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An Empirical Study of Foreign Exchange and Economic Development

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AN EMPIRICAL STUDY OF FOREIGN EXCHANGE

AND ECONOMIC DEVELOPMENT

(TITLE)

BY

Kathy L. Runyon

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

One of the most crucial economic problems existing in the world today is the low standard of living faced by the less developed countries (LDC's) of the world. In recent years much attention has been focused on this problem. An intensive examination of the problem of economic development has resulted in a long list of factors and conditions as well as obstacles and prerequisites surrounding the problem of development and growth. Economic development, however, is no simple task; it involves a complex combination of various factors that must be individually applied to the specific situations of the respective LDC's. In addition, no single cause or cure for the problem of underdevelopment exists. Numerous theories postulating necessary prerequisites for the occurrence of economic development have been popularized in the recent past. Such theories have stressed the importance of capital, entrepreneurship, technical knowledge, natural resources, and other similar factors. It cannot be disputed that these theories have provided valuable insights into the problems faced by the LDC's. It is the purpose of this study to examine one facet among the many in development theory, namely whether

or not the foreign economic sector and its consequent
provision of foreign exchange contribute significantly to
an LDC's economic growth. Although the process of economic
growth inevitably involves such factors as import substitu-
tion, savings, investment, and technological knowledge, the
present inquiry concentrates on problems of exports and
foreign exchange rather than that of imports, saving, and
investment. However, ignoring such aspects of the develop-
ment process does not negate the importance of these factors;
rather, discussion of such variables would be inappropriate
to the present study.

In theory, several obstacles to the achievement
of rapid and stable development and growth for the under-
developed countries have been recognized. A lack of foreign
exchange by the underdeveloped countries has traditionally
been viewed as one of these obstacles to sustained develop-
ment and growth. Foreign exchange is regarded as crucial
to the over-all economic well-being and growth of the less
developed countries. A nation's foreign exchange is the
means by which imported goods are acquired internationally.
Thus, it is generally believed that a lack of foreign
exchange would constrain the level of imports and subse-
quently serve as a deterrent to both capital formation
(investment) and increases in the gross national product
(GNP). Instabilities and fluctuations in domestic activity
of the less developed countries are believed to follow from

instabilities and fluctuations in foreign exchange receipts.
This relationship is almost universally accepted in develop-
ment theory. Thus, a general consensus exists that short-
term foreign exchange instability is a very serious matter
for the average underdeveloped country.[1]

The purpose of this study is to examine the rela-
tionship between foreign exchange availability and the
over-all economic growth of a particular selection of under-
developed countries. The study is meant to provide an
empirical examination of the belief that short-term fluc-
tuations in the LDC's foreign exchange earnings generate
domestic instability and reductions in the levels of invest-
ment (with a consequent loss of welfare) and complicate
the task of development planning. The effect of annual
changes in foreign exchange receipts on certain indicators
of economic development (specifically GNP and gross fixed
capital formation) will be examined. The hypothesis to
be tested is that a lack of available foreign exchange tends
to constrain the level of economic activity and growth in
the underdeveloped countries.[2] Specifically, foreign ex-
change obtained by the LDC's through exports, public cap-
ital inflow (primarily foreign aid), and private capital

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[1]This viewpoint is substantiated by A. K. Cairncross
in Factors in Economic Development (London: Allen & Unwin,
1962), pp. 213-215.

[2]Benton F. Massell, Scott R. Pearson, and James B.
Fitch, "Foreign Exchange and Economic Development: An
Empirical Study of Selected Latin American Countries,"
The Review of Economics & Statistics, LIV (May, 1972), 208.

inflow will be examined to determine the effect of exchange earnings on the LDC's domestic economic development. Gross national product and gross fixed capital formation (investment or GFC) will be the indicators of economic development used in the study. Furthermore, the various sources of foreign exchange will be examined individually to determine their relative impacts upon growth and development for the various LDC's.

