levelled off (and in some cases dramatically decreased), making it possible for developing country governments to speed up the expansion and diversification of their economies. Finally, as was already noted, a small number of countries included in the study acquired political independence after 1960. For those countries, data are considered only for the years following independence. No attempt has been made to estimate their earlier performance.

In the following sections we discuss the operationalization of the various items included in the model and the construction of the (composite)

variables that measure them. We then consider ways of establishing the temporal ordering of the variables in our model and testing the other hypotheses.

Choice of variables

The economic objectives associated with economic development can often be measured directly since indicators such as per capita domestic national product (GDP) reflect clearly defined economic concepts. The measurement of social objectives associated with modernization is not as easy (Baster, 1972:4). However, assuming that the components of social modernization are agreed upon under a broad conceptualization and that data exist for each factor not directly measurable, we can choose from among the available data those items which provide the best 'proxy' measures of the relevant constructs (McGranahan, 1972:93).

In the present investigation, the studies of Lerner (1957), Adelman and Morris (1967), Harbison et al., (1970), Baster (1972), Taylor and Hudson (1972), and Land and Spilerman (1975), as well as the publications of the OECD (1976), the World Bank (1980, 1981) and various UN-affiliated agencies are the sources from which our social indicators have been selected. To enhance the reliability of our measures, composite variables are constructed from a number of indicators that approximate different aspects of each theoretical concept.

Economic Development

The dependent variable in the model is 'economic development' (Apter's 'industrialization'). Three indicators are used to construct its summary measure, including: (a) per capita gross domestic product (GDP); (b) per capita energy consumption; and (c) the proportion of world trade (see

Appendix III).

Per capita GDP is employed as an aggregate measure of national income. While it has a rather limited usefulness, since it does not reflect the distribution of that income, it is the best indicator of domestic investment resources available. GDP was chosen instead of GNP (Gross National Product) because it excludes that part of national income that is earned outside the country and which is generally used either for external reinvestment or accumulated as 'foreign exchange' to be spent on the purchase of imported goods and technology.

Energy consumption, our second indicator of economic development, has often been used as a complementary measure to national income. It reflects the changing emphasis given by governments to manufacturing and other high-energy consumption enterprises, because a 'consumptive' society requires far more energy resources than those needed by transitional and subsistence-oriented societies (Harbison et al., 1970:5).

The third component of our economic development index, proportion of world trade, is included for two reasons: "First, trade is a principal means of promoting economic efficiency and growth; second, a strong trade base tends to be a prerequisite for attracting foreign capital" (World Bank, 1980:18). By incorporating this variable into our economic development measure, we not only measure the investment and consumption aspects of economic expansion, but we also gain insight into a country's status in the international economy.

Social Modernization

The need to evaluate overall development performance in terms of the improved living conditions associated with social modernization was discussed in the last chapter. Unfortunately, however, modernization is

not as directly measurable. It requires the choice of partial or proxy indicators that tap one or several of its dimensions. Since the choice of those proxy measures usually depends on the aims of the investigation, and because our particular interest in social modernization is as an intermediary between communications and development performance, we considered a number of widely used social indicators believed to reflect improvements in the quality of life in developing societies. The final selection of indicators employed in our 'social modernization' index includes: (a) the percentage of national population in cities over 50,000 (urbanization); (b) percentage of the population that is literate; (c) per capita secondary school enrolment; and (d) the number of physicians per capita.

Urbanization has been included in the modernization index because it provides an indication of the size of the potential industrial work force. It also reflects demographic shifts away from traditional occupational roles and toward those associated with 'modern' society. In addition, urbanization gives some indication of the extent of social mobility, increased 'empathy', and the spread of future-oriented attitudes. Finally, urbanization is commonly associated with the development of those social and political institutions that are considered essential to support changing social circumstances <3>.

Literacy and school enrolment data are included in the summary measure of modernization because both reflect improvements in access to educational services, as well as the development of a skilled human resource base. Literacy may be equated with primary school attendance since it reflects the goals of primary education. It is, in fact, a better indicator than primary school enrolment because the impact of adult education programmes is also taken into account <4>. The inclusion of data on secondary school

enrolment provides a particularly good indication of the increased capacity of a society to prepare its population for the new occupations and social roles that generally accompany economic expansion.

Like literacy and secondary school enrolment, the number of physicians per capita also reflects improved living conditions. Although there is no guarantee that doctors will be readily accessible in rural communities, at least there is the potential for improvement in health care services -- especially when it is linked with para-professional training programmes (at the secondary school level).

Communications Development

A case has already been made for treating communications inputs to the development process separately from other modernization support factors. It has also been argued that communications infrastructure plays a crucial role in the delivery of social services associated with social modernization and in the provision of timely information which is so important to successful modernization and industrialization strategies. With this in mind, the variables used here to construct the composite measure of communications development include: (a) the number of highway vehicles per capita; (b) the number of telephones per capita; (c) the number of radio receivers per capita; and (d) per capita newspaper circulation.

In this study, an indicator of transportation service is subsumed under a broad definition of communications because transportation services provide the means by which goods and people can be moved from one place to another <5>. The variable chosen to approximate the level of transportation service is the number of highway vehicles per capita. In addition to measuring the number of vehicles available, this variable provides an indication of the extent to which inter-urban and national highway

infrastructure are developed. Furthermore, it may help to illustrate the (potential) geographic mobility of the population.

All the other items included in the composite measure of communications development are related to various types of information transfer. Two of the indicators (number of radio receivers and newspaper circulation) involve mass media transfers of information. And two (newspaper circulation and telephones) require at least some amount of literacy, although their usefulness is limited since they tend to reflect predominantly 'urban' communication services.

The number of radio receivers per capita may be a good proxy for measuring community awareness. It also provides an indication of how many 'ears' a government can reach for expounding government policy. And in many rural areas, the radio is often the most important (sometimes the only) means of providing adult education services <6>.

Newspaper circulation per capita may also provide a good proxy for measuring the awareness of a population with respect to current events. In addition, it may be an indicator of labour mobility since newspapers provide information about job opportunities (Harbison et al., 1970:5) <7>.

The number of telephones per capita is the only indicator available for most countries that gives some idea of the degree to which two-way communications are developed. Unfortunately, it also tends to measure predominantly urban access and usage since, until very recently, most developing countries could not afford to extend two-way communication services into rural areas. However, the ITU, the OECD and UNESCO are working hard to educate governments and financial institutions on the vital importance of telecommunications services in satisfying the basic needs of the poor in Third World countries.

Index construction

All of the items included in the summary measures are interval level variables, and because they are measured in a variety of ways, standardized scores are used in the statistical analysis. The final choice of indicators from the Banks' (1976) data set was based on their face validity as appropriate measures of each of the items in the model. After the variables were chosen as representative of the concepts of interest, additive indices were constructed. The reliability scores for these indices are presented in Table 3.1 <8>. As the alpha scores suggest, the summary measures provide fairly reliable approximations of each of the theoretical constructs.

TABLE 3.1
INDEX RELIABILITY
(Using pooled data for the period 1960-1973)

COUNTRY CATEGORY	INDEX	ALPHA- SCORE	N-SIZE

LOW INCOME (LT US360 in 1978)	C	.86	439
	M	.88	459
	D	.83	457

MIDDLE INCOME (\$360-3500 in 1978)	C	.91	781
	M	.86	798
	D	.90	803

HIGH INCOME (GT \$3500 in 1978)	C	.91	335
	M	.83	335
	D	.87	335

ALL INCOMES	C	.96	1555
	M	.93	1592
	D	.95	1595

Other indicators were also considered, but they have been excluded for a number of reasons: First, an evaluation of an indicator's correlation with other items included in the summary measure shows it to be unrelated with two or more of them <9>. Second, for some of the variables there is simply too much missing data <10>. Third, as a rule, when two items

considered for inclusion in an index are found to be statistically redundant -- that is, they are so highly correlated that they probably reflected the same thing -- only one is used <11>.

Testing the hypotheses

The main hypotheses tested here are summarized as follows: (1) that communications development precedes social modernization and economic development in time; and (2) that communications will have a varying impact on development performance as a result of (a) the availability of capital resources for sectoral investment (national wealth); and (b) the situational context (environment, including technology) in which a country undertakes its development programme.

With regard to the first hypothesis, longitudinal data for the years 1960-1973 are used to try to demonstrate the temporal antecedence of communications development to social modernization and economic development. This is done by analysing the cross-lagged correlations of the various pairs of variables in the model, the results of which are presented in the next chapter.

A seemingly obvious way to test the second hypothesis would be to compare the three groups of countries at one point in time. All other things being equal, the progress of 'low' wealth countries may eventually resemble that of countries in middle wealth/intermediate development stages. Similarly, given approximately equivalent capacities in terms of the size of national markets, the types and extent of natural resources, and the like, countries in the middle group will likely move toward the upper end of the wealth/development scale. Following this line of argument, pooled data on the three groups of countries are examined for the 1960-1973 period as a whole, enabling us to determine some of the

immediately apparent trends among countries in the various wealth categories.

While this is a useful way of testing the hypothesis, its major shortcoming lies in the presumption that countries develop in similar ways and toward common goals. Rather, as we argued earlier in the paper, the wide availability of modern technology (especially in communications) has had a tremendous influence on the development environment, and the impact of a virtually constant flow of technological innovation is likely to render any conclusions drawn using such a (static) approach only partially appropriate for the analysis of today's developing countries. In addition, just because one country is more wealthy than another does not mean that it is ipso facto more developed. Development does not always go along with increased wealth -- as an examination of the experiences of oil-producing Third World nations shows.

Hence, we have devised a second way of testing the impact of communications which takes these considerations into account. It involves the examination of the different income categories across a period of 14 years (from 1960 to 1973). In order to maximize the N-size of each group while preserving a number of distinct country categories, we consider data for three 4-year periods (1960-1963, 1965-1968 and 1970-1973). In this way, conclusions can be drawn not only concerning the variations among the groups of countries, but also about the rate and patterns of change in development performance within each income category.

It is hoped that by treating countries with varying capacities for economic expansion and diversification separately, we will avoid some of the problems with studies that make broad statements about how countries should or do develop -- and, more to the point, how communications technology affects that process. However, this is not to say that we have

found the perfect solution to those problems. In fact, there are limitations inherent in the approach taken here which place other constraints on the extent to which inferences can be made. For example, because we use income data for 1978 -- five years after the end of the period studied -- to classify countries into the three income categories -- we cannot determine at what precise level of communications development, etc. a country is likely to move from one category into another. Nor, since we analyse grouped data, are we able to trace an individual country's progress up or down the wealth/development scale.

Control variables

As a final part of our analysis, we introduce two control variables -- political régime type and colonial heritage. Since some of the literature suggests that variables such as these may have an affect on development performance, their inclusion helps us in evaluating the overall appropriateness of the model and determining how far our conclusions can be extended.

The first control variable, political regime type, uses information provided in Powell (1982) to classify countries as either (1) 'democratic' or (2) 'non-democratic'. Powell's classification scheme has been employed here because he combines the common criteria of a number of other studies on the subject <12>. This variable is particularly worthy of examination because the literature on 'political development' -- associated with increased popular participation, representation, press freedom, and other aspects of 'democratic' government -- is so extensive <13>. Some authors have argued that democratic government is conducive to rapid economic expansion, and they view it as essential to ensuring the equitable distribution of the benefits of growth (Adelman and Morris, 1967, 1973).

