INTERNATIONAL ECONOMIC DEPENDENCE IN THE WORLD-SYSTEM

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There is great disagreement in the theoretical literature about the effects of interaction between developed and underdeveloped societies. Neo-classical economics and modernization theory in sociology see this interaction in terms of the flow of resources and the diffusion of modern traits from the advanced societies to the peripheral societies. Dependency theory, on the other hand, focusses on control structures between superordinate and subordinate societies in the world-system and the consequences that these power-dependence relations have for the peripheral societies.

The first theoretical approach predicts that interaction will facilitate economic development in the periphery and the second approach predicts retardation of development.

This thesis examines the effects of dependence on foreign investment (penetration by foreign capital), aid dependence (public foreign debt), and partner concentration (a type of trade dependence in which exchange is dominated by a single export partner) on national economic development.

Dependent variables studied include three conventional measures of aggregate economic development, and measures of economic growth in three sectors -- agriculture, mining and manufacturing. In addition two control variables are introduced into the analysis -- domestic capital formation and the extent to which a national economy is specialized

in mining.

The research design employed is panel regression analysis utilizing data at an earlier and a later time point (1950 and 1970) on all the nations for which information is available.

The results indicate that all three types of international economic dependence have overall negative effects on aggregate economic growth. This holds for the whole sample of nations on which data are available and for a subsample of poorer nations.

Investment dependence is found to positively affect economic growth in the mining sector, while aid dependence and partner concentration do not. This exception to the generally negative effects is discussed in terms of its implications for determining what mechanisms operate to produce the dependence effects.

It is concluded that dependency theories better predict the effects of inputs from advanced nations to less-developed ones than neo-classical international economics or sociological modernization theories. The pattern of results is discussed in terms of attempting to sort out which mechanisms are involved in the negative effects of dependence on development.

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DOCTOR OF PHILOSOPHY

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August, 1975

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I certify that I have read this thesis and that in my opinion it is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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TABLE OF CONTENTS

		Page
ACKNOWLEDGEMENTS		iv
LIST OF TABLES		xii
LIST OF FIGURES		xvii
INTRODUCTION		1
CHAPTER 1.	THEORETICAL ISSUES	6
1A.	Definition of Dependence and Description of World-System Context	6
1B.	Theoretical Approaches to Dependence and Development	10
1B.1	Uneven development and international power-dependence relations	10
1B.2	The theory of imperialism	12
1B.3	Dependency theory	13
1B.31	Exploitation of the periphery by the core	14
1B.32	Structural distortion of the peripheral economy	16
1B.33	Suppression of autonomous policies in the periphery	19
1B.4	Theoretical approaches which hypothesize positive effects of dependence on development	21
1B.41	Neo-classical international economics	21
1B.42	Modernization theory	23
1C.	Summary of Propositions	24
1C.1	Mechanisms by which investment and debt dependence and partner concentration negatively affect economic growth	24
1C.2	Mechanisms by which foreign investment and credit positively affect economic growth	25

		Page
CHAPTER 2.	REVIEW OF PREVIOUS COMPARATIVE RESEARCH	27
2A.	Studies of the Effects of Investment Dependence on Economic Growth	27
2B.	Studies of the Effects of Partner Concentration on Economic Growth	30
2C.	Studies of the Effects of Aid Dependence on Economic Growth	31
CHAPTER 3.	MEASUREMENT AND RESEARCH DESIGN	33
3A.	Measures of Economic Dependence	33
3A.1	Investment dependence	33
3A.2	Trade dependence--export partner concentration	38
3A.3	Aid dependence--external public debt per capita	40
3B.	Measures of Economic Growth	41
3B.1	Aggregate economic development	41
3B.11	Gross national product per capita	41
3B.12	Electrical energy consumption--logged kilowatt hours of electrical energy consumed per capita	42
3B.13	Percentage of male labor force not in agriculture	43
3C.	Production Per Capita in Economic Sectors	44
3C.1	Per capita product in agriculture	45
3C.2	Product per capita in mining	46
3C.3	Product per capita in manufacturing	46
3D.	Control Variables	47
3D.1	Domestic savings--gross domestic capital formation as a percentage of GNP	47

Page

3D.2 Specialization in scarce mineral resources--the percentage of GDP in the mining sector 47

3E. Research Design 48

3E.1 Panel regression analysis 48

3E.2 Weighting of variables 51

3E.3 Sample of nations 52

CHAPTER 4. RESULTS 54

4A. The Effects of Economic Dependence on Aggregate Economic Growth 54

4A.1 The effects of investment dependence on aggregate economic growth 54

4A.11 Investment dependence and GNP per capita--all nations 54

4A.12 Investment dependence and GNP per capita--poor nations 59

4A.13 Investment dependence and kilowatt hours of electricity consumed per capita--all nations 61

4A.14 Investment dependence and kilowatt hours of electricity consumed per capita--poor nations 63

4A.15 Investment dependence and the percentage of the work force not in agriculture--all nations 64

4A.16 Investment dependence and the percentage of the work force not in agriculture--poor nations 66

4A.17 Reciprocal effect of GNP per capita on investment dependence: Szymanski's positive result explained 69

4A.2 The effects of export partner concentration on aggregate economic growth 69

Page

4A.21 Export partner concentration and GNP per capita--all nations 69

4A.22 Export partner concentration and GNP per capita--poor nations 71

4A.23 Export partner concentration and kilowatt hours of electrical energy consumed per capita--all nations 72

4A.24 Export partner concentration and kilowatt hours of electrical energy consumed per capita--poor nations 74

4A.25 Export partner concentration and the percentage of the work force not in agriculture--all nations 75

4A.26 Export partner concentration and the percentage of the work force not in agriculture--poor nations 77

4A.3 The effects of aid dependence on aggregate economic growth 79

4A.31 Aid dependence and GNP per capita--all nations 79

4A.32 Aid dependence and GNP per capita--poor nations 82

4A.33 Aid dependence and electrical energy consumed per capita--all nations 84

4B. Controlling Additional Variables 85

4B.1 Investment dependence on aggregate economic growth controlling for domestic savings 86

4B.11 Investment dependence on GNP per capita controlling for domestic capital formation--all nations 87

4B.12 Investment dependence on GNP per capita controlling for domestic capital formation--poor nations 90

Page

4B.13 Investment dependence on kilowatt hours of electrical energy consumed per capita controlling for capital formation--all nations 92

4B.14 Investment dependence on kilowatt hours of electrical energy consumed per capita controlling for capital formation--poor nations 94

4B.15 Investment dependence on the percentage of the labor force not in agriculture controlling for capital formation--all nations 96

4B.16 Investment dependence on the percentage of the labor force not in agriculture controlling for capital formation--poor nations 99

4B.2 Scarce mineral resources and the effects of investment dependence 102

4B.21 Investment dependence on GNP per capita controlling for the percentage of GDP in mining--all nations 103

4B.22 Investment dependence on GNP per capita controlling for the percentage of GDP in mining--poor nations 105

4B.23 Investment dependence on kilowatt hours of electricity consumed per capita controlling for the percentage of GDP in mining--all nations 108

4B.24 Investment dependence on kilowatt hours of electricity consumed per capita controlling for the percentage of GDP in mining--poor nations 109

4B.25 Investment dependence on the percentage of the work force not in agriculture controlling for the percentage of GDP in mining--all nations 111

Page

4B.26 Investment dependence on the percentage of the work force not in agriculture controlling for the percentage of GDP in mining--poor nations 112

4B.3 Interaction between mineral resources and investment dependence effects on economic development 114

4C. Dependence Effects on Product Per Capita in Economic Sectors 119

4C.1 Investment dependence on sectoral product per capita 120

4C.11 Investment dependence on growth in the agricultural sector--all nations 121

4C.12 Investment dependence on growth in the agricultural sector--poor nations 124

4C.13 Investment dependence on growth in the mining sector--all nations 125

4C.14 Investment dependence on growth in the mining sector--poor nations 128

4C.15 Investment dependence on growth in the manufacturing sector--all nations 130

4C.16 Investment dependence on growth in the manufacturing sector--poor nations 132

4C.2 Effects of export partner concentration on sectoral product per capita 136

4C.3 Aid dependence on sectoral product per capita 140

4D. Summary of Results 151

4D.1 A negative effect? 151

4D.2 Size of the effects 153

LIST OF TABLES

		Page
Table 1.	Means, standard deviations and number of cases for investment dependence and GNP per capita	55
Table 2.	Pearson's r correlation coefficients for investment dependence and GNP per capita	56
Table 3.	Panel regression estimates of investment dependence effects on GNP per capita--all nations	57
Table 4.	Effect of investment dependence on GNP per capita--poor nations	59
Table 5.	Effect of investment dependence on kilowatt hours of electricity consumed per capita--all nations	62
Table 6.	Effect of investment dependence on kilowatt hours of electricity consumed per capita--poor nations	63
Table 7.	Effect of investment dependence on percentage labor force not in agriculture--all nations	65
Table 8.	Effect of investment dependence on percentage labor force not in agriculture--poor nations	67
Table 9.	Effect of partner concentration on GNP per capita--all nations	70
Table 10.	Effect of partner concentration on GNP per capita--poor nations	72
Table 11.	Effect of partner concentration on kwh electricity consumed per capita--all nations	73
Table 12.	Effect of partner concentration on kwh electricity consumed per capita--poor nations	74

Page

Table 13. Effect of partner concentration on percentage of labor not in agriculture--all nations 76

Table 14. Effect of partner concentration on percentage of labor not in agriculture--poor nations 78

Table 15. Effect of aid dependence on GNP per capita 1960-70--all nations 80

Table 16. Effect of aid dependence on GNP per capita 1965-70--all nations 81

Table 17. Effect of aid dependence on GNP per capita 1965-70--poor nations 83

Table 18. Effect of aid dependence on kwh electrical energy per capita 1960-65--all nations 84

Table 19. Effect of investment dependence on GNP per capita controlling for domestic capital formation--all nations 88

Table 20. Effect of investment dependence on GNP per capita controlling for domestic capital formation--poor nations 91

Table 21. Effect of investment dependence on kilowatt hours of electrical energy consumed per capita controlling for domestic capital formation--all nations 93

Table 22. Effect of investment dependence on kilowatt hours of electrical energy consumed per capita controlling for domestic capital formation--poor nations 95

Table 23. Effect of investment dependence on the percentage of labor force not in agriculture controlling for capital formation--all nations 97

Table 23a. Effect of investment dependence on the percentage of the work force not in agriculture for the cases available when controlling for capital formation--all nations 99

Table 24. Effect of investment dependence on the percentage of labor force not in agriculture controlling for capital formation--poor nations 100

Table 24a. Effect of investment dependence on the percentage of the work force not in agriculture for the cases available when controlling for capital formation--poor nations 101

Table 25. Effect of investment dependence on GNP per capita controlling for the percentage of GDP in mining--all nations 104

Table 26. Effect of investment dependence on GNP per capita controlling for the percentage of GDP in mining--poor nations 106

Table 27. Effect of investment dependence on kwh electricity consumed per capita controlling for the percentage of GDP in mining--all nations 108

Table 28. Effect of investment dependence on kwh electricity consumed per capita controlling for the percentage of GDP in mining--poor nations 110

Table 29. Effect of investment dependence on percentage labor not in agriculture controlling for percentage GDP in mining--all nations 111

Table 30. Effect of investment dependence on percentage labor not in agriculture controlling for percentage GDP in mining--poor nations 112

Table 31. Effect of investment dependence on GNP per capita without mineral-rich countries--all nations 116

Table 32. Effect of investment dependence on GNP per capita without mineral-rich countries--poor nations 117

Table 33. Effect of investment dependence on GNP per capita in mineral-rich countries 118

Page

Table 34. Effect of investment dependence on sectoral product per capita in agriculture--all nations 122

Table 35. Effect of investment dependence on sectoral product per capita in agriculture--poor nations 124

Table 36. Effect of investment dependence on sectoral product per capita in mining--all nations 126

Table 37. Effect of investment dependence on sectoral product per capita in mining--poor nations 128

Table 38. Effect of investment dependence on growth in the manufacturing sector--all nations 131

Table 39. Effect of investment dependence on growth in the manufacturing sector--poor nations 133

Table 40. Effect of partner concentration on growth in the agricultural sector--all nations 137

Table 41. Effect of partner concentration on growth in the agricultural sector--poor nations 143

Table 42. Effect of partner concentration on growth in the mining sector--all nations 144

Table 43. Effect of partner concentration on growth in the mining sector--poor nations 145

Table 44. Effect of partner concentration on growth in the manufacturing sector--all nations 146

Table 45. Effect of partner concentration on growth in the manufacturing sector--poor nations 147

Table 46. Effect of aid dependence on growth in the agricultural sector--all nations 148

Table 47. Effect of aid dependence on growth in the mining sector--all nations 149

Table 48. Effect of aid dependence on growth in the manufacturing sector--all nations 150

Table 49. Dependence effects on aggregate economic growth 152

Page

Table 50. Investment dependence effects on aggregate economic growth controlling for capital formation and the percentage of GDP in mining 156

Table 51. Dependence effects on growth in sectors 159

APPENDIX TABLES

Table A. Investment dependence effects on electrical energy consumption 1969--all nations 171

Table B. Investment dependence effects on electrical energy consumption 1969--poor nations 172

Table C. Investment dependence effects on the percentage of labor force not in agriculture 1965--all nations 173

Table D. Effects of GNP per capita on investment dependence--all nations 174

Table E. Effects of GNP per capita on investment dependence--poor nations 175

LIST OF FIGURES

		Page
Figure 1.	Panel Regression Model	49
Figure 2.	Causal Relationships Between Investment Dependence, Raw Material Resources and Economic Development	107

ECONOMIC DEPENDENCE IN THE WORLD SYSTEM

INTRODUCTION

It is possible to state the main theoretical problem of this thesis in a very general way: how do power-dependence relations in a social system affect the development of the actors in the system? This formulation of the problem assumes that all social systems are analytically similar and that a general theory can be formulated which applies to small groups, organizations, national societies and world-systems.

Although it may be fruitful to utilize analogies from one level of analysis to another, the theorizing in this thesis is limited to the specific problems of the effects of international power-dependence relations on the development of national economies. The task of subsuming this problem into a more general sociological theory has been put aside in favor of a more preliminary effort--that of applying a sociological approach to the understanding of this aspect of the center-periphery system in the historical context of the period from 1950 to 1970.

This is a study of the effects of location in an economically dependent position in the world economy on growth of national economies. It grew out of an interest in extending insights gained from social stratification theories to an analysis of inequalities in the world system. The common sociological idea that inequalities in any social system cumulate suggests an approach to the understanding of the growing gap between developed and underdeveloped national societies. Do international power-dependence relations maintain and increase inequalities between nations? Does contact between "modern" and "traditional" societies narrow or widen the gap?

These broad questions pose both theoretical and methodological difficultues. We must specify the larger system within which nations and international relations are imbedded. Stratification theory suggests that in order to understand particular power-dependence relations we must look at the structural characteristics of the social system in which they operate. The period under study, 1950 to 1970, was a time in which the amount of private capital invested across national boundaries grew enormously. Corporations based in the developed countries organized production on a global scale, integrating the world economy to a degree not previously known. The interdependence of the world economy, with its complex division

of labor and growing density of exchange of commodities, provides the context for the analysis of inequalities between nations and the effects of the world division of labor on the development of national economies.

A growing awareness and concern about increasing international inequalities has motivated much research into the causes of economic development and underdevelopment. Very little of this research, however, has combined an interest in international power-dependence processes with a formal comparative research design. The research reported in this dissertation is unique in using a longitudinal design to study the relationship between dependence and development.

This research investigates the effects of three dimensions of economic dependence on aggregate growth of national economies.[1] The three types of economic dependence studied are:

1. Penetration by private foreign capital (investment dependence),
2. Location in a restricted international trade network (trade partner concentration), and
3. Dependence on foreign public loans (aid dependence).

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[1] Hveem (1974) has constructed a measure of "overall penetration" which combines economic dependence with political and military dependence for a single time point. It is not possible with available data to construct such a measure for panel analysis.

The basic argument is that each of these types of economic dependence retards overall economic growth.

There are many aspects of development (other than aggregate economic growth) which might be studied to determine their relationship with dependence. It has been necessary to restrict the focus of this research. The whole effort has been to determine the overall effect of the three types of dependence on economic growth during the 20 year period studied. In the discussion of theoretical issues in Chapter 1, several of the hypothesized mechanisms by which dependence might have its effects on growth are mentioned. Unfortunately, the gross nature of the data employed and the difficulty of generating more precise and differentiating data on such a large sample of nations makes it impossible to explore most of these proposed mechanisms directly. Therefore, an estimate has been made of the overall effects on aggregate economic growth and a determination of the locus of these effects by breaking down GNP data by economic sector.

This broad test is useful, however, because of the extremely contradictory understandings of the relationship between dependence and development which are implied by different theoretical approaches.

The structure of this dissertation is as follows: Chapter 1 is a discussion of different theoretical approaches to economic dependence effects and an inventory of proposed mechanisms by which dependence affects growth. Chapter 2 is a review of the previous comparative research on economic dependence. Chapter 3 is a description of the measures used in this research and the research design employed. Chapter 4 reports the results obtained, and Chapter 5 discusses the theoretical implications of the findings.

CHAPTER 1. THEORETICAL ISSUES

1A. Definition of Dependence and Description of World-System Context

Let us define what is meant by power-dependence relations between nations and delineate the main boundaries of this inquiry. The power-dependence relations studied in this research are a subset of the many ways in which power, influence, and control can operate between nations. We do not here consider the operation of raw power in the form of military threat or action, although this form is particularly common in an international political system in which there is no central state to monopolize legitimate violence.

This study focuses on economic power and dependence. Power is defined by Weber as the probability that an actor (individual or collectivity) can realize its will even against the opposition of others. (Weber, 1947) Emerson (1972) points out that the power of A over B is directly proportional to the dependence of B on A. This dependence involves two elements: (1) the extent to which B controls resources that A needs, and (2) the existence of alternative sources of these resources. Thus power and dependence, both relational concepts, are two sides of the same coin. The power of violence derives from A's ability to deprive B of a most precious resource--survival.

As Emerson points out, power is a potential for overcoming resistance which we rarely observe in actual interaction. It is possible to infer its existence, however, from formal control structures. Thus we infer the economic dependence of a nation from its penetration by formal mechanisms of economic control from the external environment. Due to the nature of the data available we have operationalized this relational concept in terms of the nation vis-a-vis its external environment rather than vis-a-vis particular other nations, although this second way would be preferable were it possible.

It can be argued, however, that a nation can also be dependent on its external environment without being directly penetrated by formal control mechanisms. Indeed, Hveem (1974) has argued that direct control is merely the remnant of the colonial empires, and that the new form of vertical relations in the world system is based on location in a dependent position in this larger structure. Therefore we have included three types of economic dependence in this study which vary from direct penetration to indirect structural location in a dependent position. The three types are (1) investment dependence: the extent to which the nation is penetrated by direct private foreign capital; (2) aid dependence: the public debt that the nation's state has contracted with external agencies; and (3) export partner concentration: the extent to which a nation occupies a

restricted potition in the world trade network.[2]

It is possible to state the main theoretical problem of this thesis in a very general way: how do power-dependence relations in a social system affect the development of the actors (individuals or collectivities) in the system? This assumes that all social systems are analytically similar and that a general theory can be formulated which applies to small groups, organizations, national societies and world systems.

Although it may be fruitful to utilize analogies from one level of analysis to others, the theorizing in this thesis is limited to the specific problem of the effects of international power-dependence relations on the development of national economies. The task of subsuming this problem into a more general sociological theory has been put aside in favor of a more preliminary effort--that of applying a sociological approach to the understanding of this aspect of the center-periphery system in the historical context of the period from 1950 to 1970.

The structural context in which the units we are studying (nations) are located is the world system in the post-World War II period. This system is composed of a capitalist world economy with an international division of labor, a

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[2]Other types of indirect dependence such as specialization in low-wage production of raw materials, reliance on a high component of processed imports, or commodity concentration (an undiversified export) are not considered in this study, but have been studied elsewhere. (Galtung, 1972)(Delacroix, 1975)

political system of shifting alliances between nation-states, and a pluralistic cultural system which exhibits tendencies toward integration. (Meyer, Boli-Bennett & Chase-Dunn, 1975). The world economy and polity are more competitive than national systems, which are increasingly either state monopoly capitalist or state socialist. The vertical aspects of the world system, which now includes at least 135 formally independent nations, are organized around an international division of labor. The main dimension of this division of labor between national economies is organized around the production of high-wage processed goods on the one hand, and low-wage raw materials (food, minerals, etc.) on the other.[3]

The dynamics of this system are revealed by the analysis of its origins in sixteenth century Europe (Wallerstein, 1974) and its expansion in waves to the present global system. All areas have been incorporated into the capitalist mode of production but in different capacities within the international division of labor.[4] The expansion of exchange (Rosecrance and Stein, 1973), the internationalization of capital (Hymer, 1972), and the establishment of monetary institutions at the world level have proceeded in waves corresponding to the expansion and contraction of production in the world economy.