Although the theoretical and a priori reasons for expecting a strong relationship between exchange availability and the over-all domestic economic development of the LDC's have been established, few systematic empirical studies of this relationship have been conducted. Two previous studies dealing with the relationship between foreign exchange availability and economic growth, however, deserve special recognition. These studies published by Alasdair MacBean (1966) and Benton F. Massell, Scott R. Pearson, and James B. Fitch (1972) examine the relationship between foreign exchange and economic growth, but produce conflicting results.[3]

This paper will attempt to partially fill the existing gap in available research by providing an empirical study of the relationship in certain LDC's between foreign

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[3]These studies will be examined in Chapter II of this study, "the Literature of Development and Exchange Availability" (see *infra*, pp. 15-18 and 22-24.)

exchange availability on the one hand and growth and
development on the other. It will serve to analyze his-
torical trends and relationships and use them as a basis
for substantiating or questioning current beliefs about
the relationship between foreign exchange availability and
economic growth within the LDC's. Furthermore, an attempt
will be made to reconcile the differing conclusions pro-
duced by the studies of MacBean and Massell. Finally,
because of the study's importance in determining the
effects of foreign exchange fluctuations on the develop-
ment of LDC's, policy implications might well follow from
the relationships which are found to exist.

This study is arranged in the following manner.
First, the empirical and theoretical background for the
study will be presented followed by a brief survey of the
related literature. Secondly, a description of the empirical
work done here will be presented. The conclusions reached
in the empirical study will then be analyzed and placed
in perspective, both within the literature and within
contemporary development theory. Finally, significant
conclusions of the entire study will be drawn and further
research topics will be suggested.

CHAPTER II

THE LITERATURE OF DEVELOPMENT
AND EXCHANGE AVAILABILITY

The following section will be concerned with previous
studies in the field of economic development, specifically
those which examine the relationship between development
and foreign exchange availability (or some component source
of foreign exchange availability). The relative historical
position and contribution of this study will then be examined
within the context and perspective of the relevant literature.

Before undertaking a review of literature dealing
with related empirical studies, it is desirable to present
the basic theoretical arguments behind the belief that
limitations in foreign exchange tend to constrain both
the domestic economy of a less developed country and its
ability to develop and grow. Subsequently, a review of
related empirical studies will be undertaken.

Prima Facie Basis

It is generally accepted that instability in the
sources of foreign exchange as well as a lack of foreign
exchange by the underdeveloped countries inflict serious
damage upon the domestic economies of most underdeveloped

nations.[4] Fluctuations in foreign exchange receipts are believed to cause fluctuations in the domestic economies of the underdeveloped countries. Few empirical studies of this relationship have been conducted. Instead, theory surrounding the relationship has been obtained through theoretical reasoning, i.e., casual empiricism and logical deduction and has not been adequately substantiated by systematic empirical investigation. What, then, is the established theoretical basis for expecting the domestic economies of the LDC's to be damaged by a lack of available foreign exchange?

First, it is generally assumed that the less developed countries tend to produce and export primary products. Moreover, they tend to specialize exclusively in the production of a very few primary commodities. It is also accepted that the prices of primary products vary more sharply from year to year than do the prices of most industrial products. This is thought to occur because of several factors, principally because of low price elasticities accompanied by uncontrolled variability in the demand and supply for primary commodities. Consequently, specialization in a small range of primary commodities for the export market, variability in supply and demand, low price elasticity, and marketing concentration tend toward a high

[4]This viewpoint is substantiated by Benjamin Higgins in Economic Development (New York: W. W. Norton & Company, Inc., 1959), pp. 454-458.

degree of export instability in the average LDC.[5] In

addition, considerable variation in capital inflows to

the LDC's is recognized, mainly because of political and

social circumstances peculiar to the individual country.

Therefore, variations or instability in total foreign ex-

change are recognized to occur more often in less developed

countries than in the more economically advanced ones.

Less developed countries are generally described

as foreign-trade-oriented; the ratio of exports to total

production (GNP) is normally quite high and indicates the

great quantitative importance of foreign trade to the LDC's.

An underdeveloped country's reliance on foreign trade indi-

cates why national income or GNP in the LDC's should be

so sensitive to variations in export proceeds (as a com-

ponent of foreign exchange). Basic economic reasoning dic-

tates that changes in exports would have direct impacts

on the income of the exporters within the LDC's. Reper-

cussions would then follow from the change in consumption

and investment expenditures of the exporters affected by

the initial change in exports. Multiplier effects would

come into operation and amplify the initial effect on national

income caused by the change in consumption and investment.