Others, considering the failures of 'new states' (Appendix VI) -- countries which acquired independence after 1945 -- in their attempts at democratic government, have concluded that increased political participation and decentralized decision making may be possible only in those countries that have a certain (high) level of industrialization and/or social modernization (Schramm, 1973; Oshima, 1976a,b; Rogers, 1976,a,b; Edeani, 1977,1980; Geertz, 1963,1977; and Huntington, 1978).

Unfortunately, none of the literature on the subject provides convincing evidence to suggest that in the environment of 20th-century development, countries with democratic governments are more successful than others in achieving more rapid, equitable, balanced or even sustained economic growth. Instead, the remarkable progress made by some countries under authoritarian regimes implies that democracy may be a long-term product of successful social and economic development strategies (Linz, 1975; and Collier, 1979). Thus, in light of this observation, it is not expected that the consideration of regime type will radically affect the conclusions derived from our earlier comparisons.

The second control variable introduced to evaluate our approach distinguishes between countries on the basis of their historical experiences with colonialism. The data used to classify countries on this variable are taken from Banks and Textor's, "A Cross-Polity Survey" (Revised, 1968). For those countries achieving independence in the early 1960's, and which are consequently not included in that study, information about colonial experience is obtained from Banks and Overstreet (1980). Thus, all of the countries are classified into four categories, including: (1) 'British'; (2) 'French'; (3) 'Spanish'; and (4) 'Other or None' (a residual category) (Appendix VII).

One reason for looking at colonial heritage relates to the criticisms launched against Western-oriented evaluations. Among them is the concern that such approaches have tended to ignore the importance of external factors in shaping the environment in which 20th-century development takes place (Golding, 1974). A key external factor that is often cited in the literature is the effect of colonial heritage on development performance.

While no known empirical studies have been undertaken which distinguish between countries on the basis of whether or not they experienced a period of colonial domination, and if so, what type of rule it was, several authors have suggested ways in which colonialization could affect a country's development experience (Pye, 1963; Apter, 1965, 1973; Rostow, 1971; and Saul, 1979). For example, it is widely acknowledged that Britain, far more than other colonial rulers, placed considerable emphasis on the development of transport and communications infrastructure, establishing schools, and employing (some would say 'incorporating') large numbers of indigenous elites in their colonial bureaucracies. On the other hand, the literature suggests that the French generally downplayed these things -- especially the importance of communications infrastructure.

From another perspective, some authors suggest that colonialism had a negative impact on development performance because it hindered the development of indigenous institutions and local entrepreneurship. Still others argue that colonialism had a positive impact on modernizing the social and political institutions in those countries, as well as by providing a pool of skilled and experienced labour whose members were able to step in and efficiently administer government following independence. No side is taken in this paper on that debate. Rather, information about colonialism is considered merely to see whether the patterns of relations observed among the variables in the model hold across the categories of colonial rule. In

consequence, should we find that the patterns of relations among the variables vary in some systematic way by the type of colonial heritage (or by the regime type governing them), we will have to conclude that factors related to those historical experiences play a more important role in the development process than has been demonstrated heretofore and that their impact should be explored further.

In this chapter we have outlined the research design employed and indicated the operationalization of the variables used to measure the items included in our model. We have also considered some of the ways in which our hypotheses can be tested. In the next chapter, the results of the data analysis are presented and the conclusions drawn from them are discussed.

- Chapter Three Notes -

1. The World Bank groups countries into five income groups, including: "38 low-income developing countries with a per capita income of \$360 or less in 1978; 52 middle-income developing countries with a per capita income of more than \$360; 18 industrialized countries; 5 capital-surplus oil exporting countries; and 12 centrally planned economies" (World Bank, 1980:109). See Appendix IV for our three-category classification of countries.
2. Since countries with populations of less than one million are excluded from most of the World Bank Tables, it would not have been possible to classify them without further altering the classification scheme. Also, these countries are usually left out of cross-national comparisons because data are so often lacking for them.
3. See Adelman and Morris (1967) for a discussion of the modernization of social systems characterized by rapid urbanization in the first phase (1967:39). See also Lerner (1957,1958), Cutright (1963), and Schramm and Ruggels (1967) on the role of urbanization in development.
4. Until recently, definitions of literacy varied widely from country to country. For example, some countries used the ability to both read and write as the minimum requirement for literacy. Literacy requirements in countries that experienced colonial rule, on the other hand, were often based on the ability to read and write English, French or Spanish rather than the indigenous language.
5. It was decided that transportation, generally recognized to be an important element in development, should not be excluded from the analysis. However, when it is separated from the other communications indicators and combined with the modernization measures, the bivariate relationship between the two indices becomes extremely high. For example, from 1960 to 1973, the correlation between communications (excluding transportation) and modernization (including transportation) increases from .64 in 1960-1963 to .81 in 1970-1973 for the low income countries, from .77 to .83 for the middle income group, and from .79 to .87 when all the countries are grouped together.
6. Radios are most often used for one-way communications, thereby fostering centralized decision-making. Another problem with this indicator relates to how radio receivers are counted. Some countries count just the number of radio licences issued. Total figures are therefore seriously underestimated where licences are not required for all types of receivers (especially transistor radios).
7. Once again there is a problem with non-standardized measurement. While many countries go so far as to count locally mimeographed village newsletters, others count only weekly or daily newspapers.
8. The only significant difference in the alpha-scores when the transport variable is excluded from the communications index (from .86 down to .81) occur with the low income group. However, since we are especially interested in the patterns of relations for countries at the lower end

of the wealth/development continuum, the transportation variable has been kept.

9. For instance, the percentage of the population involved in agricultural activities (see Appendix III) was found to be statistically unrelated with secondary school enrolment and the number of physicians per capita. Consequently, while this might be considered as a fairly good measure of trends away from traditional occupations (if negatively correlated with the other modernization indicators), it was dropped from the analysis.
10. In a few cases where information was lacking, mean scores are substituted for the missing values. A conservative 3/4 rule is used to decide whether to assign mean scores for the communications and social modernization indices -- that is, when there is a missing value for a country on just one of four items included in the index, the average score for the income group to which it belongs is substituted for that item. Since only three items are used to construct the economic development index, a similar 2/3 rule is applied.
11. However, occasionally, when it can be justified on theoretical grounds that two highly correlated items do not measure the same thing, both are included. For example, when the countries are all grouped together, the number of highway vehicles per capita is found to be strongly correlated with the other communications indicators (ranging from $r=.74$ with newspaper circulation to $r=.93$ with telephones). Similarly, telephones correlates highly with radios and newspaper circulation ($r=.78$ and $.81$, respectively). But the highways vehicle item is used here as a measure of the transportation aspect of communications, and telephones measure two-way communications technology. Radios and newspapers are indicators of mass media communications availability.
12. Powell's (1982) definition of democratic systems is closely related to Dahl's (1971) in his study of 35 'polyarchies'. He also uses Rustow's (1967) list of countries with competitive elections, Banks' 'effective legislature' index, and Butler et al.'s (1981) list of 28 nations that held 'democratic general elections' in at least 'partly free' settings in the late 1970's. For the definition of 'democratic regimes' employed here, see Powell (1982:3). Countries classified as non-democratic include those which meet some but not all of Powell's criteria. They also include those that attempted democratic government but were unable to sustain it for more than five consecutive years between 1958 and 1976. See Appendix V for a list of the democratic and non-democratic country codes.
13. See Almond and Coleman (1960), Rostow (1960, 1971), Deutsch (1961), Huntington (1965), Dahl (1971) and Gurr (1974), as well as the empirical studies of Lerner (1957, 1958), Lipset (1959), Cutright (1963), Simpson (1964), McCrone and Cnudde (1967), Olsen (1968), Cutright and Wiley (1969-70), and Inkeles (1974), among others.

CHAPTER FOUR

Data AnalysisBivariate relationships

For the causal links suggested by our model to be demonstrated, it must first be shown that relationships exist between the dependent variable (economic development) and the explanatory variables (communications development and social modernization). The bivariate correlations (Pearson r 's) for each income group of countries, as well as for all the countries grouped together, are illustrated in Table 4.1.

TABLE 4.1
BIVARIATE CORRELATIONS AMONG COMMUNICATIONS (C), SOCIAL MODERNIZATION (M) AND ECONOMIC DEVELOPMENT (D) FOR COUNTRIES AT VARIOUS WEALTH LEVELS, USING POOLED DATA FOR THE PERIOD 1960-1973

	LOW INCOME N=437 (37 countries)		MIDDLE INCOME N=780 (61 countries)		HIGH INCOME N=335 (24 countries)		ALL INCOMES N=1552 (122 countries)	
	N	D	M	D	M	D	M	D
C	.61	.59	.79	.75	.69	.65	.80	.88
M		.70		.66		.47		.72

N.B. All correlations are significant at least at the .001 level.

As can be seen, there are fairly strong relationships between each pair of variables included in the model. What is interesting, however, is the existence of differences in the strengths of the relationships across the income categories. Furthermore, if one compares the correlations for all the countries grouped together with those for individual income groups, the usefulness of an analytical approach that takes into account the varying resources and capacities of countries becomes evident. (This will

be discussed in greater detail in a later section of this chapter.)

The temporal sequence

One of the most straightforward ways of testing assumptions about causality between variables and their ordering in such models is discussed in Kenny (1975,1979). It involves the analysis of cross-lagged correlations (CLC) <1>. In its simplest form, CLC analysis involves two constructs, say, X and Y, measured at two different points in time, say, time 1 ($t=0$) and time 2 ($t+i$ years). This generates a total of four variables (X_1 , X_2 , Y_1 and Y_2) and six correlations, including two autocorrelations ($r_{X_1X_2}$ and $r_{Y_1Y_2}$), two synchronous correlations ($r_{X_1Y_1}$ and $r_{X_2Y_2}$) and two cross-lagged correlations ($r_{X_1Y_2}$ and $r_{X_2Y_1}$) (see Fig. A.1, Appendix VIII). For example, we may want to examine the correlations for variable X at 1960 ($t=0$) and variable Y at 1970 ($t+10$), compared with the correlation between X at 1970 and Y at 1960. Should there be a substantial difference in the magnitude of those correlations, we could draw some conclusions about the direction of causality. Thus, if the correlation between variable X at $t=0$ and variable Y at $t+10$ is found to be significantly greater than that between X at $t+10$ and Y at $t=0$, there is more statistical support for arguing that X is temporally prior to Y <2>.

In order to determine whether the cross-lagged differentials are substantial enough to permit such conclusions to be drawn, a test of significance which lets us compare correlations derived from the same sample (here the same population sampled in time) is required (see Cohen and Cohen, 1975) <3>. Table 4.2 summarizes the results. It allows us to see the effects of lagging social modernization (M) ten years behind communications development (C), communications behind social modernization, and so forth <4>.