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[3]Recent theoretical attempts to specify this dimension more exactly emphasize different factors: the relative wage structure (Emmanuel, 1972), capital-intensive vs. labor intensive production, or the "level of processing". (Galtung, 1972)

[4]A discussion of the ways in which socialist nations are thought to exist within the larger world capitalist economy is contained in Wallerstein (1972).

1B. Theoretical Approaches to Dependence and Development

1B.1 Uneven development and international power-dependence relations

Myrdal (1957) points out that capitalist development unleashes market forces that create both "spread" effects by which growth in one area or sector creates development in other areas, and "backwash" effects which drain resources out of the hinterland and concentrate them. In the advanced capitalist nations (comprising what Wallerstein (1974a) calls the "core" of the world-system) class struggle and political processes have strengthened spread effects resulting in a more even distribution of development. In the periphery, however, backwash effects have been dominant, resulting in the concentration of development in the core and in enclaves attached to the core. At the level of the world-system as a whole, uneven development remains the dominant trend.

The operation of control structures between core-states and peripheral areas may reinforce this uneven development. Direct colonial control of peripheral areas has been replaced by the neo-colonial mechanisms of direct foreign investment and credit. It is my hypothesis that penetration by external control structures, other things equal, has a negative effect on economic development through the mechanisms reviewed below. The period studied in this research, 1950 to 1970, was a period of world economic expansion in which almost all national economies were growing. The hypothesis is, then, that dependent nations grow less than others.

Before discussing theories which predict or imply hypotheses about dependence effects on development, it is necessary to clear up three possible misunderstandings: First, what many theorists understand to be simply resource flows between largely unconnected societies are considered by other theorists to be control structures which link super-ordinate to subordinate units in the same interactive system. This is especially true of the types of dependence studied here--dependence on foreign investment and foreign credit. These radically different ways of perceiving the same reality lead, of course, to completely different predictions about the consequences of such relations.

The second problem in discussing different theoretical approaches is that some theorists propose very long-run structural mechanisms by which dependence may affect

development, while others propose short-term effects. Both long-run and short-term hypotheses are reviewed because the research design is germane to both.

Third is the problem that while some theories deal with the effects of international power-dependence relations in general others deal specifically with investment dependence, debt dependence, or partner concentration. Again, both the general and specific are discussed as the research is relevant to both, although more directly to the latter.

1B.2 The theory of imperialism

Marx (1867) saw the historical relationship between the centers of capitalist development and the hinterlands of the world in terms of the notion of primitive accumulation. Part of the impetus for the emergence and domination of the capitalist mode of production was the appropriation by European powers of the wealth of Africa, Asia, and the Americas. Marx thought that the domination of the capitalist mode of production would spread throughout the world economy, battering down all Chinese walls with the cheap prices of its commodities. Colonialism would destroy the pre-capitalist mode of production and each nation would develop the way England had. Marx wrote to Engels of his fear that there might be conflict between capitalist

peripheral nations and those core nations where the more advanced proletariat would establish socialism. (Amin, 1974)

Lenin (1965) introduced the concept of imperialism into the Marxist analysis of capitalist development. He pointed out that the exploitation of peripheral areas was an important dimension of capitalist development, rather than a passing phase. Lenin saw monopoly capitalism as needing to export capital and to appropriate raw materials and markets in the periphery. He predicted inter-imperialist wars resulting from the division and redivision of the periphery by the advanced capitalist powers. Lenin expected that the original centers of capitalist development in Europe would become decadent and that the source of industrial strength would move to the periphery.

1B.3 Dependency theory

The persistence of underdevelopment in the periphery led to the re-examination of the theory of imperialism and monopoly capitalism by Baran (1957). Baran put forth the theory that penetration of the periphery by core-capitalism actually creates obstacles to development. Later Frank (1969) was to term this idea the "development of underdevelopment", implying that the poverty of the periphery is an on-going modern process, not a primordial state. The literature on the mechanisms by which inter-action between core and periphery have retarded the latter

has grown greatly in recent years. There are three main topics: exploitation, structural distortion, and suppression of autonomous policies.

1B.31 Exploitation of the periphery by the core

Capitalist development on a world scale involves competition between different capitals and states for shares of the economic surplus. New resources are created, but at any point in time the amount of extant surplus if finite. Frank (1969) argues that penetration of the periphery by foreign investment drains surplus from the periphery to the core through the repatriation of profits and interest. This backwash effect accumulates capital in the core and underdevelops the periphery.[5] Amin (1974) contends that this "decapitalization" of the periphery results from a continuing process of primitive accumulation in which political and military force backs up economic advantage in core-periphery relations.

Emmanuel (1972) contends that exploitation is hidden in the prices at which commodities from the periphery are exchanged for commodities from the core. This "unequal exchange" stems from the different wage structures in the core and the periphery. In the periphery a worker must

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[5] Pinto and Knakal (1973) show that, between 1960 and 1968, profit remittances to the United States from Latin America exceeded new investment by $6.7 billion.

work, for instance, two hours to produce what is exchanged for a product which a core worker produces in one hour--and this at the same level of productivity. Thus, the market prices of core-periphery exchange contain a transfer of value to the core.

Some theorists argue that unequal exchange and uneven development will occur in any system of interaction in which the distribution of power is unequal. (Baumgartner, et al, 1975). This happens because more powerful actors will use their power to determine outcomes to their advantage. This approach seems to apply to any situation in which the welfare of the less powerful is not heavily protected by social or political institutions. Certainly the world economy is such a system. If foreign investment and credit are control structures between superordinate and subordinate actors in a competitive system, they should cause uneven development. Similarly, if partner concentration reflects a restriction of alternate partners in exchange it is a disadvantage in the competitive world economy. In the colonial empires core-states monopolized trade with their colonies. In the neo-colonial world the remnants of this particularistic exchange may act to restrict peripheral countries and thus negatively influence their development. Emerson (1972) argues that one of the determinants of a power-dependence relation between actors is the availability of alternative sources of resources.

The fewer alternative trade partners a peripheral nation has the more dependent it is on the trade partners it has.

Thus, exploitation of the periphery by the core is hypothesized to occur by means of decapitalization, unequal exchange, and subordination to external controls in a competitive system. These mechanisms are thought to retard the development of the periphery.

1B.32 Structural distortion of the peripheral economy

A number of dependency theorists argue that the economic structure which emerges in the periphery as a result of the world division of labor is distorted in such a way as to create obstacles to development. (Amin, 1974; DosSantos, 1970). An outward oriented economy specializing in the production of raw materials for export does not develop a differentiated internal structure. Frank (1969) observes that the infrastructure created by colonialism and foreign investment is oriented toward the ports of exit. Railroads, roads, telegraph lines, etc., all function to carry raw materials out of the country and return processed goods. This retards the integration of the national economy by linking the different areas and sectors of the peripheral countries with the external world rather than with one another. (Ehrensaft, 1971). The multiplier effect, by which demand in one sector or area of a country creates

demand in another, is weak because externally oriented linkages soon transfer demand out to the international economy. (Singer, 1971).

The peripheral areas have been integrated into the world economy as producers of raw materials for export to the industrial countries. Peripheral areas often specialize in a single raw material export, either agricultural or mineral. Galtung (1972) argues that an economy which is specialized in the production of raw materials will grow less than one in which production is more differentiated. Production which involves high levels of processing creates greater demand for inputs and greater opportunities for related economic activities on the output side of production (forward and backward linkages). (Hirschman, 1958).

Prebisch (1950) maintains that any national economy which remains undifferentiated will suffer from the vicissitudes of the international market, and that this is especially true of those specialized in the production of raw materials because the terms of trade for these commodities decline relative to manufactured goods and capital equipment produced in the core. Also, as there is more fluctuation in price for raw materials in the world market, instability makes economic planning (private or public) more difficult.'

Barratt-Brown (1974) has shown that the terms of trade alternately worsen and improve for third world raw material producers over the last 100 years. Wallerstein (1973) has argued that opportunities for upward mobility occur for some "semi-peripheral" nations during periods of contraction in the world economy. The recent economic downturn and the price rise for raw materials may indicate the return of such a period. Delacroix (1975) finds no negative effects of specialization in raw materials exports on economic growth.

Other dependency theorists such as Bianchi (1973) contend that dependence on foreign investment results in increased demands for imports which worsen the foreign exchange gap. Curiously, Schelling (1958) implies that this is an advantage, but dependency theorists point out that it places an increased burden on the raw material export sector to maintain the trade balance. (Pinto and Knakal, 1973).

In addition, Griffin and Enos (1970) argue that dependence on foreign credit reduces the domestic marginal propensity to save and thus negatively affects economic growth by lowering domestic capital formation.

Beckford's (1972) analysis of the role of transnational corporations in plantation economies suggests that the short-term impact of these corporations increases national income and opens new areas of production, but the long-run institutional and structural effect is to distort resource use in the peripheral economy. Transnational corporations distort land use, labor markets, and the allocation of investments. Beckford maintains that the logic by which these corporations operate is derived from the scope of the enterprise as a whole, including processing and marketing operations in the core. Thus, they influence the allocation of resources in the periphery from this point of view, using

market imperfections (monopoly power in sales and consumption) to guard against the risks of natural or political disaster. Their interest in maintaining relatively cheap labor, low taxes, and the freedom to manuever is often inconsistent with the balanced development of the peripheral country in which they produce. The distortion of resource use patterns creates what Beckford calls a state of dynamic underdevelopment.

Thus, dependence is hypothesized to distort the economic structure of the periphery in the following ways: specialization in raw material production (low differentiation), outward oriented infrastructure (low integration), worsening foreign exchange gap, and creation of resource use patterns which retard economic development.

1B.33 Suppression of autonomous policies in the periphery

Some dependency theorists have argued that dependence retards development through its suppression of autonomous policies in government and business which would mobilize balanced development. (Johnson, 1972). Baran (1957) contends that dependence distorts the development of a national bourgeoisie. Merchants, with their stake in the export of raw materials and the import of manufactured goods, combine with landed classes (which have similar interests) to prevent the emergence of a domestic

manufacturing or industrial bourgeoisie. They do this by politically preventing the introduction of tariffs that would protect infant industries against the competition of already developed producers in the core-states. Frank (1969) sees this process in the history of Latin American development. Civil wars occuring around 1830 in most of the newly independent republics involved the issue of autonomous versus external orientation. In each case the forces of "free trade" and external orientation triumphed. Wallerstein (1974a) makes a similar case for the peripheralization of Poland in the 16th century European "world-economy".

More currently, theorists maintain that strong links between elites in the periphery and core elites form what Galtung (1972) calls a "bridgehead" of interests and connections. The outward orientation of these "liaison elites" and the fact that their power and interests are based on connections with the core-states means that they suppress policies and leaders seeking to mobilize balanced autonomous development.[6] According to Hayter (1971) international and transnational agencies which lend to peripheral countries (development banks and private banks)

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[6] Trimberger (1976) studying the experience of economic nationalism by military bureaucrats in Japan, Turkey, Egypt and Peru concludes that strong mobilization of autonomous development can modify the tendency for external controls to retard development.

stand behind the operations of transnational companies in maintaining "a good climate for foreign invesement".

Sunkel (1973) claims that the connections of ruling groups in the dependent periphery with core-states and transnational corporations create a political structure which keeps wages low and concentrates development in the international sector. The links between the core and elites in the periphery increase income inequality by (1) raising the incomes of elites, and (2) keeping the wages of workers low. The power of the elites in dependent peripheral countries is backed by their alliances with the core, so they are able to suppress demands for higher wages and income redistribution.

Thus, dependence creates a political situation which retards development by linking elites in the periphery to the interests of the core. This prevents the emergence of autonomous forces seeking to mobilize balanced development and maintains extreme inequalities in the periphery.

1B.4 Theoretical approaches which hypothesize positive effects of dependence on development

1B.41 Neo-classical international economics

In neo-classical international economics the flow of capital from advanced to less developed nations is understood to be a main engine of economic growth. Capital is

capital and its investment should lead to increased production in the enterprise into which it is channeled, as well as economic growth in other sectors due to increased demand. Unrestricted international flow of capital to areas where it will bring the highest return will result in the maximization of growth for the system as a whole, and presumably also for the peripheral areas to which the capital flows. The benefits of foreign investment will spread due to incomes created by new employment and the "trickle-down" effect caused by increased demand for land, labor and materials. (Schelling, 1958). The input of foreign aid should result in growth for the same reasons, and because it supplements local savings and makes greater investment possible. (Chenery and Strout, 1966). The use of aid funds to build public works and infrastructure should have positive effects on labor growth.

The theory of comparative advantage holds that specialization in the production of raw materials (one of the correlates of dependence) will not have negative effects on growth if it is more economical to exchange raw materials for manufactured goods than to produce the imported goods domestically. Ricardo put forward the theory of comparative advantage to show why it was mutually advantageous for nations to trade. The example

he used was the exchange of English linen for Portuguese wine.' The theory holds that "whether or not one of two regions is absolutely more efficient in the production of every good than is the other, if each specializes in the products in which it has a comparative advantage (greatest relative efficiency), trade will be mutually profitable to both regions." (Samuelson, 1964). This is in direct contradiction to the idea of "structural distortion" discussed above.

1B.42 Modernization theory

Most modernization theorists focus on conditions internal to a society that promote or retard economic development (Eisenstadt, 1966; Smelser, 1963). Sociologists who discuss the effects of interaction between modern and traditional societies most often focus on the diffusion of modern traits. The main hypothesis is that the more contact and penetration, the more the traditional societies are modernized. (Lerner, 1958).

Modernization theorists emphasize the transfer of advanced technology, modern rational organizational forms, labor habits complementary to industrial production, and "modern" attitudes toward the self, the family and the

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Sideri (1970) has made a historical investigation of the emergence of this exchange and its consequences for the development of the two countries.

society which facilitate economic development. This approach implies that a country which is penetrated by direct foreign investment (has located within it subsidiaries of modern multinational corporations) should develop more than a country that is not so penetrated. Similarly, foreign aid that brings technical assistance and advice regarding fiscal and development policies should also facilitate economic growth.

1C. Summary of Propositions

The dependency literature reviewed above discusses mechanisms by which international power-dependence relations in general have effects on development. The following is an inventory of the propositions which relate specifically to the types of dependence studied in this research--investment and debt dependence, and partner concentration.

1C.1 Mechanisms by which investment and debt dependence and partner concentration negatively affect economic growth

1. Exploitation by the core drains resources from the periphery which are needed for its development. Profits on foreign investment and interest on credit transfer value from the periphery to the core and retard development in the periphery.

2. Externally oriented production and penetration by transnational corporations distorts the economic structure of the periphery. Differentiation and integration are obstructed and a pattern of resource use is created which maintains a state of dynamic underdevelopment.

3. Links between elites in the core and the dependent periphery act to suppress autonomous mobilization of national development.

4. Partner concentration results in relative weakness in the world market because of the construction of alternative partners in any particular exchange. This a disadvantage which retards economic growth.

1C.2 Mechanisms by which foreign investment and credit positively affect economic growth

1. Foreign capital creates production directly in the enterprise in which it is invested and generates demand for other inputs which contribute to economic growth.

2. Foreign credit finances public infrastructure needed for development.

3. Diffusion of technology, work habits, modern organizational forms, modern attitudes, and consumption preferences will stimulate economic development.

Let us turn now to a comparative test of dependence effects on development. This research enables us to estimate whether aggregate effects are positive or negative, but does not differentiate between the mechanisms hypothesized above. Any estimated aggregate effect may be resultant of the simultaneous operation of different mechanisms, but findings which are consistently negative will direct further attention to dependency theory.

CHAPTER 2. REVIEW OF PREVIOUS COMPARATIVE RESEARCH

There has been rather little previous comparative research on the effects of economic dependence on development. The studies reviewed here differ in research design, indicators of dependence, samples of nations, and statistical techniques. These differences and results obtained are explained in this chapter, which is organized in terms of the three types of dependence considered in this study.

2A. Studies of the Effects of Investment Dependence on Economic Growth

The two previous comparative studies of the effects of investment dependence on economic growth employ somewhat different measures than the ones used in my study. The first comparative study of the effects of investment dependence was carried out by Albert Szymanski (1971) and reported in a monograph entitled "Dependence, exploitation, and development." Szymanski measures investment dependence by computing the ratio of the total book value of United States direct investment in a nation to the Gross Domestic Product of the nation in 1969. This measure differs in three ways from the one used in this study. First the indicator used is the total book value of United States investment. This is in contrast to the measure used in this research, which is the amount of profit earned by all

foreign direct investment. (See Chapter 3 for a full description of this measure.) Second, investment dependence is measured at the same time as the dependent variable, economic growth. Third, Szymanski standardizes the variable on the Gross Domestic Product of the nation, whereas in this study the total population is used. (See Chapter 3E.)

Szymanski uses two measures of economic growth: (1) the average annual percentage change in Gross Domestic Product per capita from 1960 to 1968 and (2) the average annual percentage change in Gross Domestic Product per capita in the manufacturing sector over this same period.

For fourteen Latin American nations Szymanski finds a small positive association between investment dependence and economic growth. The sample is dichotomized on investment dependence. The average growth rates for those high on investment dependence are 2.7% and 8.6% (for overall GDP per capita and GDP per capita in manufacturing); whereas for the low group the means are 2.3% and 7.4%. These differences are small, but they tend to disconfirm the hypothesis of a negative effect of investment dependence on economic growth. For a reinterpretation of these results in the light of the findings reported here, see Chapter 4A.17.

Peter Evans (1972) tests the effects of investment dependence in two ways. First, he divides the less developed nations into five "investment regions": Communist nations, Asian recipients of U.S. investment, African recipients of U.S. investment, Latin American recipients,

and a residual category of nations isolated from U.S. investments for one reason or another. He enters these categories (except for the residual category) as dummy variables in a cross-sectional regression in which the dependent variable is the percentage of Gross Domestic Product in Industry. Also included in the regression equation is a measure of the Gross Domestic Product per capita. Although the Communist group is high on industrialization, the other categories show estimates close to zero. This is interpreted as partial support for the proposition that investment dependence has negative effects because the Communist nations do not allow any foreign private direct investment.

Second, Evans uses the "investment regions" measure to estimate the effect of investment dependence on the variance of 1966 GDP after 1950 GDP has been controlled in the regression equation. This method is very similar to the panel regression model used in this dissertation except that investment dependence is measured in a different way and not at the earlier time point. (See Chapter 3E.) He finds that the Communist category has a positive effect and the other categories have negative effects, but not in the order predicted by the dependence hypothesis.

Due to the inadequacies of the "investment region" measure Evans constructs a better measure, "investment intensity". The measure is an index composed of a combination of (1) the total book value of U.S. direct investment divided

by the GDP and (2) the number of subsidiaries of foreign corporations operating in a country divided by the GDP. The index is calculated for 20 Latin American nations for 1950 and 1966. These two measures for the Latin American sample reveal a significant negative cross-sectional association with the measure of industrialization when the level of GDP per capita is controlled. Likewise with the longitudinal test of the effect on GDP per capita over the period from 1950 to 1966 a significant negative effect is obtained. These results are in the opposite direction of those found by Szymanski. The reasons for this are discussed in Chapter 4A.17. Evans concludes that investment dependence retards industrialization in Latin America.

2B. Studies of the Effects of Partner Concentration on Economic Growth

The only comparative study of the effects of partner concentration on economic development is reported by Johan Galtung (1972). Galtung reports only cross-sectional zero-order correlations between his measure of partner concentration (constructed by the same method used in this research) and two measures of economic development, GNP per capita and the percentage of the work force in non-primary production. The correlations are -.52 and -.72 respectively. Such correlations are some indication of a negative association, but do not disentangle possible reciprocal effects. Low levels of development may cause partner concentration as well as vice versa.

2C. Studies of the Effects of Aid Dependence on Economic Growth

There are two comparative studies of aid dependence effects on economic growth. Szymanski (1971) includes a measure of total United States aid received between 1945 and 1969 divided by the GDP. He dichotomized the sample of 19 Latin American nations on aid dependence and calculated differences of means for the percentage change in GDP per capita in manufacturing for the same period. In both cases the means were slightly higher for the more dependent groups.

The other study which examines the relationship between aid dependence and economic growth is reported by Keith Griffin and J. L. Enos (1970). They measure aid dependence as total foreign capital flowing into the nation during the period from 1957 to 1964 divided by the GNP. The dependent variable is the yearly average GNP per capita growth from 1957 to 1964. With 12 Latin American cases, they find the hypothesized negative relationship.

Except in the case of Evans' longitudinal test for 19 Latin American nations, all of the above research is inconclusive for reasons of measurement or research design. Even Evans' result is problematic due to the small number of cases in his regression. All of the studies use Latin American data, except for Evans' use of "investment regions" which categorizes nations by continent. All of the studies,

with the exception of those of Griffin and Galtung, use data on only United States investment and aid. This, however, may not be a serious problem as long as only Latin America is studied, because the United States is the major core nation with investments in Latin America.