In addition to the effects of changes in exports, changes

in capital inflows are believed to affect the level of

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[5]Alasdair I. MacBean, Export Instability and Economic
Development (Cambridge: Harvard University Press, 1966),
p. 26.

investment and consumption, and through the multiplier
to affect national income even more.[6] Thus, not only is
national income thought to be affected by foreign exchange
earnings, but investment or gross fixed capital formation
is also affected by foreign exchange earnings. Assuming
that necessities account for the largest part of an LDC's
imports, any change in foreign exchange earnings would tend
to affect the LDC's capacity to import necessary commodities.
Since LDC's import large quantities of needed capital-goods
for development, a change in foreign exchange earnings
would likely affect capital-goods imports or imports of
raw materials by the LDC's. Imported capital accounts
for a large part of domestic investment (or gross fixed
capital formation). Therefore, investment and subsequent
development in the LDC's are sensitive to changes in the
ability to pay for capital-goods imports.

> Any underdeveloped country needs foreign exchange,
> not only for its development program, but also for
> the raw materials and equipment necessary to maintain
> production in existing enterprises and to provide
> certain essential consumers' goods.[7]

Foreign exchange is necessary in order to import
capital-goods for development because the LDC's are unable
to produce for themselves all the raw materials and capital
equipment necessary for their own economic development.

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[6]Ibid., p. 26.

[7]Benjamin Higgins, Economic Development (New York:
W. W. Norton & Company, Inc., 1959), p. 625.

Thus, it is ordinarily believed that foreign exchange plays a strategic role in the LDC's in determining national income (GNP), capital formation (investment), and over-all economic development.

A few economists have disagreed with the orthodox theoretical explanation of the relationship between foreign exchange and development in the LDC's. Among these is Albert O. Hirschman who argues that growth of industry may be stimulated more by fluctuations than by stable foreign exchange proceeds.[8] In addition, Joseph Coppock and Alasdair MacBean have published empirical research which disputes the orthodox explanation of foreign exchange availability and its consequences. However, the more orthodox theoretical explanation (as presented above) is not limited in acceptance. It is, in fact, widely accepted as evidenced from its support by many noted economists and international organizations.[9] Thus, widely accepted economic theory indicates that the economies of LDC's suffer from a lack of foreign exchange and severe foreign exchange fluctuations.

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[8]Albert O. Hirschman, The Strategy of Economic Development (New Haven: Yale University Press, 1958), p. 173.

[9]See, e.g., Benjamin Higgins, Economic Development, pp. 454-458; Gerald M. Meier and Robert E. Baldwin, Economic Development (New York: John Wiley & Sons, Inc., 1966), pp. 310-314, 329-330; and United Nations, Instability in Export Markets of Underdeveloped Countries (New York: United Nations Publications, 1952), pp. 1-7.

United Nations' Studies

Several studies dealing with development and instability in foreign exchange earnings have been undertaken by the United Nations. The principal United Nations' study and its published results, Instability in Export Markets of Underdeveloped Countries (1952) is not directly comparable to the study now being presented, but nonetheless sheds light on the subject of development and foreign exchange availability. The purpose of the United Nations' study was to investigate the ability of underdeveloped countries to obtain foreign exchange, as well as to examine the causes of instability in the export markets of certain specific underdeveloped countries. The UN report is based on findings relating to eighteen important primary commodities which represent the major exports of selected LDC's. Forty-seven case studies usually of the period from 1901 to 1950 were included in the study. The study measured prices, export volume, and export receipts with respect to year-to-year, cyclical, and long-term fluctuations, as well as variations within the period of a year. Concentration was, however, primarily on year-to-year and cyclical fluctuations. The study found marked fluctuations in proceeds of exports from 1901 to 1950 both on a cyclical and year-to-year basis. Practically all countries and commodities showed a substantial degree of instability. The major factor in the instability of export proceeds

was fluctuations in the volume of exports rather than
fluctuations in the price of exports. It was found that
average year-to-year fluctuations in price averaged about
14 per cent, cyclical fluctuations in price averaged about
27 per cent (with the duration of the cycle being four
years). The cyclical factor accounted for 13 per cent
of annual fluctuation in price. Thus, the cyclical factor
was found to be the most important causal force in price
instability. Long-term price changes amounted to between
4 per cent and 5 per cent a year while fluctuations within
the period of a year averaged about 27 per cent. On the
other hand, average year-to-year fluctuations in volume
of exports were between 18 per cent and 19 per cent a year,
thus exceeding that of price. Total cyclical movements
for volume of exports were, however, similar to those of
price as were changes in export volume due to long-term
factors.[10]