TABLE 4.2
SUMMARY IMPLICATIONS OF SIGNIFICANT CROSS-LAGGED DIFFERENTIALS
(CLCs), USING POOLED DATA FOR THE PERIOD 1960-1973*

COUNTRY CATEGORY	VARIABLE PAIR TESTED	CROSS-LAGGED DIFFERENTIALS	SIGNIFICANCE LEVEL (Two-Tailed Test)	DIRECTION OF CAUSALITY
LOW INCOME	C,M	.346	.001	C --> M
	C,D	.155	.01	C --> D
	M,D	-.057	.20	
MIDDLE INCOME	C,M	.080	.001	C --> M
	C,D	.049	.10	C --> D
	M,D	-.044	.20	
HIGH INCOME	C,M	.260	.001	C --> M
	C,D	-.045	.40	
	M,D	-.053	.40	
ALL INCOMES	C,M	.100	.001	C --> M
	C,D	.035	.001	C --> D
	M,D	.059	.001	D --> M

*Lagged correlations are calculated using data for $X_i(t=0)$ and $Y_i(t+10)$. Causal arrows are shown only for the statistically significant differentials.

Happily, the strongest evidence in support of treating communications development as the exogenous variable in our model is provided by the data on the low income countries -- from our perspective, the most important group since these countries are expected to benefit the most from careful sectoral planning. As the table shows, when the correlation between communications at $t=0$ and modernization at $t+10$ is compared with that of modernization at $t=0$ and communications at $t+10$, the differential is .346, which is significant at least at the .001 level. The fact that this differential is positive suggests that communications is the temporally prior variable and, consequently, that the direction of causality is from communications to modernization. In addition, the low income group CLCs establish communications as temporally prior to economic development, with a positive differential of .155 (significant at the .01 level).

In a similar way, the data on countries in the middle income category also suggest that it is appropriate to treat communications development as the first variable in the model. However, for that group, differences in the cross-lagged correlations are much smaller (.080 and .049, respectively), with the differential between communications and economic development significant only at the .10 level.

Interestingly, the data suggest a greater difference in the CLCs between communications and social modernization for the high income group than for countries in the middle category. However, the cross-lagged differentials for the other two pairs of variables -- communications and economic development and social modernization and economic development -- are negative (but statistically insignificant). Thus, for the high income countries the only clearly evident causal ordering concerns the placement of communications before modernization.

When all the countries are grouped together, we discover significant differentials for every pair of variables. Here, while increases in communications development apparently occur before increases in social modernization and economic development, the data suggest that modernization follows economic development in time <5>.

However, our inability to establish either social modernization or economic development as the prior variable when considering the income categories separately suggests that social modernization and economic development are 'mutually causal' (that is, increased levels in one stimulate increased levels in the other, leading to further increases in the first). Still, since the focus of this investigation is primarily on the relationship between communications and economic development, this need not unduly concern us. Here our interest in social modernization is in its role as an intermediate agent through which some of the effects of

communications on economic development may be channelled and, very generally speaking, its relative importance (vis-a-vis that of communications) in the development process. Consequently, while it may be more accurate to treat social modernization and economic development as temporally parallel and to include a two-way arrow linking them, we have chosen not to do this lest the analysis be needlessly complicated.

From this exercise, we can conclude that the cross-lagged differentials provide evidence to support the propositions that communications development is causally related to social modernization and economic development, and that it is temporally prior to each. Importantly, this is especially the case for the (low income) group of countries, for which the model is assumed to be the most appropriate. Finally, the variability among the differentials justifies our decision to analyse the groups of countries separately.

The varying impact of communications on development

The next part of the analysis tests the hypothesis that communications will have a varying impact on economic development. Before presenting the findings, though, a caveat is introduced concerning the statistical procedures employed here. Ideally, multiple regression procedures could have been used because they are generally considered the most appropriate for causal modelling. However, in the present analysis, high correlations between the communications, social modernization and economic development measures (see Table 4.1) prevent us from using such procedures (because the existence of multicollinearity between our explanatory variables makes it extremely difficult to single out their respective contributions).

We therefore employ other statistical techniques which are not affected by the same kinds of constraints -- in particular, partial

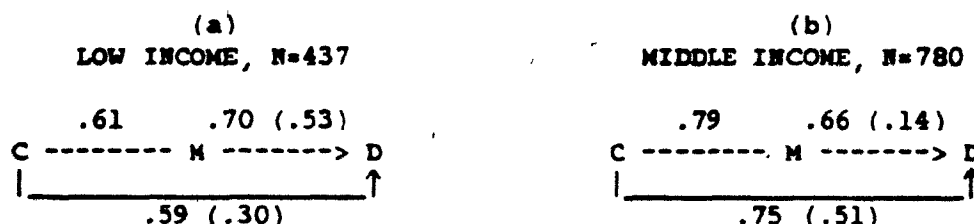
correlation analysis. One advantage of examining the partial correlations is that, in a manner similar to multiple regression, they permit us to determine the strength of a relationship between two variables while taking into account the potential impact of other factors that may have a bearing on that relationship. Furthermore, when the proper temporal sequence can be ascertained, some cautious inferences about the causal nature of those relationships can be made.

Analysis of pooled data for 1960-1973 period

A couple of ways in which our hypothesis pertaining to the varying impact of communications on development could be tested were outlined in Chapter Two. The first involves the comparison of the three groups of countries at one point in time. To that end, data for each income category have been pooled for the 1960-1973 period as a whole. Their analysis enables us to see some of the immediately apparent similarities and differences among the groups.

Figures 4.1a-d illustrate the patterns of relationships among the variables based on the pooled data. (Table A.2, Appendix VIII summarizes the correlations among the variables by income category and across time.)

FIGURE 4.1
ZERO-ORDER AND PARTIAL CORRELATIONS AMONG COMMUNICATIONS (C),
SOCIAL MODERNIZATION (M) AND ECONOMIC DEVELOPMENT (D) FOR
COUNTRIES AT VARIOUS WEALTH LEVELS, USING POOLED DATA
FOR THE PERIOD 1960-1973*



(c) HIGH INCOME, N=335			(d) ALL INCOMES, N=1552		
	.69	.47 (.04)		.80	.72 (.05)
C ----- M -----> D			C ----- M -----> D		
-----			-----		
	.65 (.51)			.88 (.74)	

*Zero-order correlations are provided for each pair of variables, with the partial correlations in brackets. Partial rMD.C for the high income countries is statistically insignificant, while for all the countries together it is significant at the .10 level. All other correlations are significant at the .0001 level.

They demonstrate a number of interesting things. We have already seen (Table 4.1) that the simple bivariate relationships between communications and social modernization, and between communications and economic development, fluctuate across the income categories, although they remain fairly to strongly correlated for all three groups of countries. The higher correlations for the middle income category suggest that as countries increase levels of communications and social modernization, and as they expand their economies, communications may have an increasingly important role to play. For the high income countries, on the other hand, the drop in the strength of those relationships implies that some kind of 'threshold' effect could be at work here -- that is, that the direct impact of communications on modernization and development performance increases to a certain level, after which it begins to level off. In contrast to the trends observed in the relationships between communications and the other two variables, the relationship between social modernization and economic development appears to decrease in strength as countries progress along the wealth/development continuum.

The partial correlations provide sharper insights into the patterns of relationships among the variables for the different country groups. The set of first-order correlations between communications and economic

development (holding social modernization constant) again suggests a levelling off of the impact of communications on development performance as national wealth increases. The partial correlation for the low income countries is a moderate .30, while for both the middle and high income groups it is a moderately strong .51. In contrast, the partial correlations between social modernization and economic development decrease at the higher income levels -- dropping from .53 for the low category to .14 for the middle group, and becoming insignificant for the high income countries at .04. Altogether, these findings support the idea that as social modernization increases, institutions and management personnel may increasingly come to depend on communications technology and information for further improvements in organizational efficiency, as well as in the delivery of social services. Note that the across-category trends are obscured in Fig. 4.1d, which summarizes the results of zero- and first-order correlation analysis for all of the countries grouped together.

In sum, although much of the impact of communications on economic development in low income countries is seen to be indirect (i.e., channelled through the other social modernization factors), it apparently has a greater direct influence on the development performance of countries in the middle and high income categories. However, as has been pointed out, while comparing the various groups of countries at one point in time is useful for illuminating some of the broad trends among them, we may gain better insights into the relationships suggested by the pooled data by examining the individual income groups over time.

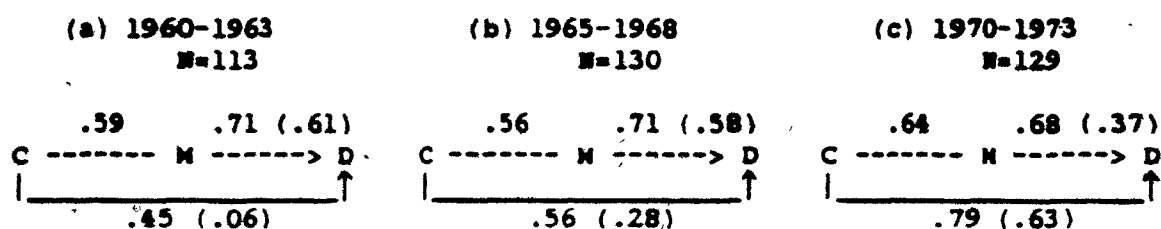
Trends in individual income categories across time

It has already been suggested that countries currently undergoing economic development do so in a highly dynamic international environment --

one in which rapid changes in market conditions and technology are persistently altering the kinds of opportunities available. Thus, we have suggested that a better way of determining the relative importance of communications in economic performance involves the analysis of data for the same group of countries at different points in time. (Data for three 4-year periods -- 1960-1963, 1965-1968 and 1970-1973 -- are thus examined for each income category.)

The first countries evaluated here are again those we consider the most important -- the low income nations. As we have noted, for these countries more than for any others, careful planning for sectoral development is crucial because they have the least amount of investment capital available and they tend to have the smallest capacity for diversifying their economies. Figures 4.2a-c illustrate the patterns that emerge over time from the data on those countries.

FIGURE 4.2
ZERO-ORDER AND PARTIAL CORRELATIONS FOR THE
LOW INCOME COUNTRIES, ACROSS TIME*



*Partial $r_{CD.M}$ for the 1960-63 period is statistically insignificant. All other correlations are significant at least at the .001 level.

Among other things, these figures show that the relationship between communications and economic development, even when the effects of the other modernization factors are considered, increases steadily from 1960 to 1973. This strongly suggests that the influence of communications system

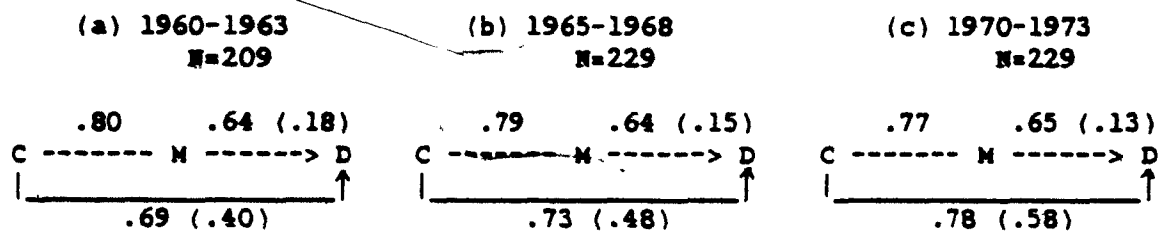
availability has become increasingly important in recent years for the successful modernization and economic development of the poorer nations.