CHAPTER 3. MEASUREMENT AND RESEARCH DESIGN

Measurement is the biggest problem for quantitative cross-national research. Operationalization of concepts is difficult because of the limited amount of comparable data available for secondary analysis, and the infeasibility of gathering original data on a large sample of nations. The accounting operations set up by the United Nations and other international organizations have attempted to standardize methods in order to collect comparable data on nations. This effort has made considerable progress since the second World War, and there is now a rather large body of data available. The problem is that this data is often not collected for the purposes which researchers have in mind and, therefore, the attempt to match up extant data with theoretically relevant concepts is problematical.

3A. Measures of Economic Dependence

3A.1 Investment dependence

The major measurement effort for this thesis has been toward developing a reliable indicator of the extent to which a national economy is penetrated by foreign capital which can be used in longitudinal analysis. Ideally we would like to know the economic value of all foreign investments in each nation for the relevant time period. This data is not available for an early enough time period

to make longitudinal analysis possible, however.[7]

Investment dependence may also be measured by the amount of profit generated by foreign investment. This quantity is reported in the International Monetary Fund's Balance of Payments Yearbooks. It is called "investment income" and is defined as "income (interest, dividends, profits, etc.) of foreigners from capital loaned or invested in the country." "I.M.F. Balance of Payments Manual, 1961)[8] This income derives from both portfolio investments and direct investment (in which foreigners set up an enterprise and control its operations). Both repatriated earnings and undistributed profits are reported in this category, and therefore national policies restricting the repatriation of profits do not affect it directly.

The Balance of Payments Yearbooks generally list national accounts in the currency of the country being reported. Therefore it is necessary to employ exchange rates to convert the values into a single unit for comparison. The dominant currency in the international monetary system during the period studied was the United States dollar, and so this is the unit into which country currencies

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[7]A study of the stock of foreign direct investment capital in 71 developing countries was made by the Organization for Economic Cooperation and Development (Paris, 1971) for the year 1967.

[8]Credits and debits on investment income are reported. We are interested in debits (the amount paid to foreigners). This should not be confused with net investment income (credits minus debits) which is reported in the I.M.F. International Trade Statistics.

were converted. These exchange rates were obtained from the United Nations Statistical Yearbooks (1965, 1967, 1971).

The "investment income" per year was averaged over a five year period to eliminate short-term variations. It was divided by the population of the nation to provide a per capita figure which controls for the size of the nation. (See the discussion of the problem of correlating ratios containing common terms in section 3E, below.) The variable so produced was found to have a few very high scores which resulted in an extremely skewed distribution. A logarithmic transformation was performed on the variable to make it suitable for linear regression analysis. This reduced the skewness coefficient from 4.55 to -.51.

Originally the investment dependence measure was standardized on both population and Gross National Product, but it was decided to use only the per capita measure because of difficulties with the ratio problem. (See 3E.2 below.) Standardizing on GNP provided an opportunity to check the amount of error due to the use of exchange rates, however. The investment income per GNP was calculated using country currencies (both investment income and GNP in the currency of the nation) and this was correlated with the same variable calculated using values which had been converted into United States dollars with exchange rates. This resulted in a Pearson's r correlation of .98, leading to the conclusion that the use of exchange rates does not create major difficulties.

Data gathered by the Organization for Economic Cooperation and Development on the total stock of foreign direct investment in developing countries (Paris, 1971) can be used to check the reliability of the measure of investment dependence discussed above. The OECD data is obviously a better measure of investment dependence because it is not affected by the profit rate, whereas investment income, being based on the amount of profit returning to foreign capital, is affected by variations in the profit rate. The reason that we use investment income is that the OECD measure is not available for an earlier time point and it is very important to do longitudinal analysis on the particular hypothesis being investigated because of existence of two-way causation between investment dependence and economic development. (See Chapter 4.)

Hveem (1974) has standardized the OECD data on the GNP of the host country and thus the appropriate comparison is with investment income standardized on GNP. The OECD data is for 1967 and the closest investment income data available is an average of the years from 1966 to 1971. The Pearson's correlation coefficient for these two measures is .55 (N=70). This is a rather low correlation between two measures of the same underlying variable. Inspection of the scatter diagram of the two distributions reveals that

most nations fall close to the regression line with the exceptions of Libya, Saudi Arabia, and Iraq. (See Appendix) These three nations are very high on investment income and not high on the total book value of foreign investment. This is because the profit rate on foreign investment is very high due to the immense profits made on the extraction of large amounts of crude oil. When these three countries are eliminated from the correlation it goes up to .70. Also when all the countries with high scores on the percentage of their Gross Domestic Product in the mining sector are selected out of the sample (those with greater than 25% of the GDP in mining) the correlation goes up to .73.

This indicates that part of the difference between the two measures is due to the high return on investments in the production of scarce mineral resources. This variable is controlled in the analysis of the effects of dependence on economic growth for this reason, and also because the presence of mineral resources has independent effects on both investment dependence and economic growth.

It should be recognized that the measure of the independent variable contains a degree of measurement error due to the different profit rates in different countries. This may bias the results of the analysis of effects on economic growth toward the positive if higher profit rates indicate a more growth-prone national economy. That is, the portion of the investment dependence indicator which is

due to high profit rates would also be related to higher levels of economic growth.

Another item from the I.M.F. Balance of Payments Yearbook was considered as a potential measure of investment dependence: the yearly flow of direct investment capital into a nation. This was rejected because inspection of some of the data revealed that this item is not at all stable from year to year and does not give any indication of the amount of foreign investment which has come in in previous years. Investment income is much more stable and is more likely to reflect the long-term dependence of a nation on outside capital.

The summary descriptive statistics on the distribution of the measure of investment dependence used in this research (logged investment income per capita averaged for the years from 1950 to 1955) are as follows: N = 63; Mean = 2.27; Standard Deviation = .79; Minimum = .05; Maximum = 3.88; Skewness = .51.

3A.2 Trade dependence--export partner concentration

The notion of a national economy being located in a dependent position in the exchange network of the world economy is measured here by an indicator first used by Galtung (1972). Export partner concentration (the percentage of a nation's total export which goes to its largest export partner), measures an aspect of power-dependence relations

pointed out by Emerson (1972). Emerson points out that the more alternative sources of a resource an actor has, the less dependent the actor is on any other actor. In international trade the more diversified a nation's trade relations are, the less likely that it can be coerced by any single other nation.[9]

Whereas Galtung coded this variable for 1965, our longitudinal research design required that we code it for an earlier time point. Using the United Nations International Trade Statistics Yearbooks, we have coded this variable for 1950 and 1955.

This measure is very stable from year to year although the mean score decreases constantly between 1950 and 1971 (from 39% to 29%). It is calculated from country currencies and thus has no error due to exchange rates. It is fairly normally distributed due to the fact that is a percentage which cannot go above 100%.

Here are the summary descriptive statistics on the distribution of the measure of trade dependence used in this research (export partner concentration in 1950): N = 69; Mean = 39%; Standard Deviation = 23%; Minimum = 11%; Maximum = 96%; Skewness = .77.

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[9] A more sophisticated measure of this idea has been proposed but not coded by Caporaso (1974). Delacroix (1975) has studied the effect of trade "ubiquity" (the number of trade partners a nation has) on economic size.

3A.3 Aid dependence--external public debt per capita

Aid dependence is the extent to which a nation is dependent on foreign public and private loans. The International Monetary Fund Balance of Payments Yearbooks contain a number of yearly capital flows which should be included in an accounting of foreign aid, such as government long term borrowing, private long term loans, grants, etc., but these items are on a yearly basis and vary greatly from year to year. What is needed is an accounting item that cumulates past debts. This is provided by the World Bank's Statistical Services Division which compiles the total of external public debt, including both government and government guaranteed debt. This sum, which is given in U.S. dollars in Table 7 of the I.B.R.D. World Tables (1971) is then divided by the population of the borrowing nation for the appropriate year. Unfortunately this information does not exist for very many countries for 1950 or 1955. Indeed there are only 19 cases in 1960 with data on this measure. This means that our longitudinal analysis with this variable is restricted to a short time lag.

The summary descriptive statistics on the distribution of external public debt per capita on 1960 and 1965 are as follows: (1960) N = 19; Mean = $555; Standard Deviation = $488; Minimum = $34; Maximum = $1750; Skewness = 1.27. (1965) N = 80; Mean = $483; Standard Deviation = $560; Minimum = $6; Maximum = $3400; Skewness = 2.5.

3B. Measures of Economic Growth

3B.1 Aggregate economic development

3B.11 Gross National Product per capita

The most elaborate measure of economic production in use during the period studied is the Gross National Product. This measure includes money incomes from all economic sectors including rents, services, interest, and capital gains. Almost all legal economic transactions which take place in a national territory are entered into the accounting scheme which comprises GNP. (O'Loughlin, 1971).

Income which returns to non-nationals--citizens or organizations which are foreign--is excluded, however. The difference between Gross Domestic Product and Gross National Product is that the former includes all income which is produced within the national territory, regardless of whether or not national citizens receive it, while the latter excludes income returning to non-nationals. Thus investment income (used in this research as an indicator of investment dependence) is included in GDP but not in GNP.

Production which does not enter the money economy (subsistence agriculture) is included in GNP accounting through an imputation of value usually based on wholesale prices. (O'Loughlin, 1971). GNP per capita data is highly correlated with other measures of aggregated economic development: the percentage of the work force not in agriculture and kilowatt hours per capita of electrical energy consumed.

The GNP data used in this study has been taken from the I.B.R.D. World Tables (1971), which contain GNP in constant 1964 U.S. dollars. The 1970 GNP data is from the World Bank Atlas (1972), and is in 1970 U.S. dollars. The difference in currency units between earlier and later time points does not affect the size of standardized regression coefficients because it is constant across all cases.[10]

The summary descriptive statistics for this data are as follows: (1950) N = 130; Mean = $329; Standard Deviation = $423; Minimum = $35; Maximum = $2368; Skewness = 2.66. (1970) N = 137; Mean = $813; Standard Deviation = $1009; Minimum = $60; Maximum = $4760; Skewness = 1.75.

3B.12 Electrical energy consumption--logged kilowatt hours of electrical energy consumed per capita

This measure is more comparable across nations because the units in which it is measured are standardized and the operations used in measuring it are built into the technology of energy production. This makes it superior in comparability to measures using monetary units and accounting operations that are more difficult to standardize.

This data is taken from the United Nations Statistical Yearbooks for the appropriate years and is divided by the population of the nation. The variable is then transformed

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[10] This measure is used unlogged although the results obtained after it has been logged are very similar. (See Chapter 4.)

to a logarithmic scale to reduce its skewness for use in linear regression. It is less useful than GNP as an overall indicator of all kinds of economic production, but the energy utilizing capacity of an economy is obviously an important dimension of what is meant by economic modernization. The summary descriptive statistics for this measure are as follows:
(1950) N = 96; Mean = 1.87; Standard Deviation = .94;
Minimum[11] = 0; Maximum = 3.73; Skewness = .21.
(1965) N = 130; Mean = 2.28; Standard Deviation = .86;
Minimum = .30; Maximum = 4.12; Skewness = -.11.

3B.13 Percentage of the male labor force not in agriculture

Another measure of economic development is the percentage of the male labor force employed in the non-agricultural sector. It is well-known the proportion of the population engaging in agricultural production has decreased steadily during the industrialization process. This measure has fewer problems of comparability than GNP because the units (people) are not monetary. The data has been collected by the International Labour Organization from carefully scritinized country censuses. This variable is distributed fairly normally because it is a percentage which cannot go above 100%. Unfortunately it is only available for a large number of countries for 1950 and

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[11] There are no countries with zero electricity consumed. This score was given in cases when logarithmic transformation resulted in a negative score. This occurs whenever the unlogged value is between zero and one.

1960 making a maximum ten year time lag for our panel regression analysis. This variable does not change rapidly and so the stability term or autoregression coefficient is always large, which restricts the potential operation of independent variables. The high quality and comparability of this data make this a valuable indicator of economic development, however. The summary descriptive statistics for the percentage of the male labor force not in agriculture are: (1950) N = 138; Mean = 38.2%; Standard Deviation = 25.9%; Minimum = 2.4%; Maximum = 98.1%; Skewness = .52. (1960) N = 138; Mean = 53.4%; Standard Deviation = 26.9%; Minimum = 4.6%; Maximum = 85.5%; Skewness = .37.

3C. Production Per Capita in Economic Sectors

In order to locate the effects of any independent variable on economic production it is possible to use GNP data for particular economic sectors. This enables us to see which sectors are affected. Data on the percentage of Gross Domestic Product by industrial branch (or economic sector) is compiled by the World Bank for 1955 and 1965. (I.B.R.D., 1971). This data was originally published in country currencies in the

United Nations Yearbooks of National Accounts Statistics. The economic sectors used to classify productive activity are based on the U.N. International Standard Industrial Classification (U.N., 1958). The agriculture, mining, and manufacturing sectors are used in this analysis. The World Bank expresses this data in percentages--the percentage of the total Gross Domestic Product produced in the sector. In order to determine productivity in each sector this percentage was multiplied times the total GNP in U.S. dollars and divided by the population of the country. This gives us per capita product in each sector for 1955 and 1965, which can be used in panel regression analysis with a ten year lag.

3C.1 Per capita product in agriculture

This sectoral category includes the value of product in agriculture, forestry, hunting, and fishing. It includes all product regardless of whether or not it is exchanged. Thus, for subsistence production an estimate of the value is made. This is known to result in some error because it is difficult to estimate the value of production that does not enter the money economy. This variable should not be confused with the percentage of work force in agriculture. The summary descriptive statistics are: (1955) N = 90; Mean = $82; Standard Deviation = $56; Minimum = $7; Maximum = $324; Skewness = 1.8.
(1965) N = 127; Mean = $77; Standard Deviation = $60; Minimum = $10; Maximum = $431; Skewness = 2.5.

3C.2 Product per capita in mining

This sectoral category includes the value of production of mineral raw materials in mining, quarrying and drilling. It does not include value added in the processing of these materials. Examples of the commodities produced are: coal, metal, crude petroleum, natural gas, and quarried stone. Summary descriptive statistics are: (1955) N = 68; Mean = $25; Standard Deviation = $59; Minimum = 0; Maximum = $434; Skewness = 5.2. (1965) N = 95; Mean = $26; Standard Deviation = $59; Minimum = 0; Maximum = $380; Skewness = 4.1.

3C.3 Product per capita in manufacturing

This sectoral category includes, among other things, the transformation of raw materials, printing, textiles, food, beverages, milling of wood, furniture, rubber products, chemicals, products of petroleum and coal, metal industries, machinery, and transport equipment. The summary descriptive statistics for this category are: (1955) N = 89; Mean = $122; Standard Deviation = $162; Minimum = $1; Maximum = $807; Skewness = 1.8. (1965) N = 127; Mean = $131; Standard Deviation = $200; Minimum = $1; Maximum = $916; Skewness = 1.9.

3D Control Variables

3D.1 Domestic savings--gross domestic capital formation as a percentage of GNP

The percentage of GNP reinvested in capital goods is an important determinant of economic growth. (Keynes, 1964). It has been hypothesized that this domestic savings and reinvestment may be related to investment dependence. If there is a scarcity of domestic investment capital relative to opportunity this may cause foreign capital to flow in and also may cause or be related to slower rates of economic growth. In order to determine whether this variable is responsible for a spurious relationship between investment dependence and economic growth it is entered into the equation as an independent variable.

The data on gross domestic capital formation for 1950 is taken from Taylor and Hudson (1971) who have coded it from the U.N. Yearbooks of National Accounts Statistics. Here are the summary descriptive statistics on the distribution of domestic capital formation per GNP for 1950: N = 43; Mean = 16.5%; Standard Deviation = 5.4%; Minimum = 7%; Maximum = 29%; Skewness = .25.

3D.2 Specialization in scarce mineral resources--the percentage of GDP in the mining sector

The second control variable which is known to be related both to economic dependence and economic growth is the specialization of a national economy in the export of scarce

mineral resources. It is well known that one of the main determinants of the penetration of third world countries by industrial nations was the need for raw materials. There is a large positive correlation between the percentage of a nation's Gross Domestic Product which is produced in the mining sector and measures of investment dependence. It is also known that the presence of large deposits of scarce mineral resources has a positive effect on economic growth. Thus if we wish to know the effect of investment dependence on economic growth without the confounding effects of mineral resources this variable must be entered into our regression equations.

The data is taken from the I.B.R.D. World Tables (1971). Here are the summary statistics on the distributions of the percentage of GDP in mining for 1955: N = 68; Mean = 5.3%; Standard Deviation = 10.6%; Minimum = .01%; Maximum = 60.8%; Skewness = 3.4.

3E. Research Design

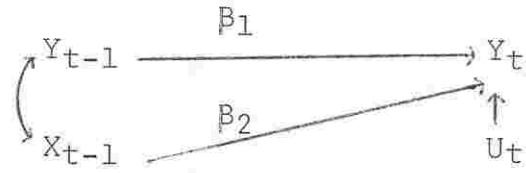
This section describes the research design, statistical method, sampling decisions, and problems of standardization of variables.

3E.1 Panel regression analysis

The method of comparative analysis used in this research is known as panel regression. It is a flexible statistical

method for testing causal propositions which allows the introduction of multiple control variables and, because it employs data at different points in time, reduces the likelihood of false inferences due to reciprocal causality. The dependent variable is measured at both the first and the second point in time (in this study 1950 and 1970). The independent variables are measured at the earlier time point (1950). The dependent variable at the later time point is regressed on itself at the early time point and the independent variables. This provides an estimate of the effect of the independent variables which is independent of the relationship between them and the dependent variable at the early time point. In essence it is an estimate of the effect which the independent variable had on the dependent variable over the period of time between the two measurements. The length of time between the two measurements is referred to as the lag, and the early measurement of the dependent variable is the "lagged dependent variable". It is a very simple form of path analysis (Duncan, 1966) which employs only one equation, and can therefore be estimated with simple multiple regression. The model to be employed is diagramed as follows:

Figure 1. Panel Regression Model



$$Y_t = \beta_0 + \beta Y_{t-1} + \beta_2 X_{t-1} + U_t$$

The straight lines represent direct causal effects. The solid curved line represents an unanalyzed correlation coefficient, which controls for the previous operation of the system. The causal arrow β_1 shows the stability of the dependent variable during the period between measurements. The path β_2 shows the effect of the independent variable at Time 0 on the dependent variable at Time 1. This method requires the assumption that there are no instantaneous effects between the variables and that residual or error term of the dependent variable (U_t) is uncorrelated with the independent variables. (This is equivalent to assuming that there are no variables not in the equation which affect both the independent and the dependent variable.) The equation corresponding to the model above is: $Y_t = \beta_o + \beta_1 Y_{t-1} + \beta_2 X_{t-1} + U_t$.

If it is thought that a variable not in the equation is causing a spurious estimate of the effect of the independent on the dependent variable the new variable may be controlled by including it in the equation--provided it can be measured at the early time point.

This research design is superior to the use of change scores or growth rates because it controls for the correlation between the independent variable and the lagged dependent variable. This takes out the effect of previous interaction between the two variables. Thus what remains is the effect of the independent variable on the dependent variable over the time lag studied. Using a change score or growth rate for

the dependent variable does not control this original relationship and thus the estimate may be contaminated if the dependent variable has a reciprocal effect on the independent variable.

It is known that this panel model results in biased ordinary least squares estimates because of autocorrelation of the error terms of the dependent variable. The measurement errors which occur in measuring the dependent variable at both time points inflate the size of the estimate of the effect of the dependent variable on itself and deflate the estimates of independent variables that are positively correlated with the dependent variable at Time 0. (Hannan, 1974). Since our dependence measures are positively correlated with Time 0 measures of economic development this bias should reduce the estimates of dependence effects toward zero.

3E.2 Weighting of variables

It has been suggested that the use of indicators that are ratios may lead to faulty inferences, especially if the same terms appear in both independent and dependent variables. (Schuessler, 1973). Thus a correlation between two indicators that are both weighted on population to control for size may be artificially high because both terms contain population in the demoninator. Likewise, two measures that contain a similar term which is in the denominator of one and the numerator of the other will have an artificially negative

correlation. The extent to which this is true depends on the relative variance of the terms. (Fuguitt & Lieberson, 1974).

In the case of estimating the effects of dependence on development it may be that negative effects such as those found by Evans (see Chapter 2) are artifactual because dependence measures are standardized on GNP to control for economic size while the dependent variable is GNP per capita. This is the case in which a similar term is in the denominator of one measure and the numerator of the other. In order to counter this objection to a negative result we standardized our measures two ways: on total population and on total GNP. Since we are hypothesizing a negative effect of dependence on development only the per capita results are present in Chapter 4. This is because the per capita measures should create a positive artifact, and thus these provide the most conservative test of a negative effect. Results using indicators of investment dependence standardized on GNP have been calculated. It is interesting that, although the correlation coefficients differ in the way suggested by Fuguitt and Lieberson (1974), the regression coefficients are very similar with both kinds of standardization.