It was found that year-to-year fluctuations in
total export proceeds from eighteen primary commodities
averaged 23 per cent between 1901 and 1950, and cyclical
fluctuations averaged 37 per cent with an average cycle
of four years. There appeared to be a correlation in rank
of different commodities in respect to their year-to-year,
cyclical, and long-term fluctuations in price, volume,

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[10]United Nations, Instability in Export Markets
of Underdeveloped Countries (New York: United Nations
Publications, 1952), p. 5.

and total export proceeds.[11]

It was also found that changes in price and in quantity of exports had a destabilizing effect on one another. Both price and quantity instability contributed to total instability in export proceeds. Thus, neither price stabilization alone nor volume stabilization alone, at the existing levels of quantity and price instability, would have been great enough to result in substantial stabilization of total export proceeds.

In addition to the examination of the relative effects of price and quantity on export proceeds, an analysis of the movements of capital and invisible earnings was made. It was found that receipts from capital movements and invisible earnings did not compensate for instability in export proceeds. Generally, receipts from capital inflows and invisible earnings were relatively small. In fact, from 1946-50 net capital inflow for investment was negative for most of the underdeveloped countries examined. In addition, receipts from capital inflow and invisible earnings were more unstable than receipts from export proceeds.[12] Underdeveloped countries relied almost exclusively on foreign exchange earnings from exports for their capacity to import.

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[11]Ibid., p. 6.

[12]Ibid., p. 72.

Thus, major instabilities in all components of foreign exchange earnings (export proceeds, capital inflows, and invisible earnings) were found for the majority of LDC's. Also the interaction and interrelation of fluctuations in price, volume, and proceeds of exports provided that neither price stabilization nor volume stabilization alone would cure the problem of instabilities in export proceeds.

Coppock's Study

Joseph Coppock's 1962 study on international economic instability presented certain relevant facts about the existence of international economic instability since World War II and subsequently attempted to explain this instability through statistical analyses. Furthermore, Coppock made general policy proposals for dealing with international economic instability. In his study, Coppock introduced empirical research which cast doubt on the orthodox explanation of export instability. Through multiple regression analysis, he found that commodity concentration of exports had little effect on the stability of exports. Coppock also calculated instability indices for total value of world trade in primary commodities and manufactures from 1948-58. He found manufactures to be more unstable than primary products. However, in a finer division of goods, Coppock found that some classes of primary goods were more unstable and some were less unstable

than manufactures. He further found that capital goods were relatively unstable while food and agricultural raw materials were relatively stable. Finally, geographic concentration for the destination of exports was found to have low correlation to export instability. Thus, Coppock's empirical results disputed orthodox economic theory as to the causes of instability in export proceeds.

MacBean's Study

One of the most comprehensive studies on foreign exchange and export instability to date is that of Alasdair MacBean (1966). His study is an empirical analysis of the causes and consequences of export fluctuations. The relationship between export earnings and over-all economic growth of the LDC's was investigated by examining the relationship between gross domestic product (GDP) and export earnings for a sample of eleven LDC's for the period 1950-60. A comparison was also made between capital goods imports and exports. Finally, certain policy measures were examined in light of the findings of the study.

Several propositions about the causes and effects of export instability within the LDC's were examined and tested by a combination of regression analyses for various groups of countries and time-series analyses.[13] From both

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[13] The results were sometimes presented in regression or correlation coefficients and sometimes in tabular comparison or direction of strength of changes in one variable compared to another.

simple and multiple regression analyses in examining com-
modity concentration, geographic concentration, and pro-
portion of exports which were primary products, it was
determined that the actual difference between the average
level of instability in underdeveloped countries' export
proceeds and those of developed countries was rather small.
Additionally, a comparison of instability for export pro-
ceeds, prices, and quantities found that fluctuations in
export proceeds of the individual LDC's were primarily
caused by fluctuations in the quantities of goods exported
and not their prices. This finding agreed with the results
of the 1952 study conducted by the United Nations.