For the 1960-1963 period, communications apparently makes no significant direct contribution to development performance. Instead, virtually all of its influence on economic development is channelled through other social infrastructure (urbanization, education and health care). Over time, however, the relationship between social modernization and economic development performance appears to remain virtually constant (rMD.C varies only slightly from .61 to .58 between 1960-1963 and 1965-1968), while the strength of the relationship between communications and economic development increases (rCD.M goes from an insignificant .07 to a moderate .28 over the two periods). This suggests a greater impact of communications development on production-related outputs than just a few years earlier.

By the end of the period studied, we see further significant increases in the partial correlation between communications and economic development, suggesting that the markets of the low income countries have indeed come to depend more and more on the information transfers made possible by the presence of modern communications systems. This is also reflected in the decreased strength of the relationship between social modernization and economic development from 1960 to 1973 (partial rMD.C). Considered together, evidence of changing patterns in the relationships among the variables over time adds a further dimension to our understanding of some of the ways in which communications technology can contribute to the development of the world's poorest countries.

Similar trends emerge from the data on the middle income group (see Figures 4.3a-c). One immediately apparent similarity between the

FIGURE 4.3
ZERO-ORDER AND PARTIAL CORRELATIONS FOR THE
MIDDLE INCOME COUNTRIES, ACROSS TIME*



*Partial rMD.C for the 1970-73 period is significant at the .10 level. All other correlations are significant at least at the .05 level.

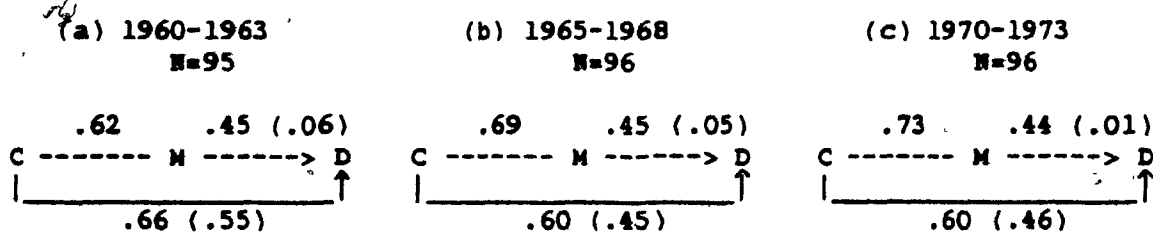
low and middle groups is the increasingly important role played by communications in the development process. Although the rate of change in communication's growing contribution vis-a-vis other modernization factors is not as dramatic for the middle group as it is for countries in the low category, it is still noteworthy. For instance, Fig. 4.3a shows that in the first years (1960-1963), the partial correlation between communications and economic development is .40 (compared with an insignificant .06 for the low income group). During the middle years it increases to .48, and by the end of the period (1970-1973) it is .58.

Some interesting differences between the groups emerge as well. Data for the low income group reveal slightly higher bivariate correlations between social modernization and economic development which, when the effects of communications are controlled for, are seen to decrease across the years (from .61 to .58 and then to .37). In contrast, the correlation between social modernization and economic development for the middle income countries drops more sharply when communications is controlled for (ranging between .13 and .18). These findings once again suggest that at higher levels of national wealth, the relationship between social modernization and economic development becomes increasingly dependent upon the

availability of communications services.

In contrast to the results for the two lower income categories, Fig. 4.4a-c illustrates that for the high income group, no discernible patterns emerge over time. This time, while the relationship between

FIGURE 4.4
ZERO-ORDER AND PARTIAL CORRELATIONS FOR THE
HIGH INCOME COUNTRIES, ACROSS TIME*



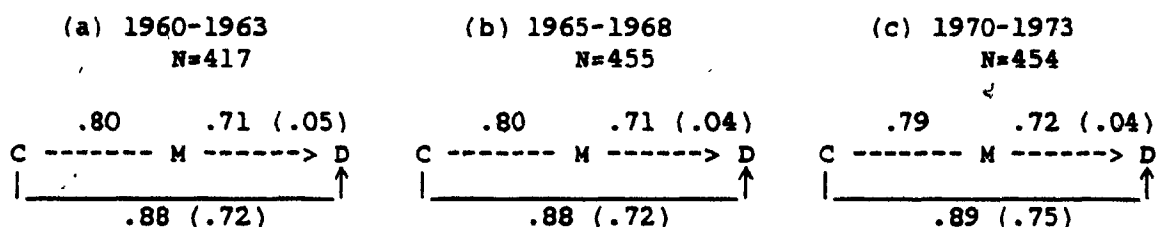
*Correlations of .06 or less are statistically insignificant.
All others are significant at the .0001 level.

communications development and social modernization increases (modestly) from 1960 to 1973, the partial correlations between communications and economic development suggest a small overall decrease in communication's contribution to the development performance of these countries. However, the disappearance of the relationship between social modernization and economic development when communications is controlled for does suggest that, in a similar way to that found in the middle income countries, this relationship depends on the presence of a correspondingly high level of communications system availability. Still, since the cross-lagged correlations for the high income category are inconclusive in establishing either communications or economic development as the prior variable, we cannot make any inferences from these findings with regard to how communications affects their development performance. Rather, our analysis of those data seems to confirm arguments in the literature which underscore a close interdependence between communications and other aspects of the

development process.

Finally, parallel data on the population of countries as a whole again justify our evaluation of each income group individually (see Figs. 4.5a-c). All that can be concluded from these aggregate data is

FIGURE 4.5
ZERO-ORDER AND PARTIAL CORRELATIONS FOR ALL
COUNTRIES GROUPED TOGETHER, ACROSS TIME*



*Correlations of .05 or less are statistically insignificant.
All others are significant at the .0001 level.

that: (a) there are strong bivariate relationships between communications and social modernization and between communications and economic development, with a slightly weaker correlation between modernization and economic development; (b) while consideration of social modernization apparently affects the relationship between communications and economic development, its influence is not dramatic; and (c) in contrast, when the effects of communications are held constant, the strong relationship between social modernization and development performance virtually disappears.

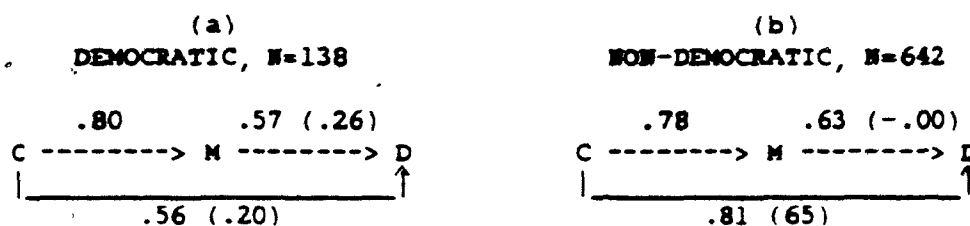
Altogether, the results of both modes of analysis provide empirical evidence in support of the hypotheses that communications' influence on development performance would vary by national income level, and increases across time. In the next section we consider the effects of introducing two additional variables -- political regime type and colonial heritage.

The control variablesPolitical Regime Type

In this analysis, political regime type is introduced to see whether the patterns of relationships among the variables already seen hold for democratic and non-democratic countries alike. We focus here on the middle income countries for a couple of reasons: First, there is simply too little variation in regime type among countries in the low income category -- only 2 of a total of 37 are classified as democratic. Thus, the most that can be inferred is that the tendency of low income countries to be ruled by authoritarian-like governments suggests that the notion of 'political development' as it is commonly conceptualized (associated with the democratization of political structures) retains a traditional Western bias. Secondly, we have already noted that the model employed here is not particularly well suited to the high income countries -- probably the product of the very different environment of pre-industrial development and the idiosyncratic growth patterns of the resource-rich nations. Therefore, only the results of analysing data for some 61 countries in the middle category -- 10 democratic and 51 non-democratic -- are discussed, although it is expected that their comparison will provide a fairly good indication of some of the effects of political regime type on the development patterns discussed earlier.

Considering first the pooled data for the 1960-1973 period, Figs. 4.7a and b illustrate the results of partial correlation analysis for countries in the middle income category. (Table A.3 in Appendix VIII summarizes the zero- and first-order correlations by regime type.)

FIGURE 4.6
ZERO-ORDER AND PARTIAL CORRELATIONS FOR MIDDLE INCOME
DEMOCRATIC AND NON-DEMOCRATIC COUNTRIES, USING POOLED
DATA FOR THE PERIOD 1960-1973*



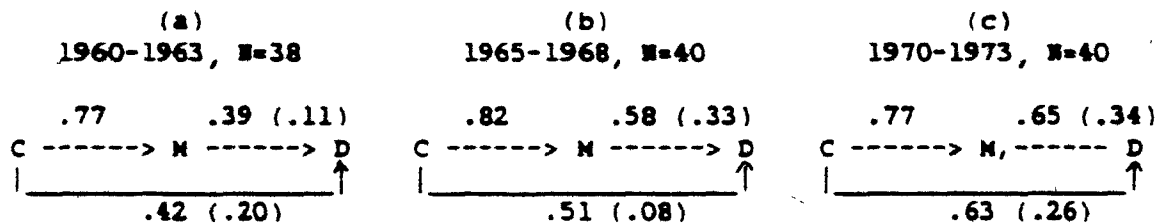
*Partial rMD.C for the non-democratic group is statistically insignificant. All other correlations are significant at least at the .05 level.

They suggest the existence of considerable variation between the democratic and non-democratic groups. In the first place, the figures show that while there is only a slight difference in the bivariate relationship between social modernization and economic development for each regime type, that relationship remains moderately strong for the democratic category but disappears completely for the non-democratic countries when the effects of communications are held constant. Furthermore, the bivariate and partial correlations associated with communications and economic development are much higher for the non-democratic countries. From this it may be inferred that communications has a greater impact on the development performance of countries in that group. The findings also suggest that in middle income nations with democratic regimes, communications and social modernization make distinct contributions to economic performance ($r_{MD.C}=.20$ and $r_{CD.M}=.26$). In the non-democratic countries, however, communications seems to play a more important and direct role, while the influence of the other modernization factors appears to depend entirely upon its presence <6>.

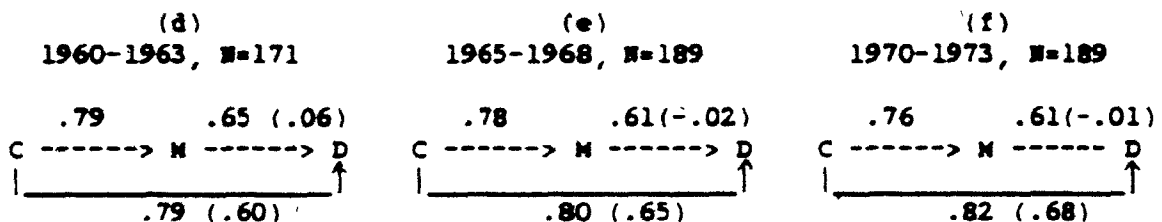
Figures 4.7a-f summarize the relationships among the variables by regime type over the years 1960 to 1973. Here the data suggest that in

FIGURE 4.7
ZERO-ORDER AND PARTIAL CORRELATIONS FOR MIDDLE INCOME
DEMOCRATIC AND NON-DEMOCRATIC COUNTRIES, ACROSS TIME*

DEMOCRATIC



NON-DEMOCRATIC



*Absolute correlations of .26 or less are statistically insignificant. All others are significant at least at the .05 level.

the democratic countries communications has no significant independent influence on development, even across the period. Instead, in those countries, all of its impact on economic performance seems to be mediated by the other social modernization factors which rival communications' contribution to that process. In contrast to this, the findings for the non-democratic countries across the 14 years again suggest that communications contributes far more directly to that group's economic expansion, with the zero- and first-order correlations remaining high and relatively constant for all three time periods. Furthermore, the disappearance of the relationship between social modernization and economic development when controlling for communications also underscores the importance of communications infrastructure in non-democratic developing countries.