3E.3 Sample of nations

Although most of the theoretical work on international economic dependence has focused on underdeveloped nations, it is clear that some developed nations are more dependent than

others. It may be that dependence has similar effects regardless of the level of economic development. The procedure used here to select the nations we wish to compare has partly been determined by the scarcity of the data and partly is due to theoretical desiderata. Each analysis is done in two ways. The first analysis includes all the cases, regardless of level of development, for which data is available. This maximizes the number of cases on which estimates will be based and allows the relative dependence or independence of developed nations to enter into the estimate. Second, the most developed nations are eliminated in order to compare the poor dependent with the poor independent (isolated) nations. This should provide the most conservative test of the proposition that dependence has negative effects on development. This is accomplished by eliminating those cases from the computation that have greater than $406 per capita GNP in 1955. This is the 75th percentile of the distribution of GNP per capita in 1955. This eliminates the most developed countries while still leaving enough cases to allow meaningful regression coefficients to be computed.

CHAPTER 4. RESULTS

This chapter presents the results. Results are presented for all nations for which data is available, and for a subsample of poorer nations--those with less than $406 per capita GNP in 1955 (the bottom 75% of the distribution).

This chapter is organized in three sections. The first section presents the effects of the measures of economic dependence on aggregate economic growth. The second section introduces two control variables into these same equations, and the third section presents the effects of the dependence measures on growth in economic sectors.

4A. The Effects of Economic Dependence on Aggregate Economic Growth

4A.1 The effects of investment dependence on aggregate economic growth

4A.11 Investment dependence and GNP per capita--all nations

The first regression estimates the effect of the measure of investment dependence on GNP per capita with a 20-year time lag--from 1950 to 1970,

Table 1 presents the means and standard deviations for the three variables in the regression equation, and the number of cases for which data was available on all these variables.

Table 1. Means, standard deviations and number of cases for investment dependence and GNP per capita

VARIABLE	MEAN	STANDARD DEVIATION	CASES
Investment dependence 1950-55	2.25	.79	62
GNP per capita 1950	$ 456	$ 482	62
GNP per capita 1970	$1147	$1192	62

The units in which these variables are measured are as follows:

1. Investment dependence is a logarithmic scale to the base ten of the ration between debits on investment income and the population of the nation. This has been averaged over a give year period, 1950 to 1955, in order to eliminate short-term variation.

2. GNP per capita 1950 is in 1964 U.S. dollars.

3. GNP per capita 1970 is in 1970 U.S. dollars.

The difference in units between the two GNP measures does not affect standardized regression coefficients because the ratio of 1964 to 1970 dollars is constant across all the cases. The change in the mean of GNP per capita from $456 to $1147 partly reflects real growth and partly is the result of the inflation of the dollar.

Table 2 contains the Pearson's r correlation coefficients calculated for these three variables.

Table 2. Pearson's r correlation coefficients for investment dependence and GNP per capita

VARIABLE	Investment dependence 1950-55	GNP per capita 1950	GNP per capita 1970
Investment dependence 1950-55	1	.34	.25
GNP per capita 1950	.34	1	.94
GNP per capita 1970	.25	.94	1

The positive correlation between investment dependence and GNP per capita reflects the fact that, while most developed nations are low on investment dependence, there is a sizeable group of very poor nations that are also quite low on it; that is, they are not penetrated by foreign capital (see section 4A.17). The effects of earlier economic development are controlled in order to see how much investment dependence affects later economic development.

Thus, the regression presented in Table 3 regresses GNP per capita in 1970 on GNP per capita in 1950 and on investment dependence. The high correlation between earlier and later GNP per capita (.94) means that an independent variable will have to have a fairly large effect to produce a regression coefficient which is significant (see Chapter 3E). Thus, this lagged regression analysis provides a rather conservative test of the existence of an effect.

Table 3 presents the estimates produced by this regression equation: GNP70 = β1 GNP50 + β2 INV.DEP55 + error

Table 3. Panel regression estimates of investment dependence effects on GNP per capita--all nations

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1955	-114.22	-.07	66.88	2.91
GNP per capita 1950	2.39	.97	.10	479.81
(constant)	310			

The small negative effect of investment dependence which is revealed by this regression is stable and can be taken seriously even though by conventional standards it is on the border of statistical significance. This is because the sample is not from a large population; rather, from 62 of the 100 or so extant nation-states at the time when the independent variable was measured in the regression.

Although the "stability" term or autocorrelation (the effect of the dependent variable on itself), is high (.97), the estimated effect of investment dependence is nearly statistically significant. This is indicated because the standard error of B is slightly more than one half the size of B, (the unstandardized regression coefficient). Also, the f ratio (2.9) indicates statistical significance at the .05 level. The negative sign of the coefficients means that investment dependence has a negative effect on GNP per capita at the later point in time controlling for GNP per capita at the earlier time point.

The size of the effect in terms of the units in which the variables are measured is indicated by the unstandardized regression coefficient (B). Unfortunately, the log scale units in which investment dependence is measured make it difficult to interpret this in policy-relevant terms.

The standardized regression coefficients (betas) are in units determined by the variances of the distributions of the variables. Thus, one standard deviation change in investment dependence produces -.07 standard deviation change in GNP per capita 1970.

4A.12 Investment dependence and GNP per capita--poor nations

Presented here is the same regression equation estimated for the sub-sample of poorer nations. Table 4, which contains the means, correlations, and regression coefficients produced, shows that the subsample contains 38 nations on which data is available for the three variables employed. (See Appendix for a list of the cases in this regression.)

Table 4. Effect of investment dependence on GNP per capita--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Investment dependence 1950-55	2.05	.74	38
GNP per capita 1950	$162	$ 79	38
GNP per capita 1970	$396	$339	38

CORRELATION COEFFICIENTS	INV.DEP	GNP PC 1950	GNP PC 1970
Investment dependence 1950-55	1	.57	.14
GNP per capita 1950	.57	1	.68
GNP per capita 1970	.14	.68	1

Dependent variable: GNP per capita 1970

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1950	-165.27	-.36	62.38	7.01
GNP per capita 1950	3.80	.89	.58	42.00
(constant)	119			

This table compares poor dependent nations with poor independent or isolated nations to determine the effect of dependence on economic growth. This should provide a more difficult test of the hypothesis of a negative effect of dependence on growth because it does not include the more developed nations, which tend to be low on dependence and also to grow more. Thus nations like Canada or Switzerland will appear dependent on this measure even though their position in the larger world economy is more one of interdependence rather than dependence. Eliminating the developed nations provides a clearer test of the effects of dependence.

Notice that the mean GNP per capita is much lower in this sample, and the mean of the investment dependence measure is somewhat lower. There is a relatively low correlation between the two measures of GNP per capita (.68). This is because economic development is less of a self-reproducing process in the poorer nations than it is in the more developed ones. (Adelman & Morris, 1967).

This means that there is more variance left over to explain after controlling for the lagged dependent variable, and it makes it more likely that an effect of an independent variable will be statistically significant.

The negative effect of investment dependence is larger than in the previous regression (beta = -.36), and the f ratio is also larger, indicating that the result is quite stable (significant at the .01 level).

Contrary to the above suggestion that exclusion of the more developed nations might reduce the size of the negative effect, this result demonstrates that the relationship between dependence and growth is more crucial for the less developed nations.

4A.13 Investment dependence and kilowatt hours of electricity consumed per capita--all nations

Another indicator of economic growth is the amount of electrical energy consumed per capita. This measure is thought to be more reliable than GNP because the accounting procedures involved in gathering data are more standardized and the units in which it is measured are universal and do not suffer from the problem of exchange rates which is encountered in monetary measures.

In order to replicate the analysis of the effects of investment dependence on aggregate economic development the measure of kilowatt hours per capita (logged because of skewness) is introduced into the same type of panel regression analysis. Here are the results for all the nations on which data are available. The time lag for this regression is 15 years instead of 20 years--from 1950 to 1965. This is because the data available for 1970 are incomplete, reducing the number of cases in the regression. The results for the 20 year lag are presented in Table A in the Appendix, and although the number of cases is low, the results are quite similar to those presented in the following two tables.

Table 5. Effect of investment dependence on kilowatt hours of electricity consumed per capita--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Investment dependence 1950-55	2.30	.77	55
kwh electricity per capita 1950	2.14	.84	55
kwh electricity per capita 1965	2.70	.70	55

CORRELATION COEFFICIENTS	INV.DEP	kwh 50	kwh 65
Investment dependence 1950-55	1	.30	.30
kwh electricity per capita 1950	.30	1	.97
kwh electricity per capita 1965	.30	.97	1

Dependent variable: kwh electricity per capita 1965

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1955	.009	.01	.031	.07
kwh electricity per capita 1950	.809	.96	.028	787.24
(constant)	.95			

In this table no significant effect of investment dependence is demonstrated. The standard error of the unstandardized regression coefficient (B) is almost four

times the size of the coefficient itself, and the f ratio is extremely small (.07). Thus for the whole sample of nations no effect of investment is shown.

4A.14 Investment dependence and kilowatt hours of electricity consumed per capita--poor nations

In this table the same equation is presented, except that the cases analyzed are those of the poorer sub-sample of nations--less than $406 per capita GNP in 1955.

Table 6. Effect of investment dependence on kilowatt hours of electricity consumed per capita--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Investment dependence 1950-55	2.06	.69	31
kwh electricity per capita 1950	1.62	.60	31
kwh electricity per capita 1965	2.23	.48	31

CORRELATION COEFFICIENTS	INV.DEP	kwh 50	kwh 65
Investment dependence 1950-55	1	.26	.13
kwh electricity per capita 1950	.26	1	.94
kwh electricity per capita 1965	.13	.94	1

Dependent variable: kwh electricity per capita 1965

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1955	-.087	-.12	.04	4.57
kwh electricity per capita 1950	.789	.97	.047	280.99
(constant)	1.13			

With 31 poorer nations in the regression the effect of investment dependence is significant and negative, (beta = -.12), indicating that nations which are penetrated by foreign capital expand their consumption of electrical energy less than those which are less penetrated. This can only come as a surprise to those who have argued that one of the beneficial effects of foreign investment is the expansion of modern utilities.

4A.15 Investment dependence and the percentage of the work force not in agriculture--all nations

Another commonly used quantitative measure of economic development is the percentage of the male work force not in the agricultural sector. This measure is also more reliable than GNP or other monetary measures because the units are fairly equivalent (male persons), and the accounting methods are fairly standardized. One difficulty in using this measure of economic development is that it changes slowly over time, and thus the autocorrelation term is always very high. Another problem is that only projections are available for recent years, rather than actual census data. Thus the data is constrained by use of only a ten year time lag, from 1950 to 1960. (The results of a 15 year lag regression with only 17 cases is shown in Table C in the Appendix). It should be kept in mind that a high proportion of the work force in agriculture corresponds to a low level of economic development, thus GNP per capita is highly correlated with the percentage of the labor force not in agriculture.

Table 7 presents results from the panel regression equation estimating the effect of investment dependence on the percentage of the labor force not in agriculture. Table 7 includes all the nations on which data was available.

Table 7. Effect of investment dependence on percentage labor force not in agriculture--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Investment dependence 1950-55	2.27	.80	62
Percentage labor force not in agriculture 1950	49%	23%	62
Percentage labor force not in agriculture 1960	55%	24%	62

CORRELATION COEFFICIENTS	INV.DEP	% NOT IN AGRIC'50	% NOT IN AGRIC'60
Investment dependence 1950-55	1	.37	.35
Percentage labor force not in agriculture 1950	.37	1	.98
Percentage labor force not in agriculture 1960	.35	.98	1

Dependent variable: Percentage labor not in agriculture 1960

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1955	-.35	-.01	60	.34
Percentage labor force not in agriculture 1950	1.03	.99	.02	2441.77
(constant)	-7.85			

Notice that the mean percentage of the labor force not in agriculture goes from 49% to 55% in the ten years between 1950 and 1960. This is quite a good deal of change for a percentage, but the correlation between the two points in time is .99, as is the standardized regression coefficient. This doesn't leave much for the independent variable to explain.

Table 7 does not demonstrate any effect of investment dependence on the percentage of the work force not in agriculture. The 15 year lag with only 19 cases does show a substantial negative estimate (see Appendix). But the small number of cases makes it difficult to infer an effect from this with much certainty.

4A.16 Investment dependence and the percentage of labor force not in agriculture--poor nations

In Table 8 we have the same equation except with the subsample of poorer nations. This is presented on the following page.

Table 8. Effect of investment dependence on percentage of labor not in agriculture--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Investment dependence 1950-55	2.05	.74	38
Percentage labor force not in agriculture 1950	36%	14%	38
Percentage labor force not in agriculture 1960	40%	15%	38

CORRELATION COEFFICIENTS	INV.DEP	% AGRIC 1950	% AGRIC 1960
Investment dependence 1950-55	1	.47	.41
Percentage labor force not in agriculture 1950	.47	1	.97
Percentage labor force not in agriculture 1960	.41	.97	1

Dependent variable: Percentage labor not in agriculture 1960

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1955	-1.19	-.06	.80	2.18
Percentage labor force not in agriculture 1950	1.04	1	.04	607.26
(constant)	-9.8			

This table provides coroborative evidence of a negative effect of investment dependence on economic development among the poorer countries. The negative beta coefficient (-.06) is not large, nor is it significant by the usual statistical tests (although nearly so), but it is in the direction which is consistent with the findings presented above. The higher a nation is on investment dependence the less likely it is to shift its labor force out of agriculture.

Thus we have obtained a significant negative effect of investment dependence on GNP per capita for the whole sample and for the subsample, a significant effect on kilowatt hours per capita for the subsample, and nearly significant effect on the percentage of labor force not in agriculture for the subsample. From the above results it is clear that there is no positive effect of investment dependence on economic development, and some support for the hypothesis of a negative effect for the less developed nations. The effects of other types of dependence will be examined to see if this result is further confirmed, after a short discussion of the effects of development on dependence.

4A.17 Reciprocal effect of GNP per capita on investment dependence: Szymanski's positive result explained

It was reported in Chapter 2 that Szymanski found a positive association between investment dependence and economic growth for his Latin American sample. This result stems from his research design. His independent variable (investment dependence) was measured in 1969 and the dependent variable was the percentage change in GNP per capita for the previous ten years. The design confuses two overlapping effects which are disentangled by the panel design used in this study--the effect of dependence on growth and the effect of growth on dependence. Tables D and E in the Appendix show that those countries in the sample of poorer nations that were higher on GNP per capita in 1950 tended to become more investment dependent in the ensuing 20-year period. In other words, development has a positive effect on dependence. This is because foreign capital tends to flow to the national economies that are relatively more developed and provide more opportunities for profitable investment.

4A.2 The effects of export partner concentration on aggregate economic growth

4A.21 Export partner concentration and GNP per capita--all nations

Export partner concentration, or the percentage of a country's total export which goes to the largest export partner, is a measure of a national economy's dependent

location in the larger world economy. The more trade partners a country has, the less dependent it will be on any single trade partner and the more alternatives, and thus the more power, it will have in international exchange.

Table 9 shows the results of the regression equation which estimates the effect of partner concentration in 1950 on GNP per capita in 1970, controlling for GNP per capita in 1950.

Table 9. Effect of partner concentration on GNP per capita--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Partner concentration 1950	.39%	23%	68
GNP per capita 1950	$ 416	$ 457	68
GNP per capita 1970	$1061	$1155	68

CORRELATION COEFFICIENTS	CONCENTRATION 1950	GNP PC 1950	GNP PC 1970
Partner concentration 1950	1	-.25	-.34
GNP per capita 1950	-.25	1	.94
GNP per capita 1970	-.34	.94	1

Dependent variable: GNP per capita 1970

VARIABLE	B	BETA	STD ERROR B	f
Partner concentration 1950	-5.63	-.11	1.92	8.57
GNP per capita 1950	2.31	.91	.098	548.21
(constant)	$317			

This table shows a rather large and significant negative effect of export partner concentration on economic development. This provides some additional support for the hypothesis that international economic dependence is one cause of the growing gap between national economies. The units in which export partner concentration is measures (the percentage of total exports to the largest export partner) are meaningful in terms of policy-oriented interpretation. Thus the unstandardized regression coefficient (B) can be understood to mean that one percent change in export partner concentration corresponds to a decrease of $5 GNP per capita over the 20-year time period.

4A.22 Export partner concentration and GNP per capita--poor nations

This same analysis is repeated with the subsample of poorer nations. In Table 10, with 45 cases on which data is available, the beta is larger but the unstandardized regression coefficient is smaller and the f ratio is smaller. The effect is undeniably negative, however.

Table 10. Effect of partner concentration on GNP per capita--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Partner concentration 1950	44%	23%	45
GNP per capita 1950	$ 161	$ 82	45
GNP per capita 1970	$ 403	$354	45

CORRELATION COEFFICIENTS	CONCENTRATION 1950	GNP PC 1950	GNP PC 1970
Partner concentration 1950	1	.01	-.19
GNP per capita 1950	.01	1	.71
GNP per capita 1970	-.19	.71	1

Dependent variable: GNP per capita 1970

VARIABLE	B	BETA	STD ERROR B	f
Partner concentration 1950	-3.10	-.20	1.55	3.97
GNP per capita 1950	3.12	.72	.44	49.80
(constant)	$38			

The 45 cases included in this regression are representative of third world nations in Asia, Africa and Latin America as well as some poorer European nations.

4A23 Export partner concentration and kilowatt hours of electrical energy consumed per capita--all nations

Here are the results of regressing log kilowatt hours per capita in 1965 on export partner concentration in 1950 and kilowatt hours in 1950 for all the cases on which data is available.

Table 11. Effect of partner concentration on kwh electricity consumed per capita--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Export partner concentration 1950	38%	23%	60
Log kwh per capita 1950	2.12	.81	60
Log kwh per capita 1965	2.66	.71	60

CORRELATION COEFFICIENTS	CONCENTRATION 1950	kwh 1950	kwh 1965
Export partner concentration 1950	1	-.23	-.31
Log kwh per capita 1950	-.23	1	.96
Log kwh per capita 1965	-.31	.96	1

Dependent variable: log kwh per capita 1965

VARIABLE	B	BETA	STD ERROR B	f
Export partner concentration 1950	-.28	-.09	.09	7.99
Log kwh per capita 1950	.82	.94	.02	831.07
(constant)	1.02			

With 60 cases in the regression a significant negative effect on electrical energy consumption is demonstrated. Because of the log scale in which electricity consumption is measured it is difficult to interpret the unstandardized regression coefficient

in policy-relevant terms. On the other hand, the unlogged distribution of electricity consumption per capita is so skewed that it cannot be used in linear regression analysis. Let it suffice that additional support has been found for the hypothesis that dependence constrains the expansion of energy consumption.

4A.24 Export partner concentration and kilowatt hours of electrical energy consumed per capita--poor nations

Table 12 shows the results of the same regression equation including only the poorer subsample of nations.

Table 12. Effect of partner concentration on kwh electricity consumed per capita--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Export partner concentration 1950	43%	23%	38
Log kwh per capita 1950	1.67	.60	38
Log kwh per capita 1965	2.26	.52	38

CORRELATION COEFFICIENTS	CONCENTRATION 1950	kwh 1950	kwh 1965
Export partner concentration 1950	1	-.01	-.14
Log kwh per capita 1950	-.01	1	.91
Log kwh per capita 1965	-.14	.91	1

Dependent variable: log kwh per capita 1965

VARIABLE	B	BETA	STD ERROR B	f
Export partner concentration 1950	-.30	-.13	.13	.97
Log kwh per capita 1950	.79	.91	.05	217.04
(constant)	1.06			

With 38 cases in the regression a larger estimated effect is produced than in Table 11, but the statistical significance is somewhat less.

4A.25 Export partner concentration and the percentage of the work force not in agriculture--all nations

Now we look at the third measure of aggregate economic development, the percentage of the male labor force not in the agricultural sector. This regression estimates the effect of partner concentration for the period from 1950 to 1960. As explained in 4A.15 above, very little data is available for more recent time points which would allow us to run a longer time lag with a sufficient number of cases.

Table 13. Effect of partner concentration on percentage of labor not in agriculture--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Export partner concentration 1950	39%	23%	68
Percentage labor not in agriculture 1950	48%	24%	68
Percentage labor not in agriculture 1960	53%	25%	68

CORRELATION COEFFICIENTS	CONCENTRATION 1950	% NOT IN AGRIC'50	% NOT IN AGRIC'60
Export partner concentration 1950	1	-.27	-.29
Percentage labor not in agriculture 1950	-.27	1	.98
Percentage labor not in agriculture 1960	-.29	.98	1

Dependent variable: percentage labor force not in agriculture 1960

VARIABLE	B	BETA	STD ERROR B	f
Export partner concentration 1950	-3.32	-.03	1.86	3.15
Percentage labor not in agriculture 1950	1.01	.98	.01	3026.37
(constant)	-7.49			

With 68 cases included, this regression results in a small but significant negative effect of partner concentration on the percentage of the work force not in agriculture. Since a high percentage of the work force in agriculture is associated with low economic development, this supports the hypothesis of a negative effect of dependence on development.

4A.26 Export partner concentration and percentage of the work force not in agriculture--poor nations

This is the same equation as in Table 13, run on the subsample of poorer nations. Notice that the mean of the percentage of work force not in agriculture is higher in this subsample than in the sample of all nations.

Table 14. Effect of partner concentration on percentage of labor not in agriculture--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Export partner concentration 1950	44%	23%	46
Percentage labor force not in agriculture 1950	35%	17%	46
Percentage labor force not in agriculture 1960	40%	18%	46

CORRELATION COEFFICIENTS	CONCENTRATION 1950	% NOT IN AGRIC '50	% NOT IN AGRIC'60
Export partner concentration 1950	1	-.05	-.07
Percentage labor force not in agriculture 1950	-.05	1	.98
Percentage labor force not in agriculture 1960	-.07	.98	1

Dependent variable: percentage labor force not in agriculture 1960

VARIABLE	B	BETA	STD ERROR B	f
Export partner concentration 1950	-1.62	-.02	2.27	.50
Percentage labor force not in agriculture 1950	1.01	.98	.03	1114.30
(constant)	-6.70			

With 46 cases in the regression the estimate of the effect of partner concentration is very small and not statistically significant, but in the direction of the previous results.

This smaller effect in the poorer subsample is contradictory to the earlier pattern in the above results in which the subsample estimates have been larger than the estimates for the whole sample. The autocorrelation terms are about the same in Tables 13 and 14, so this does not provide an explanation for the smaller estimate in Table 14.

4A.3 The effects of aid dependence on aggregate economic growth

The measure of aid dependence used in the following tables is the value of external public debt per capita. This indicates the extent to which a nation is dependent on foreign loans to the state or guaranteed by the state. Unfortunately, data is not available for 1950 or 1955 on this measure, and indeed there are only 19 cases with data for 1960. This means that the longitudinal analysis must be done with a short time lag.

4A.31 Aid dependence and GNP per capita--all nations

Because of the small number of cases available for 1960 (N=19), the results are presented using this time point for a ten year lag on GNP per capita in 1960 and 1970 and also using the aid dependence measure for 1965 (N=75).

Table 15. Effect of aid dependence on GNP per capita 1960-70--all nations

VARIABLE	MEAN	STANDARD DEVIATION	CASES	UNITS
Aid dependence 1960	$553.47	$488.14	19	US dollars per capita
GNP per capita 1960	$894.16	$557.62	19	"
GNP per capita 1970	$1863.68	$1115.77	19	"

CORRELATION COEFFICIENTS	AID DEP. 1960	GNP PC 1960	GNP PC 1970
Aid dependence 1960	1	.66	.53
GNP per capita 1960	.66	1	.96
GNP per capita 1970	.53	.96	1

Dependent variable: GNP per capita 1970

VARIABLE	B	BETA	STD ERROR B	f
Aid dependence 1960	-.82	-.35	.31	6.6
GNP per capita 1960	2.73	1.17	.32	71.64
(constant)	451.57			

This table shows a rather large and significant negative effect over this ten year period. Unfortunately, only 19 cases in the regression prohibits a lot of faith in this result. Table 16 shows the same thing with more cases and a five year lag.

Table 16. Effect of aid dependence on GNP per capita 1965-70--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Aid dependence 1965	$488.97	$568.91	75
GNP per capita 1965	$510.45	$522.07	75
GNP per capita 1970	$833.20	$900.05	75

CORRELATION COEFFICIENTS	AID DEP. 1965	GNP PC 1965	GNP PC 1970
Aid dependence 1965	1	.59	.54
GNP per capita 1965	.59	1	.98
GNP per capita 1970	.54	.98	1

Dependent variable: GNP per capita 1970

VARIABLE	B	BETA	STD ERROR B	f
Aid dependence 1965	-.08	-.05	.036	5.2
GNP per capita 1965	1.75	1.01	.040	1898.7
(constant)	-21.28			

Table 16, with 75 cases, supports the proposition that aid dependence has a negative effect on GNP per capita growth--even with only a five year lag. The rather high positive correlation between aid dependence and GNP per capita (.59) indicates that there are a number of developed countries that are indebted to foreigners. The relationship for the poorer subsample of nations must be looked at to see if it holds.

4A.32 Aid dependence and GNP per capita--poor nations

The aid dependence data for 1960 cannot be used because only six of the 19 available cases are in the poorer subsample of nations with less than $406 per capita GNP in 1955. Thus the 1965 data must be used, with the short five year lag from 1965 to 1970. These figures are presented in Table 17 which follows.

Table 17. Effect of aid dependence on GNP per capita 1965-70--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Aid dependence 1965	$319.14*	$263.79	54
GNP per capita 1965	$238.14	$165.41	54
GNP per capita 1970	$375.37	$331.77	54

CORRELATION COEFFICIENTS	AID DEP. 1965	GNP PC 1965	GNP PC 1970
Aid dependence 1965	1	.40	.32
GNP per capita 1965	.40	1	.94
GNP per capita 1970	.32	.94	1

Dependent variable: GNP per capita 1970

VARIABLE	B	BETA	STD ERROR B	f
Aid dependence 1965	-.09	-.07	.05	2.25
GNP per capita 1965	1.95	.97	.09	419.49
(constant)	-62.55			

*It should be noted that, although the amount owed is larger than the GNP per capita, external public debt is cumulative debt from the past while GNP is a yearly product.

The result in Table 17 is not large but it is in the direction consistent with the hypothesis of a negative effect of aid dependence on development.

4A.33 Aid dependence and electrical energy consumed per capita--all nations

The researcher did not have data to make a good test of the effects of aid dependence on the consumption of electrical energy per capita. The most recent time point for which data is available on kilowatt hours of electrical energy per capita is 1965, thus in order to have even a five year lag, aid dependence measured in 1960 (for which there are only 19 cases) must be used.

Table 18. Effect of aid dependence on kwh electrical energy per capita 1960-65--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Aid dependence 1960	$553.47	$488.13	19
Log kwh per capita 1960	2.83	.92	19
Log kwh per capita 1965	2.97	.94	19

CORRELATION COEFFICIENTS	AID DEP. 1960	LOG KWH 1960	LOG KWH 1965
Aid dependence 1960	1	.48	.49
Log kwh per capita 1960	.48	1	.99
Log kwh per capita 1965	.49	.99	1

Dependent variable: Log kwh electrical energy per capita 1965

VARIABLE	B	BETA	STD ERROR B	f
Aid dependence 1960	.001	.009	.003	.26
Log kwh per capita 1960	1.00	.993	.018	2825.33
(constant)	.107			

The preceding table shows no effect of aid dependence on energy consumption. The combination of such a short lag and such a small number of cases may be the reason for this. The answer awaits the coding of more appropriate data. Obviously it is not possible to do any longitudinal analysis of the effect of aid dependence on the percentage of the work force not in agriculture because the most recent data available on that variable is 1960.

The evidence shown so far in this chapter demonstrates an apparent overall negative effect of the three dimensions of economic dependence on aggregate economic growth. This does not mean that dependence has no positive effect on growth, but only that, on balance, those nations that are less dependent tend to grow somewhat faster than those that are more dependent. It remains now to see if other possible explanations for this apparent negative effect reduce or eliminate it.

4B. Controlling Additional Variables

It is possible that an apparent causal relationship between two variables actually results from the operation of a third variable which causes both of them. Multiple regression analysis allows us to enter these third variables (provided they can be measured) into the regression equation and thereby to control their effects. An estimate of the original effect is then obtained, which is independent of the operation of the

controlled variable. It is as if the controlled variable were "held constant". (Blalock, 1960; p. 450)

For instance, it is possible that investment dependence is increased by low domestic capital formation and that GNP per capita growth is decreased by it. This would result in a negative relationship between dependence and GNP per capita growth when capital formation is not included in the model. This possible spuriousness can be tested by including a measure of domestic capital formation in the regression equation.

4B.1 Investment dependence on aggregate economic growth controlling for domestic savings

As mentioned above, it has been proposed that a negative relationship between investment dependence and economic development may be explained by the effects of a national economy's ability to generate its own investment capital. Scarcity of local investment capital may cause foreign capital to flow in and also may be related to slow overall economic growth. This assumes that capital formation has a negative effect on investment dependence and a positive effect on economic growth. This possible explanation for the relationship between investment dependence and economic growth is tested in the following six tables which replicate the tables presented in 4A.1 with the addition of domestic capital formation as a percentage of Gross Domestic Product in 1950 (see Chapter 3D.1) as a measure of the ability to generate local savings for investment. See page 101 for a summary of the results presented in this section.

4B.11 Investment dependence on GNP per capita controlling for domestic capital formation--all nations

The first measure of economic development used is Gross National Product per capita. The standard expectation derived from economic theory--investment generates product--leads us to predict that capital formation will have a positive effect on GNP per capita growth. However, based on the same theory we should predict a positive effect of foreign capital investment. Let us see what happens when domestic capital formation is entered into the panel regression equation. Table 19 shows the results on the following page.

Table 19. Effect of investment dependence on GNP per capita controlling for domestic capital formation--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 1950-55	2.45	.73	34
Domestic capital formation/ GDP 1950	16.3%	5.1%	34
GNP per capita 1950	$ 655.29	$ 561.79	34
GNP per capita 1970	$1681.18	$1308.74	34

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	CAPITAL FORMATION	GNP PC 1950	GNP PC 1970
Investment dependence 1950-55	1	.16	.23	.11
Capital formation as percentage of GDP 1950	.16	1	.40	.48
GNP per capita 1950	.23	.40	1	.94
GNP per capita 1970	.11	.48	.94	1

Dependent variable: GNP per capita 1970

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1950-55	-216.8	-.12	97.2	4.97
Capital formation as percentage of GDP 1950	35.9	.14	14.7	5.97
GNP per capita 1950	2.13	.91	.13	243.10
(constant)	229.03			

Table 19 shows that the estimated effect of investment dependence is not reduced to zero or even reduced in size by controlling for capital formation (compare with Table 3). In fact the negative beta in Table 18 is larger than in Table 3 (-.12 and -.07 respectively). This is also true of the unstandardized regression coefficients (B's) and the f ratios. This indicates that the change is not simply a matter of different sample variances, although there are 62 cases in Table 3 and only 34 cases in Table 19 (data on capital formation in 1950 is scarce).

Also note that capital formation does have the predicted positive effect on later GNP per capita. This result points up the interesting difference between two kinds of economic input which have been treated as equivalent by neo-classical economics--foreign and domestic capital. These opposite effects indicate the importance which institutional context and associated control relations have for any "purely economic" input.

It is also interesting to note that the size of the betas for capital formation and investment dependence are similar, albeit in different directions. This is some indication of the relative importance of investment dependence as a cause of economic growth. Unfortunately the unstandardized regression coefficients cannot be compared because investment dependence is measured in a logarithmic scale which does not lend itself to interpretation in terms similar to that of capital

formation as a percentage of GDP. Capital formation, however, has an estimated effect such that an increase in one percentage point is associated with an increase of $35.90 in GNP per capita over a 20 year period.

4B.12 Investment dependence on GNP per capita controlling for capital formation--poor nations

This table has only 15 cases due to the combination of using capital formation data and restricting the sample to those nations with less than $406 per capita GNP in 1955.

Table 20. Effect of investment dependence on GNP per capita controlling for domestic capital formation--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Investment dependence 1950-55	2.29	.65	15
Capital formation 1950	13.2%	4.6%	15
GNP per capita 1950	$188.33	$ 78.45	15
GNP per capita 1970	$505.33	$430.53	15

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	CAPITAL FORMATION	GNP PC 1950	GNP PC 1970
Investment dependence 1950-55	1	-.08	.30	-.19
Capital formation as percentage of GDP 1950	-.08	1	.17	.39
GNP per capita 1950	.30	.17	1	.54
GNP per capita 1970	-.19	.39	.54	1

Dependent variable: GNP per capita 1970

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1950-55	-235.75	-.35	149.11	2.5
Capital formation 1950	24.23	.25	20.42	1.4
GNP per capita 1950	3.33	.60	1.25	7.1
(constant)	98.13			

The small number of cases (15) in this table makes it difficult to have much faith in it. Nevertheless, the effect of investment dependence is not reduced and indeed is larger (in the negative direction) than is the effect of capital formation (in the positive direction). Also the unstandardized regression coefficient estimating the effect of investment dependence is larger in Table 20 than in Table 4 (-235.7 and -165.3 respectively). This would seem to go against the hypothesis of a spurious estimate due to capital formation. It should be noted that neither estimate is statistically reliable with this small number of cases.

4B.13 Investment dependence on kilowatt hours of electrical energy consumed per capita controlling for capital formation--all nations

Now the negative effect of investment dependence on the consumption of electrical energy is examined to see if it is reduced or eliminated by the inclusion of the measure of domestic savings. Perhaps growth in energy consumption appears to be retarded by investment dependence because of the effects of domestic capital formation.

Table 21. Effect of investment dependence on kilowatt hours of electrical energy consumed per capita controlling for domestic capital formation--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 1950-55	2.47	.72	31
Domestic capital formation as percentage of GDP 1950	16.4%	5.2%	31
Log kwh electricity per capita 1950	2.55	.71	31
Log kwh electricity per capita 1965	3.04	.61	31

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	CAPITAL FORMATION	LOG KWH 1950	LOG KWH 1965
Investment dependence 1950-55	1	.09	.12	.09
Domestic capital formation as percentage of GDP 1950	.09	1	.56	.65
Log kwh per capita 1950	.12	.56	1	.97
Log kwh per capita 1965	.09	.65	.97	1

Dependent variable: kwh electricity per capita (log) in 1965

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1950-55	-.023	-.03	.031	.58
Domestic capital formation 1950	.018	.15	.005	12.55
Log kwh per capita 1950	.76	.88	.038	401.16
(constant)	.83			

In this regression the estimated effect of investment dependence is small and not statistically significant when capital formation is included in the equation. This was also

the case when capital formation was not included however (see Table 5 in 4A.13). Again, domestic capital formation has its expected positive effect on this measure of economic modernization.

4B.14 Investment dependence on kilowatt hours of electricity consumed per capita controlling domestic capital formation--poor nations

Although no negative effect of investment dependence on electrical energy consumption was found when the whole sample of nations was included in the regression, there was a significant negative effect when the same equation was estimated using only the poor subsample of nations. Unfortunately only a very few cases in the poor subsample have data on all four variables which are included when we control for capital formation. Nevertheless, the results of that regression are presented in Table 22.

Table 22. Effect of investment dependence on kilowatt hours of electricity consumed per capita controlling for domestic capital formation--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Investment dependence 1950-55	2.31	.57	13
Domestic capital formation as percentage of GDP 1950	13.1%	4.6%	13
Log kwh electricity per capita 1950	1.89	.47	13
Log kwh electricity per capita 1965	2.44	.40	13

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	CAPITAL FORMATION	LOG KWH 1950	LOG KWH 1965
Investment dependence 1950-55	1	-.34	-.25	-.40
Domestic capital formation 1950	-.34	1	.24	.55
Log kwh per capita 1950	-.25	.24	1	.90
Log kwh per capita 1965	-.40	.55	.90	1

Dependent variable: kwh electricity per capita (log) in 1965

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1950-55	-.063	-.09	.065	.93
Domestic capital formation 1950	.028	.32	.007	12.27
Log kwh per capita 1950	.68	.79	.07	78.68
(constant)	.93			

Due to the large standard error of the unstandardized regression coefficient this negative estimate is not statistically significant although the beta in this equation is only a little

smaller than when domestic capital formation is not included (-.09 and -.12 respectively). (See Table 6 in 4A.14). With only 13 cases it is difficult to conclude whether or not capital formation causes a spurious relationship to appear between investment dependence and electrical energy consumption.

4B.15 Investment dependence on the percentage of the male labor force not in agriculture controlling for capital formation--all nations

The last indicator of aggregate economic development in the percentage of the male labor force not employed in agriculture. It will be recalled that this dependent variable is only available for panel regression analysis for the years 1950 and 1960. The effect of investment dependence on this measure is subjected to the possibility that domestic capital formation is the real cause of the apparent negative effect.

Table 23. Effect of investment dependence on the percentage of the male labor force not in agriculture controlling for capital formation--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 50-55	2.45	.73	34
Capital formation 1950	16.3%	5.1%	34
Percentage of labor not in agriculture 1950	58.8%	22.0%	34
Percentage of labor not in agriculture 1960	64.8%	22.7%	34

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	CAPITAL FORMATION	% NOT IN AGRIC'50	% NOT IN AGRIC'60
Log investment dependence 1950-55	1	.16	.26	.22
Capital formation 1950	.16	1	.48	.53
Percentage of labor not in agriculture 1950	.26	.22	1	.98
Percentage of labor not in agriculture 1960	.22	.53	.98	1

Dependent variable: Percentage labor not in agriculture 1960

VARIABLE	B	BETA	STD ERROR B	f
Log investment dependence 1950-55	-1.33	-.04	.96	1.9
Capital formation 1950	.31	.07	.15	4.3
Percentage labor not in agriculture 1950	.98	.96	.03	750.5
(constant)	-3.5			

This table shows that there is a small negative estimate of the effect of investment dependence on the percentage of the work force not in agriculture when capital formation is

controlled but that it is not statistically significant. It is, however, larger and closer to significance than when capital formation is not controlled. (Beta = -.04; f = 1.9 vs. Beta = -.01; f = .3) (See Table 7 in 4A.15.) Both the standardized and the unstandardized regression coefficients are larger in Table 23 indicating that the difference is not simply due to a change in sample variance accompanying the reduction in the number of cases in the regression.

The higher means of the percentage of the work force not in agriculture in Table 23 (compared to Table 7) show that the cases which have data on capital formation tend to be relatively more developed than those which do not. Why this should raise the estimate of investment dependence is not known. It is possible to check if this increase is due to the change in sample or the addition of the control variable by estimating the equation without the control variable for just this sample.

When this is done the result is the same as in Table 23, indicating that the larger estimate is indeed due to the change in sample rather than the addition of the control variable. Table 23a which follows shows this.

Table 23a. Effect of investment dependence on the percentage of the work force not in agriculture for the cases available when controlling for capital formation--all nations

VARIABLE	B	BETA	STANDARD ERROR B	f
Investment dependence 1950-55	-1.25	-.04	1.00	1.55
Percentage labor not in agriculture 1950	1.02	.99	.03	932.4
(constant)	-9.9			

It is possible that the negative effects of investment dependence are larger for the middle income countries (contrary to the argument made by Cardoso explained in Chapter 1). Nevertheless, the addition of capital formation to the equation does not decrease the estimate of the effect of investment dependence. Instead this estimate is increased in statistical significance because the standard error is reduced. (Compare Table 23a to Table 23.)

4B.16 Investment dependence on the percentage of labor not in agriculture controlling for capital formation--poor nations

Only 15 of the cases in the poor subsample have data on the variables in the equation.

Table 24. Effect of investment dependence on the percentage of labor not in agriculture controlling for capital formation--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Investment dependence 1950-55	2.29	.65	15
Capital formation 1950	13.2%	4.6%	15
Percentage labor not in agriculture 1950	38%	13%	15
Percentage labor not in agriculture 1960	43%	14%	15

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	CAPITAL FORMATION	% NOT IN AGRIC'50	% NOT IN AGRIC'60
Investment dependence 1950-55	1	-.08	.44	.28
Capital formation 1950	-.08	1	.06	.25
Percentage labor not in agriculture 1950	.44	.06	1	.95
Percentage labor not in agriculture 1960	.28	.25	.95	1

Dependent variable: Percentage labor not in agriculture 1960

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1950-55	- 3.19	-.15	1.54	4.2
Capital formation 1950	.53	.18	.19	7.5
Percentage labor not in agriculture 1950	1.1	1.0	.07	187.4
(constant)	-10.8			

Again, with only 15 cases it is impossible to make a conclusive inference, but this table shows a larger estimated effect of investment dependence on economic development than

when capital formation is not controlled. (Compare with Table 8 in 4A.16.) Also, the beta coefficients for capital formation and investment dependence are about the same size, although in opposite directions.

The increase in the size of the dependence estimate is not due to adding capital formation, however, but is due to the change in sample which results from including this variable. This is shown in Table 24a below, which presents the estimate for the same cases without including capital formation in the equation. Again, adding capital formation does not reduce the size of the dependence effect and raises its statistical significance.

Table 24a. Effect of investment dependence on the percentage of work force not in agriculture for the cases available when controlling for capital formation--poor nations

VARIABLE	B	BETA	STANDARD ERROR B	f
Investment dependence 1950-55	- 3.71	-.17	1.90	3.8
Percentage labor not in agriculture 1950	1.11	1.02	.09	128.4
(constant)	-20.56			

In conclusion, it appears that the estimated effect of investment dependence on measures of aggregate economic growth is not produced spuriously due to variation in domestic capital formation. In five out of the six

replications which added capital formation as a control variable the resulting estimate was as large or larger than before the control variable was included. Only in the equation estimating the effect on electricity consumption per capita for the poor subsample did the control result in a smaller estimate of the dependence effect.

It seems reasonable to conclude that the negative effect of investment dependence on economic development cannot be attributed to the effects of domestic capital formation.

4B.2 Scarce mineral resources and the effects of investment dependence

It is well known that one of the main reasons why the capitalist centers penetrated and colonized Africa, Asia and Latin America was in order to obtain raw materials. Areas that remained independent did so, for the most part, because there were no raw material resources to exploit. (Von der Mehden, 1964). It is likely that this cause of penetration persisted into the 20 year period under study. The existence of scarce mineral resources in a country increases the likelihood that it will be penetrated by foreign investment. At the same time these valuable resources may have a positive effect on the country's economic growth. Therefore it is necessary to measure and control

this variable in order to obtain a correct estimate of the effect of investment dependence on economic growth.