Overall, the results of introducing political regime type imply that

different factors may be operating in the democratic and non-democratic countries considered here. Exactly what those factors are cannot, of course, be determined from our analysis with any degree of precision. Still, a key to their identification may be found in the high correlations between communications and social modernization for both types of countries (and possibly to the even stronger relationship between communications and economic development observed for the non-democratic group). Alternatively, variations between the groups may relate not so much to the type of socio-political structures found in countries within each category, but rather to how well they function -- either to encourage grassroots involvement in all stages of project design and implementation, or in achieving national development goals even where popular participation in decision making is discouraged.

To carry this idea further, it is possible that the greater participation levels anticipated under democratic rule do in fact provide more opportunities to developing societies. In this way, increased access to policy makers could reflect the greater efficiency of inter-personal communication channels (i.e., the 'openness' of government) in those countries, accounting for the insignificant partial correlations between communications and economic development. It may also be the case that democratic rule results in less government involvement in economic activities, thereby stimulating private entrepreneurship at all levels of national society. Or perhaps the countries classified here as democratic are different from their non-democratic counterparts in the middle category in ways which are not as immediately apparent <7>.

In sum, the results of our rather cursory examination of several democratic and non-democratic countries suggest that further research in this area is needed. Certainly political regime type appears to be a more

important factor in the development process than we originally thought. It is therefore possible that a more sophisticated research design and/or the use of other political variables could help identify the kinds of factors operating in these nations and shed some light on how they stimulate (or hinder) economic expansion.

Colonial Heritage

The second control variable considered is colonial heritage -- that is, whether or not a country experienced colonial rule and, if so, what type. Originally all of the countries were classified as having either a British, French or Spanish colonial heritage; those with some other kind of colonial experience were placed in a residual category (Banks and Textor, 1968; also see Appendix VII) <8>. However, for this part of the analysis, we consider only those countries in the lowest income group because they are likely to be particularly susceptible to any of the (positive or negative) effects of colonialism. That is, their low potential for building up infrastructure and social institutions, or for diversifying their manufacturing sectors is assumed to have caused them to depend heavily on the lessons learned under colonial rule. By contrast, wealthier countries and those that have been developing for a longer time, are assumed to be in a better position to possess the means (i.e., the resources and skills) for more rapid economic expansion. Consequently, even countries at lower levels of the middle category, regardless of their historical past, may be able to play an active role in the international market-place much sooner than their poorer neighbours, and the lessons learned there will be likely to have a greater influence than colonial tutelage on the setting of their development agendas. It is therefore very probable that the combined effects of greater resources and more experience

in implementing development programmes (related to the amount of time they have been independent) have eroded most of the impact of colonialism by the first years of our study (1960-1963) <9>. In addition, since all of the countries formerly ruled by Spain fall into the middle income category <10>, the bulk of this discussion is limited to the comparison of those 28 low income countries that were subjected either to British or French colonial rule. Thirteen of these were colonized by the British; the other fifteen were ruled for a time by France.

Before presenting the results of the correlational analysis, it may be interesting to note that of all the countries that undertook economic development as independent polities since the turn of this century, over half (53.8 per cent) of those with a British colonial heritage have been classified as middle income. This may be compared with roughly a third (36.4 per cent) of those which were once governed by France, and slightly more (39 per cent) of the countries with some other or no colonial experience.

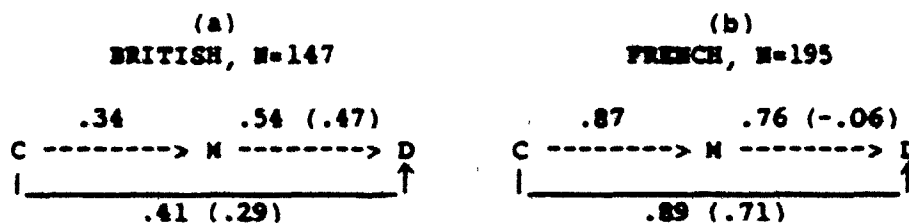
Therefore, even without looking more closely at the data, we can infer from this prima facie evidence that British colonial heritage tended to lead to more rapid economic expansion than that witnessed in other countries. Countries ruled for a time by the British prove to be approximately 1.48 times more likely to be classified as middle income than those with French colonial experience, and they are about 1.38 times more likely than countries with some other (except Spanish) colonial heritage or none at all. This suggests that the claims of other authors that colonialism has an impact on development patterns are probably correct and that the type of colonial rule may determine whether that influence is positive or negative in terms of economic performance.

Earlier in this paper we also made reference to the emphasis placed by

British colonial governments on the development of roads, rail services and telegraph lines. Consequently, we expect to find some variation in the patterns of relationships among the variables for the former British and French colonies. We also expect that the passage of time will erode some part of those differences.

Figures 4.8a and b illustrate the general patterns of each colonial group when pooled data for the years 1960-1973 are examined. (See Table A.4, Appendix VIII for a summary of the zero- and first-order correlations by type of colonial heritage.) The most immediately apparent contrasts

FIGURE 4.8
ZERO-ORDER AND PARTIAL CORRELATIONS FOR LOW INCOME
COUNTRIES WITH BRITISH AND FRENCH COLONIAL HERITAGE,
USING POOLED DATA FOR THE PERIOD 1960-1973*



*Partial r_{MD.C} for the French group is statistically insignificant. The other correlations are significant at least at the .05 level.

between the two groups is in the higher bivariate correlations for the French heritage group. In addition, the figures suggest that while the other social modernization factors rival communications in its influence on development performance in the former British colonies, the relationship between social modernization and economic performance for countries with a French colonial heritage apparently depends entirely on communications <11>.

A closer look at the trends in these patterns of relationships over time provides another vantage point. Figures 4.9a-c and Figs. 4.10a-c contrast the British and French groups across the 14 years. Some rather

FIGURE 4.9
ZERO-ORDER AND PARTIAL CORRELATIONS FOR LOW INCOME
COUNTRIES WITH BRITISH COLONIAL HERITAGE, ACROSS TIME*

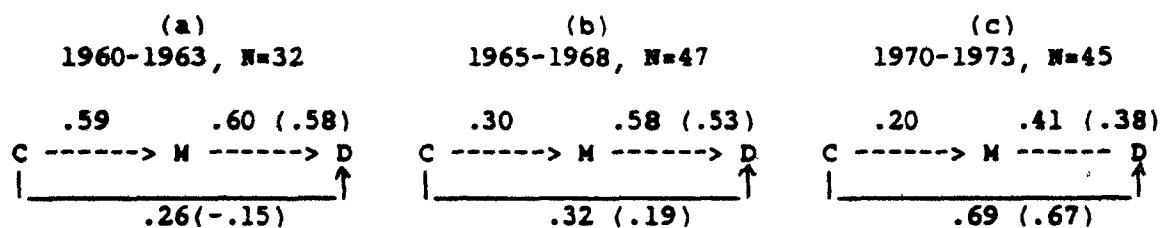
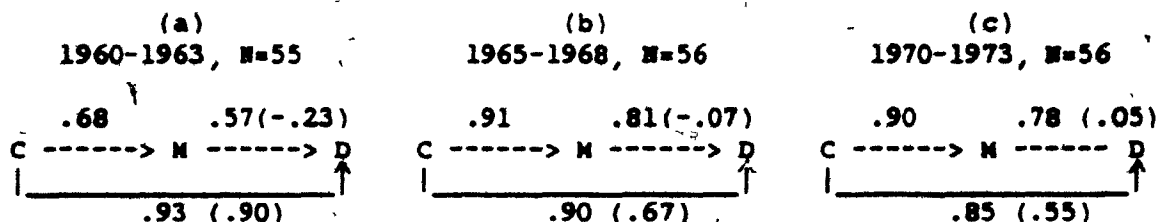


FIGURE 4.10
ZERO-ORDER AND PARTIAL CORRELATIONS FOR LOW INCOME
COUNTRIES WITH FRENCH COLONIAL HERITAGE, ACROSS TIME*



*Absolute correlations of .26 or less are statistically insignificant, except for partial $r_{MD.C}$ in Fig. 4.10a which is significant at the .10 level. The others are significant at least at the .05 level.

interesting changes in the patterns of relationships among the variables become evident.

One of them is the emerging importance of communications in the development of countries colonized by the British. While virtually all of the impact of communications on the economic performance of these countries is channelled through the other modernization factors in the first two periods, its direct influence reaches a high level ($r_{CD.M}=.67$) in the final years studied. Also of interest in the former British colonies is the decrease over time in the strength of the first-order relationship between communications and social modernization (dropping from .58 to .38). From this it can be inferred that despite the existence of extensive communications systems in those countries during the period of colonial rule, other factors may have operated in the years immediately following

independence to prevent communications from contributing more to their economic development.

In contrast to these trends, the data for the French colonial group suggest a more important role for communications throughout the period. In the first years considered the correlation between communications and economic development is extremely high, and it is hardly affected when we control for social modernization. However, while the partial correlations in the second and third periods indicate the persistence of a strong relationship between communications and economic performance, some portion of communications' influence is apparently being channelled through the other modernization factors (suggested by the greater difference between the bivariate and partial correlations).

By introducing colonial heritage as a control variable, we can see that, as anticipated, it does have a bearing on the economic performance of the low income countries evaluated. One explanation for the differences between the British and French colonial groups could have something to do with the traditional under-emphasis of the French government on the development of communications infrastructure (even within France itself). In consequence, the very high bivariate correlations among communications, social modernization and economic development calculated for the French group in the two later periods may actually be reflecting a relationship between the lack of (rather than increases in) communications system availability and low levels of development performance in those countries. The findings also suggest that factors not included in the present study could be operating in the former British colonies -- especially since the bivariate correlation between communications and social modernization is so much lower for those countries than it is for the French group (e.g., $r_{CM} = .20$ compared with $.90$ in the final period). This idea is given further

credence by the fact that almost half (48 per cent) of the countries once governed by the British are in the middle income category. It could be that other factors -- such as the extremely small size (demographic or geographic) of the low-income former British colonies or, alternatively, their severely limited natural resources -- are crippling their capacity for economic expansion. As with the consideration of political regime type, the introduction of colonial heritage points to the need for further research into how this factor may affect development patterns in post-colonial societies.

The final chapter discusses the direction that future research in this area should take. It also summarizes the implications of our findings for development planning in countries in the low and middle income groups.