The extent to which a national economy specializes in the production of valuable mineral raw materials such as crude petroleum, copper, bauxite, etc., is indicated by the percentage of the Gross Domestic Product produced in the mining sector. The following six tables replicate the tables in 4A.1 controlling for this variable. (See 3D.2 for a detailed description of this measure.) For a summary of the tables in this section, turn to page 113.

4B.21 Investment dependence on GNP per capita controlling for the percentage of GDP in mining--all nations

Just as in the previous section the addition of another independent variable reduces the number of cases on which data is available for the regression. This is less of a problem with the percentage of GDP in mining, however. Table 25 has 46 cases, and the smallest number of cases in the following tables in this section is 26.

Table 25. Effect of investment dependence on GNP per capita controlling for the percentage of GDP in mining--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 1950-55	2.27	.80	46
Percentage of GDP in mining 1955	4.0%	8.4%	46
GNP per capita 1950	$ 480.1	$ 521.2	46
GNP per capita 1970	$1212.4	$1272.4	46

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	PERCENTAGE MINING	GNP PC 1950	GNP PC 1970
Investment dependence 1950-55	1	.41	.31	.22
Percentage of GDP in mining 1955	.41	1	-.05	-.07
GNP per capita 1950	.31	-.05	1	.94
GNP per capita 1970	.22	-.07	.94	1

Dependent variable: GNP per capita 1970

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1950-55	-135.17	-.08	92.55	2.13
Percentage of GDP in mining 1955	1.61	.01	8.31	.04
GNP per capita 1950	2.37	.97	.13	334.48
(constant)	373.38			

This table shows that, when the whole sample of nations is used in the regression, investment dependence is positively correlated with the percentage of GDP in mining and the effect

of investment dependence is not markedly changed by the addition of this variable to the equation. Compared with Table 3 in 4A.11, the B and the beta are a little larger but the f ratio significance test is somewhat smaller due to the larger standard error of B. (Table 3: B = -114.22, beta = -.07, standard error B = 66.88, f = 2.91)

Also notice that the control variable does not appear to have an effect on economic growth in this regression. This is inconsistent with the results shown below in which specialization in mining is shown to have a positive effect on growth.

4B.22 Investment dependence on GNP per capita controlling for the percentage of GDP in mining--poor nations

Table 26, which follows, shows the figures for this equation.

Table 26. Effect of investment dependence on GNP per capita controlling for the percentage of GDP in mining--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 1950-55	2.08	.72	29
Percentage of GDP in mining 1955	3.8%	9.3%	29
GNP per capita 1950	$ 164.1	$ 81.2	29
GNP per capita 1970	$ 411.7	$374.9	29

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	PERCENTAGE MINING	GNP PC 1950	GNP PC 1970
Log investment dependence 1950-55	1	.47	.51	.07
Percentage of GDP in mining 1955	.47	1	.08	.04
GNP per capita 1950	.51	.08	1	.68
GNP per capita 1970	.07	.04	.68	1

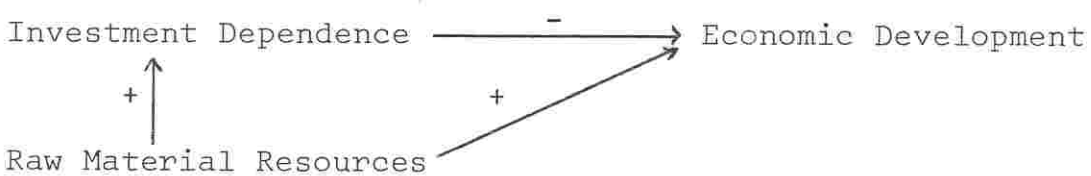
Dependent variable: GNP per capita 1970

VARIABLE	B	BETA	STD ERROR B	f
Log investment dependence 1950-55	-262.15	-.50	90.18	8.45
Percentage of GDP in mining 1955	8.53	.21	5.96	2.05
GNP per capita 1950	4.25	.92	.70	36.52
(constant)	226.6			

Comparing poor dependent countries to other poor countries (the poor subsample) reveals a major change due to controlling the extent to which a nation is specialized in the production

of raw mineral resources. Compared with Table 4 in 4A.12, the effect of investment dependence is much larger and more significant. This is consistent with the idea that the presence of mineral resources causes foreign investment to flow in to poor nations and also increases economic production. The following model illustrates these relationships.

Figure 2. Causal relationships between investment dependence, raw material resources and economic development



Thus when this variable is included in the regression equation the estimate of the negative effect of investment dependence increases because the positive effects of raw material resources are controlled.

It has also been suggested that there may be some interaction between investment dependence and raw material resources such that dependence may have positive effects on growth in, for instance, countries that have huge deposits of petroleum. This would assume that economic production expands more in these cases when the production is in the hands of foreign concerns. If this is true investment dependence should have a positive effect on economic growth among these countries and a negative effect in less oil-endowed countries. In order to

test this hypothesis the oil-rich countries are separated from the rest of the sample and the regression is run for each group: oil and non-oil. This is done in the next section.

4B.23 Investment dependence on kilowatt hours of electricity consumed per capita controlling for the percentage of GDP in mining--all nations

Table 27. Effect of investment dependence on kwh electricity consumed per capita controlling for the percentage of GDP in mining--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 1950-55	2.28	.79	43
Percentage of GDP in mining 1955	3.6%	7.7%	43
Log kwh electricity per capita 1950	2.13	.89	43
Log kwh electricity per capita 1965	2.69	.75	43

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	PERCENTAGE MINING	LOG KWH 1950	LOG KWH 1965
Investment dependence 1950-55	1	.38	.33	.31
Percentage GDP in mining 1955	.38	1	.00	.07
Log kwh electricity per capita 1950	.33	.00	1	.97
Log kwh electricity per capita 1965	.31	.07	.97	1

Dependent variable: Log kwh electricity per capita 1965

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1950-55	-.05	-.05	.03	2.2
Percentage GDP in mining 1955	.008	.08	.003	6.8
Log kwh electricity 1950	.83	.99	.03	914.7
(constant)	.98			

Comparing Table 27 with Table 5, it can be seen that what was a zero estimate for the effect of investment dependence becomes a nearly significant negative effect with mineral resources controlled. Furthermore the percentage of GDP in mining itself has a significant positive effect on the expansion of electricity consumption. This is again consistent with the causal model presented on page 107.

4B.24 Investment dependence on kilowatt hours of electricity consumed per capita controlling for the percentage of GDP in mining--poor nations

Table 28 presents the statistical figures for this section, on the following page.

Table 28. Effect of investment dependence on kwh electricity consumed per capita controlling for the percentage of GDP in mining--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 1950-55	2.08	.69	26
Percentage of GDP in mining 1955	3.0%	8.1%	26
Log kwh electricity per capita 1950	1.58	.64	26
Log kwh electricity per capita 1965	2.20	.50	26

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	PERCENTAGE MINING	LOG KWH 1950	LOG KWH 1965
Log investment dependence 1950-55	1	.38	.26	.12
Percentage of GDP in mining 1955	.38	1	.03	.11
Log kwh electricity per capita 1950	.26	.03	1	.94
Log kwh electricity per capita 1965	.12	.11	.94	1

Dependent variable: Log kwh electricity per capita 1965

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1950-55	-.14	-.19	.04	10.9
Percentage GDP in mining 1955	.009	.15	.003	7.3
Log kwh electricity per capita 1950	.78	.99	.04	325.3
(constant)	1.22			

The estimates in this table are larger and more significant than in either the previous table including the whole sample or the comparable table in Section 4A.14 (Table 6), which uses only the poor subsample but without including the percentage of GDP

in mining. Again, this is consistent with the model on page 107.

4B.25 Investment dependence on the percentage of the work force not in agriculture controlling for the percentage of GDP in mining--all nations

Table 29. Effect of investment dependence on percentage labor not in agriculture controlling for percentage GDP in mining--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 1950-55	2.27	.80	46
Percentage GDP in mining 1955	2.0%	8.4%	46
Percentage not in agriculture 1950	50%	24%	46
Percentage not in agriculture 1960	55%	25%	46

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	PERCENTAGE MINING	% NOT IN AGRIC'50	% NOT IN AGRIC'60
Log investment dependence 1950-55	1	.41	.37	.36
Percentage GDP in mining 1955	.41	1	.12	.13
Percentage not in agriculture '50	.37	.12	1	.98
Percentage not in agriculture '60	.36	.13	.98	1

Dependent variable: Percentage male labor not in agriculture 1960

VARIABLE	B	BETA	STD ERROR B	f
Log investment dependence 1950-55	- .52	- .02	.80	.43
Percentage GDP in mining 1955	.034	.01	.071	.23
Percentage not in agriculture '50	1.03	.99	.02	1725.97
(constant)	-8.24			

Just as in the original regression in 4A.15, this table reveals no significant estimate of the effects of investment dependence on the percentage of the work force not in agriculture. Likewise, the estimate of the effect of mineral resources production is near zero.

4B.26 Investment dependence on the percentage of the work force not in agriculture controlling for the percentage of GDP in mining--poor nations

Table 30. Effect of investment dependence on percentage labor not in agriculture controlling for percentage GDP in mining--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 1950-55	2.07	.71	29
Percentage GDP in mining 1955	3.8%	9.2%	29
Percentage labor not in agriculture '50	35%	14%	29
Percentage labor not in agriculture '60	40%	15%	29

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	PERCENTAGE MINING	% NOT IN AGRIC'50	% NOT IN AGRIC'60
Investment dependence 1950-55	1	.47	.45	.37
Percentage GDP in mining 1955	.47	1	.39	.37
Percentage labor not in agric. '50	.45	.39	1	.97
Percentage labor not in agric. '60	.37	.37	.97	1

Dependent variable: Percentage male labor not in agriculture 1960

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1950-55	- 2.18	-.10	1.05	4.2
Percentage GDP in mining 1955	.054	.03	.078	.5
Percentage labor not in agric. '50	1.06	1.0	.05	446.2
(constant)	-13.0			

In the preceding table, the estimate of the effect of investment dependence is significant and larger than in the comparable Table 8 in 4A.16. Thus, controlling for the effects of mineral resources reveals that investment dependence has a negative effect on the transition from a predominantly agricultural labor force among poor nations.

In summing up this section, it seems clear that there is an important interrelationship between investment dependence, specialization in the production of valuable mineral resources, and economic growth. In the six tables presented, the cross-sectional correlation between investment dependence and the percentage of GDP in mining varies from .38 to .47. This is some evidence in support of the proposition that the presence of mineral resources makes it more likely that a nation (especially a less developed nation) will be penetrated by foreign capital.

It is also likely to be the case that the presence of valuable mineral resources has positive effects on economic growth. Thus the coefficient estimating this effect is positive in all six tables and is statistically significant in three of them.

The most obvious conclusion to be drawn from the preceding tables is that controlling the effects of the percentage of GDP in mining increases the negative effect of investment dependence on economic growth. This occurs in all of the tables and the difference is considerable in four of them. This pattern of

results supports the proposed model on page 107 in which mineral resources have a positive effect on investment dependence and economic growth and investment dependence has a negative effect on economic growth.

4B.3 Interaction between mineral resources and investment dependence effects on economic development

In the last section it was shown that controlling for the extent to which a nation is specialized in mining raises the estimated negative effects of investment dependence on economic growth. This is because the existence of mineral resources in a country tends to draw foreign investment and also has positive effects on later development. Thus, controlling for specialization in mining removes the effects of these resources which were spuriously assigned to the dependence variable before.

It has also been argued that investment dependence may have positive effects on growth in countries that are blessed with extensive mineral resources. These resources are more profitable by far than resources such as land, labor, etc., that are available in other countries and may be peculiarly benefitted by any kind of investment. It is possible to test for an interaction effect between dependence and mineral resources by separating our sample of countries into those which have abundant mineral resources and those which do not, and estimating the effect of dependence separately for the

two groups. If the hypothesis of interaction is true, the effect should be positive for the mineral-rich and more negative for the mineral-poor than when the regression is done on the whole sample.

Of the countries with data on investment dependence, eight have great mineral resources: Bolivia (tin), Chile (copper), Indonesia (oil), Iran (oil), Iraq (oil), Surinam (bauxite), Venezuela (oil), and South Africa (gold). The following tables estimate the effect of investment dependence for these eight and for the remaining countries with data available. The first table shows the results for the sample of both rich and poor nations with the above eight selected out.

Table 31. Effect of investment dependence on GNP per capita without mineral-rich countries--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 1950-55	2.17	.77	54
GNP per capita 1950	$ 488	$ 506	54
GNP per capita 1970	$1244	$1244	54

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	GNP PC 1950	GNP PC 1970
Log investment dependence 1950-55	1	.41	.33
GNP per capita 1950	.41	1	.94
GNP per capita 1970	.33	.94	1

Dependent variable: GNP per capita 1970

VARIABLE	B	BETA	STD ERROR B	f
Log investment dependence 1950-55	-111.8	-.07	81.0	1.9
GNP per capita 1950	2.38	.97	.12	374.9
(constant)	319.8			

This table is not different from Table 3 in section 4A.1. This would seem to indicate that there is not important interaction between dependence and mineral resources. However, when the mineral-rich cases are removed from the poor subsample, a different result is obtained (see Table 32, below). This may mean that the interaction effect is hidden when affluent countries are in the regression because of their ability to generate their own investment capital.

Table 32. Effect of investment dependence on GNP per capita without mineral-rich countries--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 1950-55	1.95	.72	32
GNP per capita 1950	$159	$ 76	32
GNP per capita 1970	$401	$358	32

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	GNP PC 1950	GNP PC 1970
Log investment dependence 1950-55	1	.62	.11
GNP per capita 1950	.62	1	.67
GNP per capita 1970	.11	.67	1

Dependent variable: GNP per capita 1970

VARIABLE	B	BETA	STD ERROR B	f
Log investment dependence 1950-55	-245.2	-.49	74.3	10.8
GNP per capita 1950	4.6	.98	.69	43.3
(constant)	141.3			

In comparison with Table 4 in section 4A.1, this table reveals an even greater negative effect of investment dependence when the mineral-rich countries are not included. Notice that

there are only six fewer cases in this table than in Table 4. This is because South Africa and Venezuela are not in the poor subsample because their GNP per capita in 1955 was greater than $406. This result supports the contention that there is an interaction between investment dependence and mineral resources. Some further indication that this is true is contained in the next table, which estimates the effect of investment dependence on economic growth for the eight mineral-rich countries.

Table 33. Effect of investment dependence on GNP per capita in mineral-rich countries

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 1950-55	2.8	.68	8
GNP per capita 1950	$240	$152	8
GNP per capita 1970	$493	$309	8

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	GNP PC 1950	GNP PC 1970
Log investment dependence 1950-55	1	.68	.81
GNP per capita 1950	.68	1	.97
GNP per capita 1970	.81	.97	1

Dependent variable: GNP per capita 1970

VARIABLE	B	BETA	STD ERROR B	f
Log investment dependence 1950-55	125.4	.28	37.0	11.5
GNP per capita 1950	1.58	.78	.16	91.6
(constant)	-245.0			

The preceding table has such a small number of cases that it is difficult to take seriously as evidence. Yet the estimated effect of investment dependence is so large and positive (and significant at the .05 level) that it does provide some indication that, during the period studied, the influx of foreign capital with its accompanying technology and marketing connections increased the growth of those nations with great mineral resources.

4C. Dependence Effects on Product Per Capita in Economic Sectors

The determination of the existence of an overall negative effect of dependence on economic growth leads to the following questions:

1. By what mechanisms does this effect operate?
2. What sectors of a national economy are most and least affected?
3. Is the overall negative effect not a combination of some positive and some larger negative effects?

It is not possible to definitively answer some of the most interesting of these questions because data is not available which is adequate to the task. For instance, it may be that certain kinds of foreign investment have positive effects while other kinds have negative effects. If data on the type of investment were available for a suitable number of countries this could be determined by a comparative research design. It may also be that

investment dependence has different effects on different sectors of a national economy. This question is more amenable to comparative research because data on sectoral production does exist for a large number of countries.

Sectoral production per capita has been gathered for two points in time, 1955 and 1965, as described in section 3C. This data is used in the following section to determine the effects of economic dependence over this ten-year time period. The sectors which are used are agriculture, mining and manufacturing. For each national economy the value in United States dollars of the product in each sector is divided by the total national population to give the sectoral product per capita. This is then used as the dependent variable. Total Gross National Product per capita is the sum of these sectoral products plus the remaining sectors and unclassifiable economic activities. The analysis of the sectors separately may reveal that the overall effects on GNP are the result of different combined effects on the sectors.

4C.1 Investment dependence on sectoral product per capita

In the case of investment dependence, foreign investment would be expected to have positive effects on the production of the immediate enterprise in which capital is invested.

Likewise, economic sectors which receive a great deal of foreign capital may be positively affected. If this is so we would expect the negative effects of investment dependence to operate on the sectors in which direct investment does not take place. This has been suggested by Frank (1969) in his study of Latin American underdevelopment and also by some of the literature on economic dualism in dependent countries. (Singer, 1971) A summary of the results in this section is presented on page .

4C.11 Investment dependence on growth in the agricultural sector--all nations

Ideally, a distinction should be made between export agriculture, which is often heavily penetrated by foreign capital, and domestic agriculture. This is impossible with the data at hand, however. Table 34 presents the results of regressing agricultural product per capita (both export and domestic) on investment dependence. It should be kept in mind that the time lag is shorter than that used in section 4A.1 (10 vs. 20 years) and thus the effects are not likely to be as large.

Table 34. Effect of investment dependence on sectoral product per capita in agriculture--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 1950-55	2.27	.79	54
Agriculture per capita 1955	$92.84	$60.31	54
Agriculture per capita 1965	$90.32	$51.41	54

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	AGRIC PC 1955	AGRIC PC 1965
Log investment dependence 1950-55	1	.39	.33
Agriculture per capita 1955	.39	1	.95
Agriculture per capita 1965	.33	.95	1

Dependent variable: Product per capita in agriculture 1965

VARIABLE	B	BETA	STD ERROR B	f
Log investment dependence 1950-55	-2.9	-.05	3.0	.96
Agriculture per capita 1955	.82	.96	.04	423
(constant)	20.50			

Several interesting things are revealed in this table. The mean per capita product in agriculture, unlike all other indicators of economic growth used thus far, does not increase over the ten year period and, indeed, decreases slightly.

The estimated effect of investment dependence is negative but not statistically significant for the whole sample of nations. Let us examine results of this same equation for the poorer countries only.

4C.12 Investment dependence on growth in the agricultural sector--poor countries

Excepting the United States and the Soviet Union, the main exporters of agricultural goods are the underdeveloped nations. Since in the past foreign capital has been invested in plantation agriculture, it might be expected that investment dependence would have a positive effect on this sector when only the poor subsample is included in the regression.

Table 35. Effect of investment dependence on sectoral product per capita in agriculture--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 1950-55	2.07	.73	32
Agriculture per capita 1955	$67.37	$37.51	32
Agriculture per capita 1965	$69.41	$31.47	32

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	AGRIC PC 1955	AGRIC PC 1965
Log investment dependence 1950-55	1	.45	.35
Agriculture per capita 1955	.45	1	.85
Agriculture per capita 1965	.35	.85	1

Dependent variable: Product per capita in agriculture 1965

VARIABLE	B	BETA	STD ERROR B	f
Log investment dependence 1950-55	-2.0	-.05	4.5	.19
Agriculture per capita 1955	.73	.87	.09	65.75
(constant)	24.09			

As mentioned above, the mean of product per capita in agriculture goes up slightly for the poor countries. Also notice that the correlation between investment dependence and agricultural product per capita is higher for the poor nations than for the whole sample. This is due to colonial and neo-colonial plantation agriculture. The estimated effect of investment dependence over the period studied is negative, although the coefficient is not statistically significant. This is due to the rather large standard error. This supports Beckford's (1972) contention that the long-run effect of trans-national corporations in plantation economies retards development.

4C.13 Investment dependence on growth in the mining sector--all nations

It has been shown in section 4B.2 that controlling for the effects of specialization in the production of scarce mineral resources increases the estimate of the negative effect of investment dependence on aggregate economic growth. This is thought to occur because the presence of scarce minerals, which are needed by advanced countries for industrial production, tends to increase the likelihood that a poorer nation will be investment dependent, and has positive effects on economic growth.

The proposition that investment dependence has an effect on the per capita production of mineral raw materials

is tested in this section. This is a slightly different proposition from the one contained in the explanation of the results found in 4B.2 in that the direction of causality is reversed. It was supposed that mineral resources resulted in investment dependence. Now we are asking whether investment dependence causes growth in the production of mineral raw materials. The panel regression design allows a separate estimate of these reciprocal effects.