- Chapter Four Notes -

1. Kenny (1979:248) sees cross-lagged correlation (CLC) analysis as an exploratory strategy in longitudinal data analysis. It permits researchers to uncover simple causal relationships between uncontrolled variables, and deals with the structure of analytical models. It is not, however, concerned either with the choice of factors to be included in those models or with parameter estimation. See also Burrowes (1970) and Haas (1966).
2. Kenny (1975,1979) raises a number of concerns about analysing CLC differentials. According to him, for CLC analysis to be appropriate, the two constructs, X and Y, must (a) be measured at the same point in time (synchronicity), and (b) each should be measured in the same way at the two points of measurement (stationarity). Among his other concerns are the following: First, it will be difficult to obtain statistically significant differentials when samples are of less than moderate size. Second, CLC analysis is inappropriate for examining the causal effects of variables that do not change over time. Third, large differentials may be difficult to obtain because a measured time lag between the variables will not necessarily correspond to the actual causal lag. Finally, CLC analysis is considered to be the most appropriate for the analysis of variables that have moderate or large synchronous correlations (Kenny, 1979:237-38). It is sufficient to note that each of these concerns has been met in this paper.
3. Cohen and Cohen's formula yields a t-statistic for $(n - 3)$ degrees of freedom (Cohen and Cohen, Formula 2.8.8, 1975:53):

$$t = \frac{(r_{X1Y2} - r_{X2Y1}) \sqrt{(N - 3)(1 + r_{X1X2})}}{\sqrt{2(1 - r_{X1Y2} - r_{X2Y1} - r_{X1X2} + 2r_{X1Y2}r_{X2Y1}r_{X1X2})}}$$

Where X_i is an explanatory variable at one point in time, and Y_i is the dependent variable at the other.

Thus, r_{X1Y2} is the cross-lagged correlation between variable X at time 1 and variable Y at time 2.

4. By using a fairly large time lag (of ten years), we try to capture as much of the effect of lagging as possible. Thus, the correlations for X_i at $t=0$ with Y_i at $t+10$ compare pooled data for the years 1960-1963 ($t=0$) with those for 1970-1973 ($t+10$). Since the N-sizes vary (because of missing data), the smaller N is used in the calculation of t. Figure A.2 in Appendix VIII summarizes the cross-lagged correlations for each pair of variables across income categories. Those correlations, together with the N-sizes and calculated t-scores are also provided in Table A.1, Appendix VIII.
5. One explanation of this phenomenon may lie in the fact that the longitudinal data considered here cover only a 14-year period, and that clearer trends might become apparent from data covering a longer period of time. Another explanation may relate to the fact that through the 1960's, orthodox development strategies placed heavy emphasis on

industrialization, often at the expense of social programmes.

6. The much larger N-size of the non-democratic group accounts for its closer resemblance to the findings for the middle income category as a whole.
7. The World Bank's ranking of the middle income countries shows that, with the exception of the Philippines, all of the democratic nations rank at or very near the top of that category, and they have higher per capita incomes (more than US\$1100 in 1978) than most other countries in that group.
8. Countries previously ruled by other European colonial powers are not treated separately because those European nations either colonized very few countries or at some point in time relinquished control over their colonial territories to one of the colonial rulers considered here.
9. Of the countries classified as low income, some 86.5 per cent achieved political independence after 1945. This compares with 36.1 per cent of those in the middle income category (Appendix VI).
10. All 18 of the former Spanish colonies are classified as middle income, although this may be partially explained by the fact that each of them acquired political independence prior to the First World War. In contrast, only one of the French and six of the British colonies had achieved independence by that time. And in the case of the former British colonies, four of the six include the industrialized countries of Australia, Canada, New Zealand and the USA.
11. This is similar to the patterns observed for the non-democratic group. However, that is hardly surprising, since all of the countries formerly ruled by France had non-democratic regimes.

CHAPTER FIVE

Conclusions

A new concept of participation, developmental communications is not limited to information, much less to mass media. Communications supports education, culture, science and technology, and it should inter-relate with these areas to promote social, political and economic change. Developmental communications must be two way, where information is shared rather than simply disseminated from the top downward. It must also be horizontal in nature, with relative equals exchanging messages and linking themselves together, and it must be decentralized so that villages and rural areas can participate (Stover, 1984:12).

The research reported in this paper focusses on a central question in communications and development theory: What impacts do differences in communications technology have on economic performance, in contrast to other development support factors associated with social modernization?

We have attempted to provide an answer to that question by assessing the relative importance of communications (measured in terms of media consumption, telephone systems, and transportation) vis-a-vis factors such as urbanization, literacy rates, and the like. Together, these indicators are introduced as determinants of economic development performance -- reflected in the magnitude of a country's activities in international trade, energy consumption and per capita income.

Although a rather simple research design has been used here, and despite the limitations imposed by the paucity of reliable data for many of the developing countries, our study does provide empirical evidence for drawing conclusions about the emphasis on (or neglect of) communications development in a variety of societies. In addition, while it is not possible to make definitive statements about exactly how communications

influences development performance -- since the variables included in our model are rather crude instruments for measuring the relevant theoretical constructs -- a number of observations about the findings can be made.

As expected, the contributions of communications and other social modernization factors are seen to vary by national income category and across time. At low levels of per capita wealth, the smaller contribution of communications is probably indicative of a general lack of adequate infrastructure of all types in those countries. At the highest income levels, by contrast, the higher inter-correlations suggest that the variables are strongly interdependent. Further, the data support the proposition that communications will become increasingly important over time -- both directly, through the delivery of information and indirectly, as a means by which public services are distributed.

When political regime type and colonial heritage are introduced as control variables, some very interesting trends also emerge. For instance, the data suggest that our model is better suited to the evaluation of countries with non-democratic governments, and the patterns of relationships among the variables differ substantially in democratic and non-democratic nations. Similarly, when countries are divided on the basis of colonial heritage, it becomes evident that -- at least for those in the low income group -- the type of colonial rule experienced does affect communications' impact on economic expansion.

Implications for development planning

In general, then, the results add something to our knowledge about the nature of the relationship between communications and economic development. They also permit tentative conclusions to be drawn about how countries in the different income groups should set about determining their national

development strategies.

With regard to countries in the low income group, the results suggest that national planners should increase their efforts to upgrade and extend communications facilities in rural as well as urban areas, regardless of short-term return-on-investment considerations. Our findings also imply that until adequate communications infrastructures are in place in the LDCs, they will be hindered in meeting national development targets.

For the middle income countries, on the other hand, the data suggest the existence of a threshold level of communications development after which its contributions to development will begin to level off. For countries approaching that threshold, budgetary planners again need to be made aware of the importance of the communications sector and its expansion should continue to be emphasized. However, in countries that have surpassed that threshold, decision makers must be especially careful in weighing the benefits of additional capital investments for communications development. They will need to balance communications sector allocations against the requirements of other sectors so that the distribution of social benefits throughout society can be assured. Still, even in these countries, the danger exists that political pressures will come to bear on sectoral budgeting, and that if present investment levels are not maintained, those systems already in place may fall into disrepair. Therefore, decision makers in countries at upper levels of the middle category should continue to support those existing services deemed essential to sustain current growth levels.

Suggestions for future research

Throughout the paper we have pointed to the need for further research. We have also suggested other possible factors -- both internal and external

-- that may affect the development performance of Third World nations. With regard to the types of internal factors that could be relevant to the study of 20th-century development, our introduction of a simple dichotomous measure of regime type raises questions about the ways in which different political structures may affect development planning and economic performance. It is suggested that either multi-dimensional measures of 'political development' or the consideration of other political factors (such as the size of a country's government bureaucracy relative to its population or consideration of evidence of centralized versus decentralized policy making), may help us to understand better the differences uncovered here. Considering, in turn, the types of external influences that could affect development performance, our research reveals a wide variation between low income countries that experienced French colonial rule and those colonized by Britain (especially in the earlier years studied). And we conclude from our findings that this factor may, indeed, have important implications for post-colonial societies. Research on other aspects of colonial heritage -- such as the length of its duration or whether a country was governed 'directly' or 'indirectly' -- could probably give more insights into how it affects the development performance of those countries.

Furthermore, the application of more complex research designs could probably shed additional light on our observations. Such designs could include, for example, the use of varied time lags in multiple regression and path analysis. Alternatively, one or a number of low income 'new states' could be studied over a longer period -- say, from independence up to the present time. In this way, research undertaken along similar lines to our approach, but with a more precise focus, might help to resolve some of the issues that emerge from our discussions.

Summary

One contribution that our research makes to the literature is the provision of empirical evidence which demonstrates the temporal priority of communications to other factors commonly associated with development. Another is its attempt to sensitize researchers to the importance of breaking down the population of countries into smaller, more comparable units. We have suggested that one way of doing this may be to group them on the basis of shared economic characteristics. Other approaches might group them in terms of population size or common geographic characteristics -- such as whether they are island states, are land-locked or whether they are 'strategically' situated (in geopolitical terms).

Our analysis has clearly shown that the single-path approach to development is inappropriate for the evaluation of 20th-century development patterns. We also conclude that in the evaluation of recent development trends, communications is correctly treated as a determinant of economic performance. Consequently, we confirm the conclusions of those authors who maintain that the extension of telephone, radio and more recently, satellite and computer systems, have usurped industrialization, urbanization and literacy as the agents of change. Indeed, visual and verbal communications have come to play a vital role in the provision of those public services associated with improved quality of life. They may also be used as substitutes for travel in meeting the needs of rural communities, and thus help to stem the tide of urban migration in the Third World.

APPENDICES

APPENDIX I

COUNTRIES LIST

ICPSR* CODE	COUNTRY NAME (ALPHABETIC LIST)	ICPSR CODE (NUMERIC LIST)	COUNTRY NAME
700	Afghanistan	002	U.S.A.
339	Albania	020	Canada
615	Algeria	040	Cuba
160	Argentina	041	Haiti
900	Australia	042	Dominican Republic
305	Austria	051	Jamaica
771	Bangladesh	052	Trinidad and Tobago
211	Belgium	070	Mexico
434	Benin (Dahomey)	090	Guatemala
760	Bhutan	091	Honduras
145	Bolivia	092	El Salvador
140	Brazil	093	Nicaragua
355	Bulgaria	094	Costa Rica
775	Burma	095	Panama
516	Burundi	100	Columbia
471	Cameroun	101	Venezuela
020	Canada	130	Ecuador
482	Central African Rep.	135	Peru
483	Chad	140	Brazil
155	Chile	145	Bolivia
710	China	150	Paraguay
100	Columbia	155	Chile
484	Congo (Brazzaville)	160	Argentina
094	Costa Rica	165	Uruguay
040	Cuba	200	United Kingdom
315	Czechoslovakia	205	Ireland
390	Denmark	210	Netherlands
042	Dominican Republic	211	Belgium
130	Ecuador	220	France
651	Egypt	225	Switzerland
092	El Salvador	230	Spain
530	Ethiopia	235	Portugal
375	Finland	260	German Federal Rep.
220	France	265	German Dem. Rep.
265	German Dem. Rep.	290	Poland
260	German Federal Rep.	305	Austria
452	Ghana	310	Hungary
350	Greece	315	Czechoslovakia
090	Guatemala	325	Italy
041	Haiti	339	Albania
091	Honduras	345	Yugoslavia

310	Hungary	350	Greece
750	India	355	Bulgaria
850	Indonesia	360	Romania
630	Iran	365	U.S.S.R.
645	Iraq	375	Finland
205	Ireland	380	Sweden
666	Israel	385	Norway
325	Italy	390	Denmark
437	Ivory Coast	432	Mali
051	Jamaica	433	Senegal
740	Japan	434	Benin (Dahomey)
663	Jordan	435	Mauritania
811	Kampuchea (Cambodia)	436	Niger
501	Kenya	437	Ivory Coast
731	Korean People's Rep.	439	Upper Volta
732	Korean Republic (South)	450	Liberia
690	Kuwait	451	Sierra Leone
812	Laos	452	Ghana
660	Lebanon	461	Togo
570	Lesotho	471	Cameroun
450	Liberia	475	Nigeria
620	Libya	482	Central African Rep.
368	Lithuania	483	Chad
580	Madagascar	484	Congo (Brazzaville)
553	Malawi	490	Zaire Republic
820	Malaysia	500	Uganda
432	Mali	501	Kenya
070	Mexico	510	Tanzania
712	Mongolia	516	Burundi
600	Morocco	517	Rwanda
790	Nepal	520	Somali Republic
210	Netherlands	530	Ethiopia
920	New Zealand	551	Zambia
093	Nicaragua	552	Zimbabwe (Rhodesia)
436	Niger	553	Malawi
475	Nigeria	560	South Africa
385	Norway	570	Lesotho
770	Pakistan	580	Madagascar
095	Panama	600	Morocco
190	Papua New Guinea	615	Algeria
150	Paraguay	616	Tunisia
135	Peru	620	Libya
840	Philippines	625	Sudan
290	Poland	630	Iran
235	Portugal	640	Turkey
360	Romania	645	Iraq
517	Rwanda	651	Egypt
670	Sa'udi Arabia	652	Syria
451	Sierra Leone	660	Lebanon
520	Somali Republic	663	Jordan
830	Singapore	666	Israel

520	Somali Republic	670	Sa'udi Arabia
560	South Africa	678	Yemen Arab Republic
230	Spain	680	Yemen People's Dem. Rep.
780	Sri Lanka (Ceylon)	690	Kuwait
625	Sudan	700	Afghanistan
380	Sweden	710	China PRC
225	Switzerland	712	Mongolia
662	Syria	713	Taiwan
713	Taiwan	731	Korean People's Rep.
510	Tanzania	732	Korean Republic (South)
800	Thailand	740	Japan
461	Togo	750	India
052	Trinidad and Tobago	760	Bhutan
616	Tunisia	770	Pakistan
640	Turkey	771	Bangladesh
500	Uganda	775	Burma
200	United Kingdom	780	Sri Lanka (Ceylon)
365	U.S.S.R.	790	Nepal
002	U.S.A.	800	Thailand
439	Upper Volta	811	Kampuchea (Cambodia)
165	Uruguay	812	Laos
101	Venezuela	816	Vietnam People's Rep.
816	Vietnam People's Rep.	817	Vietnam Republic (South)
817	Vietnam Republic (South)	820	Malaysia
678	Yemen Arab Republic	830	Singapore
680	Yemen People's Dem. Rep.	840	Philippines
345	Yugoslavia	850	Indonesia
490	Zaire Republic (Congo)	900	Australia
551	Zambia	910	Papua New Guinea
552	Zimbabwe (Rhodesia)	920	New Zealand

*Inter-University Consortium for Political and Social Research,
University of Michigan.

APPENDIX II

COUNTRIES EXCLUDED FROM ANALYSIS*COUNTRY NAME
(ALPHABETIC LIST)COUNTRY NAME
(ALPHABETIC LIST)

Bahamas
 Bahrain
 Barbados
 Belize
 Botswana
 Cape Verde
 Comoros
 Cyprus
 Djibouti
 Equatorial Guinea

Fiji
 Gabon
 Gambia, The
 Grenada
 Guinea-Bissau
 Guyana

Hong Kong**
 Iceland
 Luxembourg
 Maldives
 Malta
 Mauritius
 Oman
 Qatar
 Sao Tome & Principe
 Seychelles

Solomon Islands
 Suriname
 Swaziland
 Tonga
 United Arab Emirates
 Western Samoa

* These countries are excluded because they have populations of less than 1 million and are consequently not included in the World Bank tables.

** Hong Kong was excluded because it is not an independent polity.

APPENDIX III

LIST OF VARIABLES

CODEBOOK
VARIABLE
NUMBER

VARIABLE
NAME

Indicators from Banks' "Cross-National Time Series" Data Set

v9	Urbanization: percentage population in cities of 50,000 or more
v29	Proportion of World Trade
v33	Energy Consumption Per Capita
v53	Highway Vehicles Per Capita
v59	Number of Telephones Per Capita
v65	Number of Radio Receivers Per Capita
v68	Newspaper Circulation Per Capita
v74	Secondary School Enrolment Per Capita
v82	Percentage of the Population Literate
v83	Number of Physicians Per Capita
v85	Gross Domestic Product (GDP) per capita

Other Indicators from Banks' Data Set Considered for Inclusion

v38	Percentage Work Force in Agriculture
v39	Percentage Work Force in Industry
v40	Percentage Work Force Non-Agricultural, Non-Industrial
v47	Rail Ton Miles Per Capita
v51	Number of Commercial Vehicles Per Capita
v57	Number of Telegrammes Per Capita
v63	Total Mail Per Capita
v67	Number of Television Sets Per Capita
v70	Number of Book Titles Per Capita
v72	Primary School Enrolment Per Capita
v79	University Enrolment Per Capita
v86	Gross National Product (GNP) Per Capita
v110	Composite Legislative Index
v113	Rae's Party Fractionalization Index
v130	Electrical Power Production Per Capita
v132	Steel Production Per Capita

Categorical Variables Derived from other sources

COLONIAL	Type of Colonial Heritage
INDEPENDENCE	Time of Political Independence
INCOME LEVEL	Three-category Modification of World Bank Five-category Classification
REGIME TYPE	Fowell's (1982) List of 'Democratic' Regimes

APPENDIX IV

THREE-CATEGORY INCOME LEVELS (122 countries)

(Adapted from World Bank classification (1981))

LOW INCOME ($< \text{US\$360 P.C. INCOME}$) (ICPSR CODE)*	MIDDLE INCOME ($\text{\$361-\$3500 P.C. INCOME}$) (ICPSR CODE)	HIGH INCOME ($> \text{\$3500 P.C. INCOME}$) (ICPSR CODE)
041 750	040 338 678	002
432 760	042 345 680	020
433 770	051 350 712	200
434 771	052 355 713	210
435 775	070 360 731	211
436 780	090 437 732	220
439 790	091 450 800	225
451 811	092 452 820	260
461 812	093 471 830	265
482 816	094 475 840	290
483 817	095 484 910	305
490 850	100 551	315
500	101 552	325
501	130 560	365
510	135 600	375
516	140 615	380
517	145 616	385
520	150 630	390
530	155 640	620
553	160 645	670
570	165 651	690
580	205 652	740
625	230 660	900
700	235 663	920
710	310 666	
N=37	N=61	N=24

*Country codes are cross-referenced with the corresponding country names in Appendix I.

APPENDIX V

POLITICAL REGIME TYPE (122 countries)

(Adapted from Powell's (1982) Classification)

DEMOCRATIC (ICPSR CODE)	DEMOCRATIC (COUNTRY NAME)	NON-DEMOCRATIC (ICPSR CODE)			
002	U.S.A.	040	434	616	830
020	Canada	041	435	620	850
051	Jamaica	042	436	625	910
094	Costa Rica	052	437	630	
101	Venezuela	070	439	645	
155	Chile	090	450	651	
165	Uruguay	091	451	652	
200	United Kingdom	092	452	660	
205	Ireland	093	461	663	
210	Netherlands	095	471	670	
211	Belgium	100	475	678	
220	France	130	482	680	
225	Switzerland	135	483	690	
260	German Fed. Rep.	140	484	700	
305	Austria	145	490	710	
325	Italy	150	500	712	
350	Greece	160	501	713	
375	Finland	230	510	731	
380	Sweden	235	516	732	
385	Norway	265	517	760	
390	Denmark	290	520	770	
640	Turkey	310	530	771	
666	Israel	315	551	775	
740	Japan	339	552	790	
750	India	345	553	800	
780	Sri Lanka	355	560	811	
840	Philippines	360	570	812	
900	Australia	365	580	816	
920	New Zealand	732	600	817	
		433	615	820	
N=29		N=93			

APPENDIX VI

DATE OF INDEPENDENCE (122 countries)

(Adapted from Banks and Textor (Revised, 1968))

"NEW STATES" AFTER 1945			1914-1945	1800-1913	BEFORE 19TH CENTURY	
051	520	812	205	020	355	002
052	551	816	290	040	360	200
260	552	817	310	041	450	210
265	553	820	315	042	560	220
432	570	830	345	070	900	225
433	580	840	375	090	920	230
434	600	850	645	091		235
435	615	910	652	092		305
436	616		660	093		365
437	620		670	094		380
439	625		678	095		385
451	651		680	100		390
452	663		712	101		530
461	666			130		630
471	690			135		640
475	713			140		700
482	731			145		710
483	732			150		740
484	750			155		790
490	760			160		800
500	770			165		
501	771			211		
510	775			325		
516	780			339		
517	811			350		
N=58			N=13	N=31	N=20	

APPENDIX VII

COLONIAL HERITAGE (122 countries)

(Adapted from Banks and Textor (Revised, 1968))

ICPSR COUNTRY CODES				
BRITISH		FRENCH	SPANISH	NONE/OTHER
002	775	041	040	140 450
020	780	432	042	200 490
051	790	433	070	210 518
052	820	434	090	211 517
205	830	435	091	220 520
451	900	436	092	225 530
452	920	437	093	230 620
475		439	094	235 630
500		461	095	260 640
501		471	100	265 670
510		482	101	290 678
551		483	130	305 690
552		484	135	310 700
553		580	145	315 710
560		600	150	325 712
570		615	155	339 713
625		616	160	345 731
645		652	165	350 732
651		660		355 740
663		811		360 760
666		812		365 800
680		816		375 840
750		817		380 850
770				385 910
771				390
N=32		N=23	N=18	N=49

APPENDIX VIII
FIGURES AND TABLES

FIGURE A.1
 CROSS-LAGGED CORRELATION (CLC) PARADIGM
 (Adapted from Kenny, 1975:888)