Table 36. Effect of investment dependence on sectoral product per capita in mining--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 1950-55	2.27	.81	44
Mining per capita 1955	$28.66	$71.20	44
Mining per capita 1965	$27.46	$57.82	44

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	MINING PC 1955	MINING PC 1965
Log investment dependence 1950-55	1	.35	.45
Mining per capita 1955	.35	1	.96
Mining per capita 1965	.45	.96	1

Dependent variable: Product per capita in mining 1965

VARIABLE	B	BETA	STD ERROR B	f
Log investment dependence 1950-55	8.5	.12	2.7	9.6
Mining per capita 1955	.74	.92	.03	551.9
(constant)	-13.53			

Table 36 shows investment dependence to have a relatively large significant positive effect on per capita product in mining. This effect is not surprising in light of the strategic interest which advanced nations have in obtaining mineral raw materials. The result shown in Table 33 means that, given a certain level of production in the mining sector, a nation is more likely to increase production if it is penetrated by foreign capital. The neo-classical economists would explain this finding by saying that capital is capital and an input of capital will increase production. We have shown that this is not the case for aggregate GNP growth and for other measures of economic development. So why should it be true in the case of the mining sector? One possibility is that mining and petroleum production is a highly technology-intensive business and requires the participation of multinational corporations based in the advanced countries in order to grow. Another possibility is that the international distribution network for mineral raw materials is controlled by the political policies of the advanced nations and the economic activity of their multinational corporations and thus it is difficult for an independent mineral producer to grow in this situation.

It is also possible that the mining sector receives foreign capital investment most directly and thus benefits directly from this capital. A fully adequate empirical

test of these different explanations for the preceding result would require more detailed data, but some light can be shed on the probable intervening mechanism with the data at hand. The discussion will be continued in light of the following tables.

4C.14 Investment dependence on growth in the mining sector--poor nations

Table 37. Effect of investment dependence on growth in the mining sector--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 1950-55	2.08	.72	28
Mining per capita 1955	$21.36	$82.12	28
Mining per capita 1965	$18.90	$58.88	28

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	MINING PC 1955	MINING PC 1965
Log investment dependence 1950-55	1	.36	.41
Mining per capita 1955	.36	1	.99
Mining per capita 1965	.41	.99	1

Dependent variable: Product per capita in mining 1965

VARIABLE	B	BETA	STD ERROR B	f
Log investment dependence 1950-55	5.1	.06	2.1	5.6
Mining per capita 1955	.69	.96	.01	1278
(constant)	-6.69			

Although the estimated effect for the poor subsample is positive and significant, it is not as large as that found for the whole sample of nations. This confirms the previous result and also suggests that the intervening mechanisms by which it operates are not uniquely linked with peripheral location. In other words, the effect must be as strong or stronger among richer nations as among the poorer. Unfortunately this does not distinguish in a strong way between any of the intervening mechanisms suggested in the previous section. Developed as well as undeveloped mineral producers are at the mercy of multinational companies that control distribution networks and the largest nation-states that stockpile minerals and practice "dumping" in order to discourage price rises on the world market. (Likewise, poor nations may be just as able to practice "combination" with other mineral producers in order to influence the world market although these commodity cartels were not operative in the period under study.) Richer countries may be less dependent on outside inputs of advanced technology, however. Since the above finding shows that the effect is as large or larger for rich countries this suggests that technological dependence is not the explanation.

4C.15 Investment dependence on growth in the manufacturing sector--all nations

In his study of the causes of underdevelopment, Baran stressed the way in which location in a peripheral position in the world economy prevented the emergence of a national bourgeoisie and thus retarded the growth of industrial production.

Even though we do not have data adequate to the task of measuring the independence or orientation of national ruling classes, the effect of investment dependence on the growth of production in manufacturing can be examined. The following equation estimates this effect for the whole sample of nations.

Table 38. Effect of investment dependence on growth in the manufacturing sector--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 1950-55	2.27	.79	54
Mfg. per capita 1955	$142.39	$175.28	54
Mfg. per capita 1965	$196.85	$229.40	54

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	MFG PC 1955	MFG PC 1965
Log investment dependence 1950-55	1	.22	.18
Mfg. per capita 1955	.22	1	.98
Mfg. per capita 1965	.18	.98	1

Dependent variable: Product per capita in manufacturing 1965

VARIABLE	B	BETA	STD ERROR B	f
Log investment dependence 1950-55	-8.0	-.03	7.7	1.07
Mfg. per capita 1955	1.29	.98	.03	1370.2
(constant)	30.86			

This table reveals that the mean product per capita in manufacturing is much higher than the other two sectors examined in this section. Also the cross-sectional correlation between investment dependence and this measure of economic production is lower than any of the other development measures examined. The estimated effect of investment dependence for the ten year period is negative but not statistically significant.

4C.16 Effect of investment dependence on growth in the manufacturing sector--poor nations

Let us examine the same equation for the poor subsample, on the following page.

Table 39. Effect of investment dependence on growth in the manufacturing sector--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Log investment dependence 1950-55	2.07	.73	32
Mfg. per capita 1955	$35.05	$33.44	32
Mfg. per capita 1965	$52.20	$49.24	32

CORRELATION COEFFICIENTS	INVESTMENT DEPENDENCE	MFG PC 1955	MFG PC 1965
Log investment dependence 1950-55	1	.32	.12
Mfg. per capita 1955	.32	1	.83
Mfg. per capita 1965	.12	.83	1

Dependent variable: Product per capita in manufacturing 1965

VARIABLE	B	BETA	STD ERROR B	f
Log investment dependence 1950-55	-11.1	-.17	6.8	2.6
Mfg. per capita 1955	1.31	.89	.15	74.5
(constant)	29.20			

This table demonstrates a large negative effect of investment dependence on product per capita in manufacturing. Indeed, the unstandardized regression coefficient is larger

than in any of the other regressions in this section (4C.).

When the effects of investment dependence on growth in agriculture, mining and manufacturing are examined, the estimated effects are seen to be consistently negative on agriculture and manufacturing, but they are positive and large on mining. Only the effects on mining were statistically significant. This may be due to the short ten year time lag.

Baran's (1957) most general proposition is supported although the mechanism he suggested, class distortion, is not directly confirmed. There are several other possible explanations for this effect. These will be discussed in terms of the previous results.

If gains in mining were due to the input of modern technology accompanying investment from the advanced nations then this may also have a positive effect on the manufacturing sector, if it is equally technology-intensive. Much production in manufacturing which takes place in peripheral countries employs little advanced technology. But the most growth-prone industries are technology-intensive, and so, if technology dependence is an important intervening variable, then there should be a positive effect on growth in manufacturing. This is not the case, however.

Baran's hypothesis of class distortion is consistent with the positive effect on mining and the negative effect on manufacturing. Baran argued that economic interests of

the national ruling class in a dependent country would be tied to export markets, the composition of which would be chiefly determined by the needs of the advanced capitalist nations. A national industrial bourgeoisie would not develop because the state would be controlled by these exporters of raw materials who would prefer to import manufactured goods and luxury items from the advanced countries in exchange for raw material exports rather than expend the effort necessary to develop domestic manufacturing. (For a more recent statement of this arguement with historical evidence from Latin America see Frank, 1972.) Negative effect on the agricultural sector, which has been largely composed of exports in the peripheral nations, may be inconsistent with Baran's hypothesis.

Likewise the hypothesis that control of distribution by the advanced nations and multinational corporations determines the results assumes that mining is more dependent on exportation than agriculture or manufacturing.

The idea that the amount of foreign capital which flows into a sector determines the relationship between national dependence on foreign investment and growth in the sector is consistent with the positive effect on mining but may be inconsistent with the negative effect on manufacturing. Greater amounts of foreign investment have gone into the manufacturing sector during the period studied

without producing a positive relationship between dependence and overall growth in this sector. Data on the type of enterprise in which foreign capital is invested would better answer this question.

4C.2 Effects of export partner concentration on sectoral product per capita

Further light can be shed on the relationship between dependence and development by examining the effect of other types of economic dependence on the growth of product per capita in different sectors. Export partner concentration, or the extent to which a nation is located in a restricted trade network in which it sends most of its exports to one other export partner, provides an interesting comparison with investment dependence because it is quite a different kind of dependence on the larger world economy. It has been shown in Section 4A.2 that export partner concentration has consistent negative effect on measures of aggregate economic development. Does this overall effect have different and even opposite components among the economic sectors of a national economy? Let us investigate this relationship for agriculture, mining and manufacturing as was done in the previous section.

Table 40. Effect of partner concentration on growth in the agricultural sector--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Export partner concentration 1955	.37	.22	76
Agriculture per capita 1955	$86.89	$58.18	76
Agriculture per capita 1965	$89.98	$56.01	76

CORRELATION COEFFICIENTS	PARTNER CONCEN.	AGRIC.PC 1955	AGRIC.PC 1965
Export partner concentration 1955	1	.11	.01
Agriculture per capita 1955	.11	1	.90
Agriculture per capita 1965	.01	.90	1

Dependent variable: Product per capita in agriculture 1965

VARIABLE	B	BETA	STD ERROR B	f
Export partner concentration 1955	-22.6	-.09	12.2	3.39
Agriculture per capita 1955	.88	.91	.04	362.1
(constant)	21.5			

For the whole sample of nations the estimated effect of partner concentration on agricultural production is negative and statistically significant. The results of this regression

equation for the poor subsample are similar except that the estimated coefficient is larger (beta = -.14) and the standard error is also larger which makes the result less statistically significant. (See Table 41 at the end of this section.)

The results estimating the effects of partner concentration on product per capita in mining are zero for both the whole sample and the poor subsample. (See Table 42 and Table 43 at the end of this section.) This suggests that location in a restricted trade network effects economic growth in ways that are different from dependence on foreign capital.

The effects of partner concentration on production in manufacturing are negative and significant for both the whole sample and the poor subsample (betas = -.05 and -.14 respectively). (See Tables 44 and 45 at the end of this section.)

It should also be pointed out that the cross-sectional correlation between export partner concentration and product per capita in manufacturing is negative (-.27). This is interesting in comparison with most of the correlations between dependence indicators and measures of economic development, which are positive (.20 to .35). This may indicate that the development of manufacturing has a negative effect on partner concentration.

The similarities between these results and the effects of investment dependence are greater than the differences. Negative effects for both kinds of dependence are found on production in agriculture and in manufacturing. The positive effect of investment dependence on production in mining is not repeated by partner concentration, but instead of the effect being negative, as it is on the other sectors, it is zero. A zero estimate does not help the effort to determine which intervening mechanisms are at work. It may be a resultant of both positive and negative factors associated with partner concentration which happen to balance. It seems unlikely that a nation's location in the world trade network would have absolutely no effect on the growth of mineral production. It is more likely that factors are associated with partner concentration which have both positive and negative effects. For instance, a nation such as Algeria may have an exclusive trade agreement with France which guarantees a price to be paid for oil which is higher than the price on the world market. This would tend to spur oil production in Algeria. On the other hand, a nation such as Trinidad may sell almost all of its bauxite to the United States while bauxite mining is controlled by U.S. multinational corporations which restrict production to maintain the price of bauxite on the world market.

4C.3 Aid dependence on sectoral product per capita

The existence of a larger external debt indicates a type of economic dependence which involves less direct penetration than investment dependence because it is mediated by the national state, and yet it is more direct than partner concentration, which may be purely structural involving very few formal control relations. When the estimated effects of the measure of aid dependence under study (external public debt per capita) are examined, we encounter the problem of scarce data. The following results (as will be remembered from Section 4A.3) employ aid dependence measured in 1960 and the sectoral product measures for 1955 and 1965. This provides us with an inexact panel regression model because the independent variable is measured after the lagged dependent variable. This should not be too serious a problem because the external public debt per capita is relatively stable over a five year period for most countries. Since data is available for only a few cases for the following equations, the results are not conclusive.

The complete tables are presented at the end of this section (Tables 46, 47 and 48). Here is a summary of the results. With 18, 15 and 18 cases respectively, the betas of aid dependence on production in agriculture, mining and manufacturing are -.05, -.05, and -.04. None of these was statistically significant. The scarcity of data prevented estimation for the poor subsample.

These results are similar to those obtained with the other dependence measures and suggest a consistency, although they are not conclusive due to the small data base and statistical insignificance. It would be imprudent to speculate about the meaning of the estimated negative effect of aid dependence on production in mining. Suffice it to say that this tentative result again suggests that the types of dependence studied differ somewhat in their economic effects. It may be that "direct" dependence stimulates growth in areas of production which are strategic for the dominant nations, and less direct dependence, such as partner concentration and aid dependence, have negative effects on all sectors.

This section can be summarized by saying that all three kinds of economic dependence examined have negative effects on production in agriculture and production in manufacturing (although the evidence for aid dependence is weak). They have different effects on production in mining. Investment dependence is positive, partner concentration is zero, and aid dependence is possibly negative.

This pattern of results supports the contention that different types of dependence affect economic development in a generally negative way, but that specific factors tied to one or another form of dependence may have some positive effects. The anomaly of a positive effect of investment dependence on production in mining suggests

that penetration by foreign capital may have benefits outweighing the costs when the world market is controlled by the agents which do the penetrating. Whether or not this will remain true in the era of producers' cartels which began with the Organization of Petroleum Exporting Countries remains to be seen. It seems unlikely that investment dependence will continue to be an advantage once a countervailing force to the multinational corporations is organized.

Table 41. Effect of partner concentration on growth in the agricultural sector--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Export partner concentration 1955	.42	.21	49
Agriculture per capita 1955	$63.02	$34.17	49
Agriculture per capita 1965	$66.91	$37.36	49

CORRELATION COEFFICIENTS	PARTNER CONCEN.	AGRIC.PC 1955	AGRIC.PC 1965
Export partner concentration 1955	1	.32	.13
Agriculture per capita 1955	.32	1	.80
Agriculture per capita 1965	.13	.80	1

Dependent variable: Product per capita in agriculture 1965

VARIABLE	B	BETA	STD ERROR B	f
Export partner concentration 1955	-23.92	-.14	15.33	2.4
Agriculture per capita 1955	.92	.84	.09	88.4
(constant)	18.57			

Table 42. Effect of partner concentration on growth in the mining sector--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Export partner concentration 1955	.39	.21	58
Mining per capita 1955	$26.37	$63.80	58
Mining per capita 1965	$26.56	$53.87	58

CORRELATION COEFFICIENTS	PARTNER CONCEN.	MINING PC 1955	MINING PC 1965
Export partner concentration 1955	1	.08	.07
Mining per capita 1955	.08	1	.95
Mining per capita 1965	.07	.95	1

Dependent variable: Product per capita in mining 1965

VARIABLE	B	BETA	STD ERROR B	f
Export partner concentration 1955	-1.5	-.01	9.9	.02
Mining per capita 1955	.80	.95	.03	557.59
(constant)	5.9			

Table 43. Effect of partner concentration on growth in the mining sector--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Export partner concentration 1955	.43	.22	41
Mining per capita 1955	$19.68	$69.66	41
Mining per capita 1965	$19.91	$53.65	41

CORRELATION COEFFICIENTS	PARTNER CONCEN.	MINING PC 1955	MINING PC 1965
Export partner concentration 1955	1	.13	.11
Mining per capita 1955	.13	1	.96
Mining per capita 1965	.11	.96	1

Dependent variable: Product per capita in mining 1965

VARIABLE	B	BETA	STD ERROR B	f
Export partner concentration 1955	-3.6	-.01	10.1	.13
Mining per capita 1955	.74	.96	.03	520.09
(constant)	6.8			

Table 44. Effect of partner concentration on growth in the manufacturing sector--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Export partner concentration 1955	.37	.22	75
Mfg. per capita 1955	$131.96	$163.02	75
Mfg. per capita 1965	$190.82	$224.55	75

CORRELATION COEFFICIENTS	PARTNER CONCEN.	MFG PC 1955	MFG PC 1965
Export partner concentration 1955	1	-.27	-.31
Mfg. per capita 1955	-.27	1	.97
Mfg. per capita 1965	-.31	.97	1

Dependent variable: Product per capita in manufacturing 1965

VARIABLE	B	BETA	STD ERROR B	f
Export partner concentration 1955	-48.9	-.05	27.4	3.2
Mfg. per capita 1955	1.32	.96	.04	1259.1
(constant)	34.3			

Table 45. Effect of partner concentration on growth in the manufacturing sector--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Export partner concentration 1955	.42	.22	48
Mfg. per capita 1955	$39.19	$40.18	48
Mfg. per capita 1965	$62.06	$69.40	48

CORRELATION COEFFICIENTS	PARTNER CONCEN.	MFG PC 1955	MFG PC 1965
Export partner concentration 1955	1	-.00	-.14
Mfg. per capita 1955	-.00	1	.90
Mfg. per capita 1965	-.14	.90	1

Dependent variable: Product per capita in manufacturing 1965

VARIABLE	B	BETA	STD ERROR B	f
Export partner concentration 1955	-45.1	-.14	18.6	5.8
Mfg. per capita 1955	1.56	.90	.10	229.3
(constant)	19.9			

Table 46. Effect of aid dependence on growth in the agricultural sector--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
External public debt per capita 1960	$567.55	$498.30	18
Agriculture per capita 1955	$126.97	$ 83.58	18
Agriculture per capita 1965	$124.73	$ 77.28	18

CORRELATION COEFFICIENTS	AID DEPENDENCE	AGRIC PC 1955	AGRIC PC 1965
External public debt per capita 1960	1	.67	.62
Agriculture per capita 1955	.67	1	.97
Agriculture per capita 1965	.62	.97	1

Dependent variable: Product per capita in agriculture 1965

VARIABLE	B	BETA	STD ERROR B	f
External public debt per capita 1960	-.008	-.05	.012	.49
Agriculture per capita 1955	.93	1.01	.07	163.2
(constant)	11.0			

Table 47. Effect of aid dependence on growth in the mining sector--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
External public debt per capita 1960	$594.66	$543.89	15
Mining per capita 1955	$ 19.82	$ 18.87	15
Mining per capita 1965	$ 18.91	$ 18.77	15

CORRELATION COEFFICIENTS	AID DEPENDENCE	MINING PC 1955	MINING PC 1965
External public debt per capita 1960	1	.23	.16
Mining per capita 1955	.23	1	.91
Mining per capita 1965	.16	.91	1

Dependent variable: Product per capita in mining 1965

VARIABLE	B	BETA	STD ERROR B	f
External public debt per capita 1960	-.002	-.05	.004	.22
Mining per capita 1955	.92	.93	.11	62.9
(constant)	1.7			

Table 48. Effect of aid dependence on growth in the manufacturing sector--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
External public debt per capita 1960	$567.55	$498.30	18
Mfg. per capita 1955	$246.45	$177.08	18
Mfg. per capita 1965	$343.90	$227.90	18

CORRELATION COEFFICIENTS	DEPENDENCE	MINING PC 1955	MINING PC 1965
External public debt per capita 1960	1	.50	.45
Mfg. per capita 1955	.50	1	.98
Mfg. per capita 1965	.45	.98	1

Dependent variable: Product per capita in manufacturing 1965

VARIABLE	B	BETA	STD ERROR B	f
External public debt per capita 1960	-.02	-.04	.02	.73
Mfg. per capita 1955	1.29	1.01	.06	374.89
(constant)	36.3			

4D. Summary of Results

The results presented in the previous sections are summarized in Tables 49, 50 and 51, which follow. Table 49 shows the estimates obtained for the effects of the three types of economic dependence on three measures of aggregate national economic growth. Of the 16 estimates presented, 15 are in the negative direction and 10 are significant at the .05 level or above. This is conclusive evidence against theories which predict a positive effect of economic penetration on economic growth. The consistency of the results indicates that economic dependence has an overall negative effect on growth. Table 50 again reveals consistent negative effects when domestic capital formation and specialization in mineral resource production are controlled, although only five of the 12 estimates are significant at the .05 level or higher.

4D.1 A negative effect?

The question of certainty as to the existence of a negative effect rests on two problems: (1) Is there some unmeasured variable which affects both dependence and development, creating a spurious negative estimate? (2) Is there measurement error in the indicators of dependence which would artifactually create this negative result? The control variables (Table 50) do not eliminate

Table 49. Dependence effects on aggregate economic growth

Dependent variable: GNP per capita 1970
Lagged dependent variable: GNP per capita 1950 (or the appropriate early time point)

INDEPENDENT VARIABLE	SAMPLE	CASES	B	BETA	STANDARD ERROR B	f	SIG.
Investment dependence 1950-55	All	62	-114	-.07	66	2.9	*
	Poor	38	-165	-.36	62	7.0	**
Partner concentration 1950	All	68	-563	-.11	192	8.5	***
	Poor	45	-310	-.20	155	3.9	*
Aid dependence 1960	All	19	-.82	-.35	.31	6.6	*
Aid dependence 1965	All	75	-.08	-.05	.04	5.2	*
	Poor	54	-.09	-.07	.05	2.2	

Dependent variable: Log kilowatt hours of electricity consumed per capita 1965
Lagged dependent variable: Log kilowatt hours of electricity consumed per capita 1950 (or the appropriate early time point)

INDEPENDENT VARIABLE	SAMPLE	CASES	B	BETA	STANDARD ERROR B	f	SIG.
Investment dependence 1950-55	All	55	.008	.009	.031	.07	
	Poor	31	.087	-.12	.041	4.5	*
Partner concentration 1950	All	60	-.28	-.09	.09	7.9	***
	Poor	38	-.30	-.13	.13	4.9	**
Aid dependence 1960	All	19	.001	.009	.003	.26	

Dependent variable: Percentage of male labor force not in agriculture 1960
Lagged dependent variable: Percentage of male labor force not in agriculture 1950 (or the appropriate early time point)

INDEPENDENT VARIABLE	SAMPLE	CASES	B	BETA	STANDARD ERROR B	f	SIG.
Investment dependence 1950-55	All	62	-.35	-.01	.60	.3	
	Poor	38	-1.19	-.06	.80	2.1	
Partner concentration 1950	All	68	-3.3	-.03	1.8	3.1	*
	Poor	46	-1.6	-.02	2.2	.5	

Significance: * = .05 level; ** = .01 level; *** = .001 level

the negative estimate, but it is impossible to know for certain that no other variable exists that would create the negative result spuriously. As for measurement error, it seems unlikely that the same kind of error would exist for the three quite different types of dependence studied, although this is not impossible. The problem of artifactual association due to common ratio terms (explained in Chapter 3E) should work against a negative result in the cases of aid and investment dependence. Partner concentration is not subject to this problem. Better measurement, the addition of more cases, and a larger time lag will make it possible to improve the certainty of the hypothesis that dependence has a negative effect on growth. For now, my best guess is that it does.

4D.2 Size of the effects

What conclusion can be made about the size of this negative effect? The regression coefficient used here must be interpreted with caution with regard to the question of the size of the effects. The standardized coefficients (betas) are determined by the sample variances of the independent and dependent variables. The unstandardized coefficients (B's) are in the units in which the indicators are measured, and these units are not always meaningful for interpretation. For instance, investment dependence has

been converted to a logarithmic scale to make the distribution appropriate for linear regression. In this case some light may be shed by comparing the size of the betas for investment dependence and capital formation in Table 50. Although these coefficients are in opposite directions, their sizes are about the same. This may be interpreted to mean that variation in investment dependence makes about as much difference for economic growth as does variation in capital formation.

For partner concentration we may look at the unstandardized coefficients (B's) in Table 49. When GNP per capita is the dependent variable an increase of one percentage point in partner concentration corresponds to an average decrease of $5.63 in GNP per capita over the 20-year period. Actually, this means that increase in GNP per capita is reduced by this amount, as we know that practically all nations increase GNP per capita in this period.

The measure of aid dependence has not been logged and so a direct interpretation of its unstandardized coefficient can be made. On GNP per capita for the ten year period from 1960 to 1970, it is seen (in Table 49) that every dollar per capita of aid dependence decreases GNP per capita 82 cents. The five year lag from 1965 to 1970, with a more respectable number of cases, shows a decrease of eight cents for every dollar increase in aid. Of course,

these ratios cannot be taken as exact given the problems of measurement involved in cross-national research, but they do indicate the approximate magnitude of the effects under consideration.

4D.3 Controlling capital formation and specialization in the production of mineral raw materials

Table 50 shows the effects of investment dependence when domestic capital formation and specialization in the production of mineral raw materials are controlled. As explained in Chapter 4B.1, capital formation was controlled because it has been hypothesized that it might create a spurious negative relationship between investment dependence and economic growth. Low levels of domestic capital formation may result in investment dependence as foreign capital flows into take up the investment opportunities not exploited by domestic capital. Further, low levels of domestic savings retard economic development. This, if true, would produce a spurious negative estimate of investment dependence if capital formation is not included in the regression equation. When it is included, however, five of the six betas estimating the effects of investment dependence are the same size or larger. (Compare Table 50 with Table 49.) The f ratios are smaller, but this is due to the reduced sample size resulting from missing data on

Table 50. Investment dependence effects on aggregate economic growth controlling for capital formation and the percentage of GDP in mining

INDEPENDENT VARIABLE	SAMPLE	CASES	B	BETA	STANDARD ERROR B	f	SIG.
Dependent variable: GNP per capita 1970 Lagged dependent variable: GNP per capita 1950							
Investment dependence 1950-55	All	34	-216	-.12	97	4.9	**
Capital formation 1950	"	"	35.9	.14	14.7	5.9	
Investment dependence 1950-55	Poor	15	-235	-.35	149	2.5	
Capital formation 1950	"	"	24.2	.25	20.4	1.4	
Investment dependence 1950-55	All	46	-135	-.08	92	2.1	
% GDP in mining 1955	"	"	1.6	.01	8.3	.04	
Investment dependence 1950-55	Poor	29	-262	-.50	90	8.4	***
% GDP in mining 1955	"	"	8.5	.21	5.9	2.0	
Dependent variable: Log kilowatt hours of electricity consumed per capita 1965 Lagged dependent variable: Log kilowatt hours of electricity consumed per capita 1950							
Investment dependence 1950-55	All	31	-.02	-.03	.03	.58	
Capital formation 1950	"	"	.02	.15	.005	12.5	
Investment dependence 1950-55	Poor	13	-.06	-.09	.06	.93	
Capital formation 1950	"	"	.03	.32	.008	12.3	
Investment dependence 1950-55	All	43	-.05	-.05	.03	2.2	
% GDP in mining 1955	"	"	.008	.08	.003	6.8	
Investment dependence 1950-55	Poor	26	-.14	-.19	.04	10.9	***
% GDP in mining 1955	"	"	.009	.15	.003	7.3	

Table 50 (continued)

Dependent variable: Percentage of male labor force not in agriculture 1960 Lagged dependent variable: Percentage of male labor force not in agriculture 1950							
INDEPENDENT VARIABLE	SAMPLE	CASES	B	BETA	STANDARD ERROR B	f	SIG.
Investment dependence 1950-55	All	34	-1.3	-.04	.9	1.9	
Capital formation 1950	"	"	.31	.07	.15	4.3	
Investment dependence 1950-55	Poor	15	-3.1	-.15	1.5	4.2	*
Capital formation 1950	"	"	.53	.18	.19	7.5	
Investment dependence 1950-55	All	46	-.52	-.02	.80	.43	
% GDP in mining 1955	"	"	.032	.01	.071	.23	
Investment dependence 1950-55	Poor	29	-2.18	-.10	1.05	4.2	**
% GDP in mining 1955	"	"	.054	.03	.078	.5	

Significance: * = .05 level; ** = .01 level; *** = .001 level
Significance level is not indicated for control variables.

capital formation. Thus it can be concluded that capital formation does not produce the negative effect of investment dependence on economic growth.

Chapter 4B.2 contains a detailed examination of the results obtained when mineral raw material production is controlled. As can be seen by comparing Table 50 with Table 49, in every case the inclusion of this variable increases the size of the estimated negative effect of investment dependence. I think this occurs because the presence of mineral raw materials draws foreign capital, increasing investment dependence, and also has a small positive effect on economic growth (see Table 50). Thus, controlling this variable takes out a positive artifact which is included in the estimate of the dependence effect when it is not controlled. Investment dependence also has a positive effect on the growth of production in the mining sector. I discuss this below, as well as the interaction between specialization in mineral raw materials and investment dependence.

4D.4 Dependence effects on economic sectors

Table 51 shows the estimated effects of dependence on growth in the agricultural, mining and manufacturing sectors. These results are consistently negative except for the effects of investment dependence on growth in mining.

Table 51. Dependence effects on growth in sectors

INDEPENDENT VARIABLE	SAMPLE	CASES	B	BETA	STANDARD ERROR B	f	SIG.
Dependent variable: Product per capita in agriculture 1965 Lagged dependent variable: Product per capita in agriculture 1955							
Investment dependence 1950-55	All	54	- 2.9	-.05	3.0	.96	
	Poor	32	- 2.0	-.05	4.5	.19	
Partner concentration 1950	All	76	-22.6	-.09	12.2	3.4	*
	Poor	49	-23.9	-.14	15.3	2.4	
Aid dependence 1960	All	18	-.008	-.05	.012	.49	
Dependent variable: Product per capita in mining 1965 Lagged dependent variable: Product per capita in mining 1955							
Investment dependence 1950-55	All	44	8.5	.12	2.7	9.6	***
	Poor	28	5.1	.06	2.1	5.6	**
Partner concentration 1950	All	58	- 1.5	-.01	9.9	.02	
	Poor	41	- 3.6	-.01	10.1	.13	
Aid dependence 1960	All	15	-.002	-.05	.004	.22	
Dependent variable: Product per capita in manufacturing 1965 Lagged dependent variable: Product per capita in manufacturing 1955							
Investment dependence 1950-55	All	54	- 8.0	-.03	7.7	1.1	
	Poor	32	-11.1	-.17	6.8	2.6	
Partner concentration 1950	All	75	-48.9	-.05	27.4	3.2	*
	Poor	48	-45.1	-.14	18.6	5.8	**
Aid dependence 1960	All	18	-.02	-.04	.02	.73	

Significance: * = .05 level; ** = .01 level; *** = .001 level

These are positive and statistically significant at the .01 level. Thus, penetration by foreign capital has a positive effect on the expansion of mineral production, at least during the period studied (1955 to 1965). Further evidence for this is presented in Section 4B.3 (Table 33) which shows that investment dependence has a positive effect on GNP per capita growth among eight countries specializing in mineral production. This result reminds us that the effects of economic dependence are complex and that further research is required to disentangle different types of dependence (such as foreign investment in manufactures vs. foreign investment in raw materials) and to specify the locus of the effects and the mechanisms by which they occur.

4D.5 Dependence of rich and poor countries

What can be concluded from the practice of estimating each regression equation for both the whole sample of nations on which data is available and the subsample excluding the most developed nations? It should be remembered that this procedure was intended to provide a conservative test of the hypothesis of a negative effect. The comparison of poor dependent with poor independent (or isolated) countries should provide the toughest test of a negative effect. Negative effects were found in both samples, but

in six of the seven comparisons in Table 49, the beta is larger when the rich countries are excluded. Likewise, the f ratio is larger in four of the seven comparisons. This means that dependence is more of a handicap for an underdeveloped nation, although the possibility of a negative effect of dependence among developed nations is not precluded. Further analysis would be required to estimate this effect for just the rich nations.

CHAPTER 5. THEORETICAL IMPLICATIONS

The finding of a relatively certain negative effect of economic dependence on national economic development has important implications for theories of international economics and the sociology of modernization. The most obvious implication is that neo-classical economics and diffusionist theories are wrong insofar as they predict that inputs from modern societies will necessarily result in development of a peripheral area. The flows of resources such as private capital and public aid must be understood in terms of their institutional context. If they are accompanied by control relations, extending the power of center nations or multinational corporations, they will not necessarily result in the economic growth of peripheral nations. A substantive understanding of the power-dependence relations in which these flows are imbedded is required in order to comprehend the effect that they have.

The dependency theories outlined in Chapter 1 predict more accurately the effects of inputs of foreign resources. Both direct penetrations discussed by the neo-Marxists and indirect dependence postulated by the ECLA economists have the predicted negative effects. Of course the results of this research do not prove that none of the hypothesized

effects operate, but only that, in the balance, the negative effects dominate.

The predominance of negative effects is demonstrated, but which mechanism or combination of mechanism is responsible for this overall effect? The finding of a negative effect on manufacturing supports both Baran's (1957) class distortion hypothesis and the idea that dependence creates a mono-economy which retards the development of domestic sectors. Further research could distinguish between these two explanations by measuring the economic differentiation of national economies and testing to see if this is an intervening variable between dependence and development.

The finding with the most interesting implications for dependency theory is the positive effect of investment dependence on mining, and the interaction between investment dependence and a nation's specialization in mining on aggregate economic growth. Let us consider the possible explanations for these results.

One possibility is that the requirements of advanced technology for the extraction of mineral resources requires multinational participation for this type of production. The negative effect on manufacturing, which also involves advanced technology, suggests that technology is not the crucial factor, however.

Perhaps the positive effect on mining results from the control by multinational corporations of systems of distribution in the international market. Mining is an export business and the necessity for foreign markets may work against national control. This agrument would seem to apply to export agriculture as well, however, and we find a negative effect of dependence on agricultural production. Further research which measures the extent to which agricultural and mineral products are exported could directly test the hypothesis that access to export markets intervenes in the relationship between dependence and development.

The existence of extensive mineral deposits may give a peripheral nation the internal resources necessary to control foreign inputs so that they facilitate national development. If this is so, dependence should have less of a negative effect on overall development in nations that have already achieved a certain amount of industrialization. The "semi-periphery" or middle level of nations could be separated out to test this idea in further analysis.

Cardoso (1973a) has suggested that dependence will have positive effects on development when the development is in the direct strategic interest of the center nations. This would apply to the case of the positive effect on mining. Core interest may also expand manufacturing in dependent countries that have a lot of foreign investment

in that sector. This could be tested by counting the number of multinational subsidiaries in a country that are engaged in manufacturing.

Similarly, the notion of strategic interests would lead to the prediction that dependence has a positive effect on export agriculture. It has been mentioned that this can be tested by employing international trade data. It would be difficult to empirically separate the idea of center-nation interests from the idea, discussed above, of multinational control of international markets.

Future comparative research into the mechanisms by which dependence has its effects will have important consequences for dependency theory and the understanding of vertical relations in the world system. It must be remembered that these theories are not merely of academic interest. The policy implications of such research involve the welfare of millions of people. In this light let me make one additional suggestion for future research and discuss the results found in this study in the context of present tendencies in the world economy.

It seems likely that economic nationalism in peripheral nations can control and select foreign inputs in such a way that the negative effects of dependence are reduced or reversed. The example of Japan, and perhaps of Mexico and Yugoslavia as well, would seem to suggest that

defensive policies can control the negative tendencies that accompany foreign economic penetration. (Trimberger, 1976). This proposition can be tested by measuring economic nationalism--coding investment laws, taxation of direct investment and exchange regulations. It should be realized, however, that due to competition between peripheral nations it has been difficult for individual nations to implement such controls without becoming isolated.

It does not follow from the results of this research that autarchy is the answer for underdeveloped nations. Those nations such as Burma that have cut themselves off from external inputs have stagnated. As Wallerstein (1974b) has pointed out, isolation from the world economy is only a path toward development under certain conditions. The U.S.S.R. and China have been able to make economic advances through autarchy by combining a huge national political mobilization with large internal markets and natural resources. Smaller nations do not have this path open to them even if the political forces for mobilization should come into being. (The examples of Chile and Cuba suggest themselves.) The possibility of regional integration has been discussed at length by development economists (Girvan, 1973). Regional integration could provide the requisite market and resource base for autonomous development, but the international economic, political and

military situation has so far prevented such integration. The balkanization of peripheral areas has been the legacy of colonialism. Valient efforts to forge unity, such as the pan-African movement, have so far proven unsuccessful.

This situation may be changing in the era which the world economy has entered in the last few years. A general economic contraction and world-wide inflation have increased economic competition between center nations and have compromised the hegemony that the United States enjoyed during the Pax Americana. A period of increase economic competition and pluralism in the world political system, with more of a balance between the most powerful center nations, may create opportunities for peripheral solidarity that have not heretofore existed.[12] We already have seen manifestations of such solidarity in the Organization of Petroleum Exporting Countries and the other producers' combinations that have formed. Less dramatic has been the formation and growth of third world regional trade, investment and development associations,' and the rise of economic nationalist regulation of foreign investment in many peripheral nations. These defensive reactions to

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[12] In earlier periods of contraction peripheral nations have individually moved toward political and economic independence. (Frank, 1969; Ness, 1972).

I refer to the Andean Group, the Latin American Free Trade Association, the Association of South East Asian Nations, the Carribean Economic Community, the Central American Common Market, the Middle Asian Regional Cooperation for Development, and other organizations of this type.

the encroachments of economic power from the center do not necessarily mean that dependence (or inputs from center nations) will cease to have negative effects. The multinational corporations have shown themselves adept at avoiding tariff barriers and outwitting schemes of nationalization. (Moran, 1973). Nevertheless, there is a growing awareness that inputs from the center are not always in the best interests of balanced development in the periphery and the multinational corporations will be forced to accomodate themselves to this awareness.

Economic nationalism provides a strategy against the most obvious incursions of economic dependence, such as foreign direct investment. But the more subtle forms, such as bilateral and even multilateral aid, have not engendered such a reaction. Still less has indirect dependence resulting from restricted location in the world trade network or marginalization in the world division of labor been perceived by policy-makers in the periphery as a cause of their slow and uneven development. Indirect dependence can be attacked in some of the same ways as direct dependence once it is perceived, but it seems unlikely that even the most sustained efforts of the peripheral nations will be able to reverse the growing gap between center and periphery and the grossly uneven expansion of the world economy. Balanced international

growth most probably awaits the formation of a reallocative world state. It may be that the contradiction between immense productivity and increasing inequality will be the motive force from which such a state emerges.

APPENDIX

1. List of countries in Table 4:

Ethiopia, Sudan, United Arab Republic, Costa Rica, Cuba, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Surinam, Burma, Sri Lanka, Taiwan, India, Indonesia, Iran, Iraq, Japan, Jordan, Pakistan, Phillippines, Syria, Thailand, Turkey, Greece, Portugal, Yugoslavia.

2. Investment dependence effects on kilowatt hours with a 20-year lag: fewer cases are available for kilowatt hours in 1969. This table is referred to in Section 4A.13 in the text.

Table A. Investment dependence effects on electrical energy consumption 1969--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Investment dependence 1950-55	2.25	.80	44
Log kwh electricity 1950	2.26	.83	44
Log kwh electricity 1969	2.95	.66	44

CORRELATION COEFFICIENTS	INV. DEP.	LOG KWH 1950	LOG KWH 1969
Investment dependence 1950-55	1	.29	.30
Log kwh electricity 1950	.29	1	.94
Log kwh electricity 1969	.30	.94	1

Dependent variable: Log kwh per capita 1969

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1950-55	.02	.03	.04	.44
Log kwh electricity 1950	.74	.93	.04	334.53
(constant)	1.19			

Table B. Investment dependence effects on electrical energy consumption 1969--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Investment dependence 1950-55	1.91	.66	22
Log kwh electricity 1950	1.67	.59	22
Log kwh electricity 1969	2.44	.46	22

CORRELATION COEFFICIENTS	INV. DEP.	LOG KWH 1950	LOG KWH 1969
Investment dependence 1950-55	1	.13	-.05
Log kwh electricity 1950	.13	1	.89
Log kwh electricity 1969	-.05	.89	1

Dependent variable: Log kwh per capita 1969

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1950-55	-.12	-.17	.06	3.21
Log kwh electricity 1950	.72	.91	.07	87.80
(constant)	1.46			

3. A 15-year lagged effect of investment dependence on the percentage of the labor force not in agriculture may be calculated even though only 17 cases are available for this estimation. Section 4A.15 refers to the following table.

Table C. Investment dependence effects on the percentage of labor force not in agriculture 1965--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Investment dependence 1950-55	2.17	.84	17
Percentage labor not in agriculture 1950	54%	23.15	17
Percentage labor not in agriculture 1965	73%	24.07	17

CORRELATION COEFFICIENTS	INV. DEP.	% NOT IN AGRIC'50	% NOT IN AGRIC'65
Investment dependence 1950-55	1	.07	-.06
Percentage labor not in agriculture 1950	.07	1	.91
Percentage labor not in agriculture 1965	-.06	.91	1

Dependent variable: Percentage labor not in agriculture 1965

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1950-55	3.91	-.13	2.94	1.76
Percentage labor not in agriculture 1950	.95	.92	.10	79.05
(constant)	-15.5			

4. Section 4A.17 of the text refers to the finding that economic development increases investment dependence because capital flows to areas where economic activity is greater. This finding is shown in the following two tables.

Table D. Effects of GNP per capita on investment dependence--all nations

VARIABLE	MEAN	STANDARD DEV	CASES
Investment dependence 1950-55	2.24	.79	61
Investment dependenct 1966-71	2.87	.79	61
GNP per capita 1950	$459.45	$486.24	61

CORRELATION COEFFICIENTS	INV.DEP. 1950-55	INV.DEP. 1966-71	GNP PC 1950
Investment dependence 1950-55	1	.69	.35
Investment dependence 1966-71	.69	1	.55
GNP per capita 1950	.35	.55	1

Dependent variable: Log investment incl. debits per capita 1966-71

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1950-55	.50	.56	.08	39.92
GNP per capita 1950	.0005	.35	.0001	15.20
(constant)	1.49			

Table E. Effects of GNP per capita on investment dependence--poor nations

VARIABLE	MEAN	STANDARD DEV	CASES
Investment dependence 1950-55	2.03	.74	37
Investment dependence 1966-71	2.52	.65	37
GNP per capita 1950	$158.97	$78.02	37

CORRELATION COEFFICIENTS	INV.DEP. 1950-55	INV.DEP. 1966-71	GNP PC 1950
Investment dependence 1950-55	1	.78	.55
Investment dependence 1966-71	.78	1	.67
GNP per capita 1950	.55	.67	1

Dependent variable: Log investment inc. debits per capita 1966-71

VARIABLE	B	BETA	STD ERROR B	f
Investment dependence 1950-55	.53	.60	.09	29.06
GNP per capita 1950	.003	.34	.0009	9.42
(constant)	.98			

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