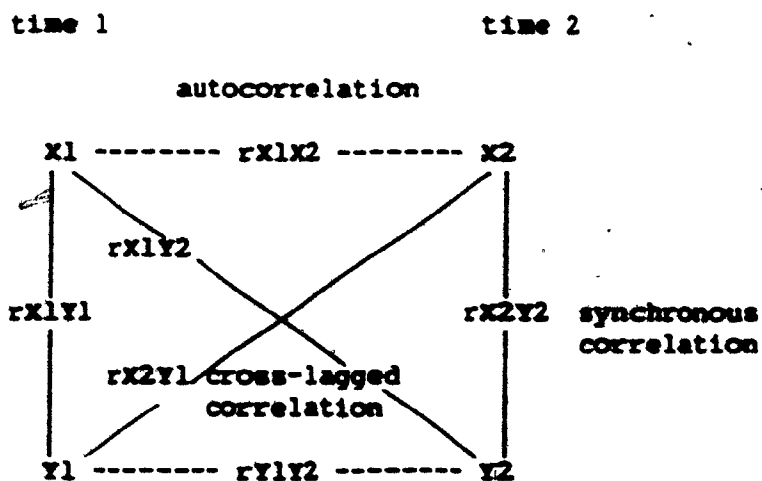
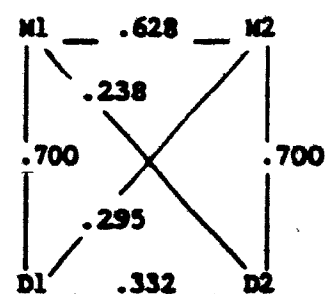
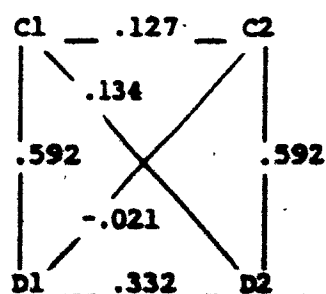
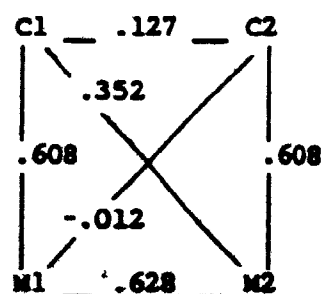
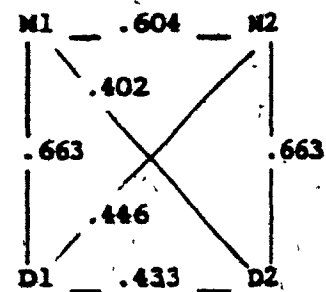
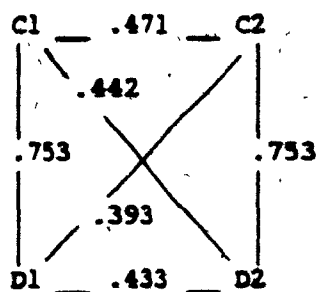
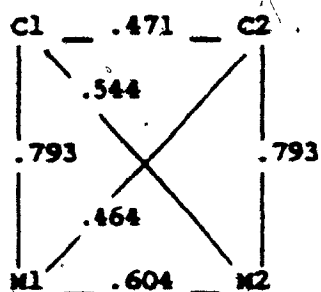


FIGURE A.2
 SUMMARY OF AUTOCORRELATIONS, SYNCHRONOUS AND CROSS-LAGGED
 CORRELATIONS ON COUNTRIES AT VARIOUS WEALTH LEVELS, USING
 POOLED DATA FOR THE PERIOD 1960-1973

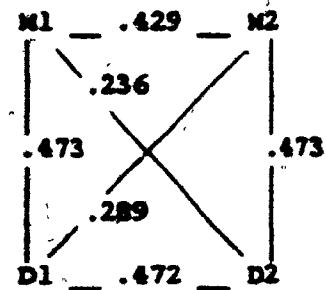
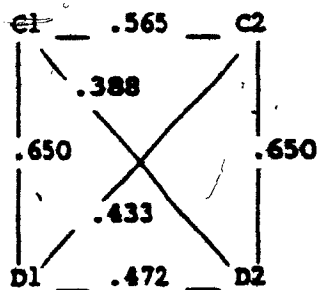
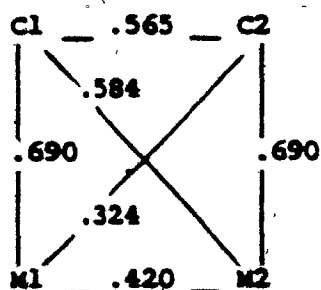
(a)
 LOW INCOME COUNTRIES



(b)
MIDDLE INCOME COUNTRIES



(c)
HIGH INCOME COUNTRIES



(d)
ALL COUNTRIES

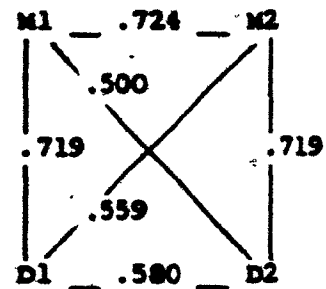
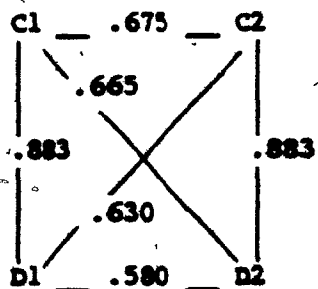
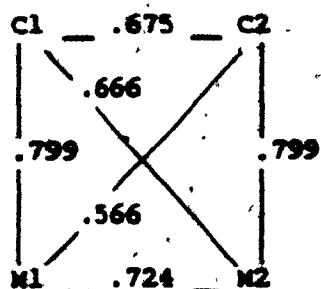


TABLE A.1
CROSS-LAGGED CORRELATIONS (CLCs) ON COUNTRIES AT VARIOUS
WEALTH LEVELS, FOR THE PERIOD 1960-1973*

Bivariate Relationship	LOW INCOME	MIDDLE INCOME	HIGH INCOME	ALL INCOMES

C,M				
rC1M2 =	.352	.544	.584	.666
rC2M1 =	-.012	.464	.324	.566
rC1M1 =	.608	.793	.690	.799
N =	253	546	206	1343
t =	7.216	3.462	5.848	7.763
significance level	.001	.001	.001	.001

C,D				
rC1D2 =	.134	.442	.388	.665
rC2D1 =	-.021	.393	.433	.630
rC1D1 =	.592	.753	.650	.883
N =	253	546	206	1343
t =	2.744	1.820	-.86	3.574
significance level	.01	.10	.40	.001

M,D				
rM1D2 =	.238	.402	.236	.500
rM2D1 =	.295	.446	.289	.559
rM1D1 =	.700	.663	.473	.719
N =	280	560	206	1410
t =	-1.284	-1.432	-.774	-3.614
significance level	.20	.20	.40	.001

*Absolute correlations of .02 or less are statistically insignificant. All others are significant at the .001 level. N-sizes vary because of missing data. Thus, in the calculation of t the smallest N for the bivariate relationship is used.

TABLE A.2
 PARTIAL CORRELATIONS AMONG COMMUNICATIONS (C),
 SOCIAL MODERNIZATION (M) AND ECONOMIC DEVELOPMENT (D)

COUNTRY CATEGORY	PERIOD/ N-SIZE	BIVARIATE RELATION	ZERO- ORDER r	FIRST- OORDER r	CONTROL VAR.
=====					
LOW INCOME	1960-73 N=437	C,D	.59	.30	M
		M,D	.70	.53	C
		C,M	.61		
	1960-63 N=113	C,D	.46	.06	M
		M,D	.71	.61	C
		C,M	.60		
	1965-68 N=130	C,D	.56	.28	M
		M,D	.71	.58	C
		C,M	.56		
	1970-73 N=129	C,D	.79	.63	M
		M,D	.68	.36	C
		C,M	.64		

MIDDLE INCOME	1960=73 N=780	C,D	.75	.51	M
		M,D	.66	.14	C
		C,M	.79		
	1960-63 N=209	C,D	.69	.40	M
		M,D	.64	.18	C
		C,M	.80		
	1965-68 N=229	C,D	.73	.48	M
		M,D	.64	.15	C
		C,M	.79		
	1970-73 N=229	C,D	.78	.58	M
		M,D	.65	.13	C
		C,M	.77		

HIGH INCOME	1960-73 N=335	C,D	.65	.51	M
		M,D	.47	.04	C
		C,M	.69		
	1960-63 N=95	C,D	.66	.55	M
		M,D	.45	.06	C
		C,M	.62		
	1965=68 N=94	C,D	.60	.45	M
		M,D	.45	.05	C
		C,M	.69		
	1970-73 N=96	C,D	.60	.46	M
		M,D	.44	.01	C
		C,M	.73		

ALL INCOMES	1960-73	C,D	.88	.74	M
	N=1552	M,D	.72	.05	C
		C,M	.80		
	1960-63	C,D	.88	.72	M
	N=417	M,D	.71	.05	C
		C,M	.80		
	1965-68	C,D	.88	.72	M
	N=453	M,D	.71	.04	C
		C,M	.80		
	1970-73	C,D	.89	.75	M
	N=454	M,D	.72	.04	C
		C,M	.79		

*Correlations of .06 or less are statistically insignificant, except when all countries are grouped together (rMD.C=.05) for 1960-73. This correlation and others greater than .06 are significant at least at the .001 level.

TABLE A.3
PARTIAL CORRELATIONS,
BY REGIME TYPE*

COUNTRY CATEGORY	PERIOD/ N-SIZE	BIVARIATE RELATION	ZERO- ORDER r	FIRST- ORDER r	CONTROL VAR.

MIDDLE INCOME DEMOCRATIC	1960-73 N=138	C,D	.56	.20	M
		M,D	.57	.26	C
		C,M	.80		
	1960-63 N=38	C,D	.42	.20	M
		M,D	.39	.11	C
		C,M	.77		
	1965-68 N=40	C,D	.51	.08	M
		M,D	.58	.33	C
		C,M	.82		
	1970-73 N=40	C,D	.63	.26	M
		M,D	.65	.34	C
		C,M	.77		

MIDDLE INCOME NON- DEMOCRATIC	1960-73 N=642	C,D	.81	.65	M
		M,D	.63	-.00	C
		C,M	.78		
	1960-63 N=171	C,D	.79	.60	M
		M,D	.65	.06	C
		C,M	.79		
	1965-68 N=189	C,D	.80	.65	M
		M,D	.61	-.02	C
		C,M	.78		
	1970-73 N=189	C,D	.82	.68	M
		M,D	.61	-.01	C
		C,M	.76		

*Absolute correlations of .26 or less are statistically insignificant, except for partial $r_{MD.C}$ and $r_{CD.M}$ for the democratic countries for the 1960-73 period as a whole. These and others greater than .26 are significant at least at the .05 level.

TABLE A.4
PARTIAL CORRELATIONS -- FORMER COLONIES
(LOW INCOME ONLY)*

COUNTRY CATEGORY	PERIOD/ N-SIZE	BIVARIATE RELATIONSHIP	ZERO- ORDER r	FIRST- ORDER r	CONTROL VAR.
BRITISH COLONIAL HERITAGE	1960-73 N=147	C,D	.41	.29	M
		M,D	.54	.47	C
		C,M	.34		
	1960-63 N=32	C,D	.26	-.15	M
		M,D	.61	.58	C
		C,M	.59		
	1965-68 N=47	C,D	.32	.19	M
		M,D	.58	.53	C
		C,M	.30		
	1970-73 N=45	C,D	.69	.67	M
		M,D	.41	.38	C
		C,M	.20		
FRENCH COLONIAL HERITAGE	1960-73 N=195	C,D	.89	.71	M
		M,D	.76	-.06	C
		C,M	.87		
	1960-63 N=55	C,D	.93	.90	M
		M,D	.57	-.23	C
		C,M	.68		
	1965-68 N=56	C,D	.90	.67	M
		M,D	.81	-.07	C
		C,M	.92		
	1970-73 N=56	C,D	.85	.55	M
		M,D	.78	.05	C
		C,M	.90		

*Absolute correlations of .26 or less are statistically insignificant, except for partial r_{MD.C} for the French colonial heritage group which is significant at the .10 level. All others are significant at least at the .05 level.

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