By comparing data for sixty-four countries indi-
cating the ratio of trade to income, it was found that there
was little or no significant difference between developed
and underdeveloped countries in the relative quantitative
importance of trade to their total economies. Thus, the
contention that the less developed countries are more highly
trade oriented than the more advanced ones seems to be
unfounded. Regression analyses on both cross-sectional
and time-series data for eleven LDC's for the period 1950-60
indicated that there existed no significant relationship
between fluctuations in export proceeds and fluctuations
in domestic income, investment, and price levels. Imports,
however, were found to have a significant positive relation
to exports. Therefore, data and results from this study

lead one to believe that short-term instability of export
earnings in the LDC's present no significant adverse con-
sequences for their domestic economies or prospects for
growth.[14] This is not to say that short-term export in-
stability has not lessened the ability of some LDC's to
achieve high rates of economic growth, but that underde-
veloped countries in general are not deterred from achiev-
ing growth because of export fluctuations.

> The study has not established that fluctuations
> in export earnings do no damage to underdeveloped
> countries, but it has shown that the contrary view
> of grave internal troubles arising inevitably from
> export instability is not upheld by examination of
> the only readily obtainable evidence.[15]

This lack of relationship between domestic variables and
export fluctuations was explained by the existence of a
relatively low value of the foreign trade multiplier in
most LDC's and by the pattern of distributed lags in re-
actions to an initial change in exporter's incomes.

These conclusions were supported by detailed case
studies of five countries--Uganda, Tanganyika, Puerto Rico,
Chile, and Pakistan. The conclusions are important and
contain certain policy implications. If short-term export
fluctuations do not cause serious damage to most under-
developed countries' economies, the benefits of stabilization
policies to the economies of the underdeveloped countries

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[14]MacBean, Export Instability and Economic Develop-
ment, p. 339.

[15]Ibid., p. 341.

may be small. If this proves to be true, resources spent
on stabilization policies may be better employed elsewhere.
Because MacBean's study is unorthodox in its conclusion
that export instability within the LDC's generally does
not adversely affect the domestic economy of the less developed
nations, his conclusions and policy proposals obviously
need closer scrutiny.

Cohen's Study

Benjamin I. Cohen, formerly associated with the
Agency for International Development (AID) and now at
Harvard University, conducted a study in 1968 dealing with
the relative effects of foreign capital and larger export
earnings on economic development within the less developed
countries. His study examined both the theoretical arguments
of the relative effects of larger exports and foreign cap-
ital and presented empirical research measuring these rel-
ative effects. In recent years, much attention has been
given by governments, international organizations, and
economists to the role of larger export earnings in the
economic development of the LDC's. This emphasis origi-
nated for two principal reasons. First, since the average
annual rate of growth of real GNP in the LDC's has been
lower than hoped by many people, a series of panaceas to
achieve significant growth and development have emerged.
Among these is the importance of increasing export earnings
for the LDC's. Secondly, increasing the flow of public

capital to the LDC's is seen as a more difficult undertaking and often beyond the control of the less developed countries. Thus, emphasis was often laid on the importance of increasing export earnings, and Cohen's study attempted to determine if the emphasis on increasing export earnings was well-founded.

Cohen's empirical study made use of cross-sectional data for various underdeveloped countries for two different time periods: 1955-60 and 1960-65. The study involved regression analysis and examined the effects of net foreign investment (defined as cumulative total imports minus cumulative total exports) and the growth of exports on the growth in GNP. The growth in GNP was assumed to depend on both the growth of exports and the level of foreign investment. Cohen found that both larger exports and larger foreign capital inflows tended to contribute to increases in total GNP. In addition to the over-all effect, it was found that the regression coefficients for extra exports was larger than for foreign investment in both time periods indicating that an extra dollar of exports contributed as much (or more) as did an extra dollar of foreign investment to the increase in GNP.[16] Thus, a significant relationship between foreign investment and increases in export earnings in the LDC's on the one hand and growth

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[16]Benjamin I. Cohen, "Relative Effects of Foreign Capital and Larger Exports on Economic Development," The Review of Economics and Statistics, L (May, 1968), 283.

in GNP of the LDC's on the other was found to exist.

Maizels' Study

A 1968 study by Alfred Maizels investigated the theoretical and empirical relationships between exports and economic growth of a particular selection of developing countries, namely those which were members of the Overseas Sterling Area. Furthermore, the study projected exports from the Overseas Sterling Area and their implications for economic growth for 1975 by use of a macro-economic model linking exports and net capital flows with economic growth through a capital-output model. Projections were made for both individual commodities and individual countries by using a simple aggregative macro-economic model of the interrelationships between the foreign trade and domestic sectors of the LDC's economies. The model distinguished between two gaps, namely the trade gap (the difference between imports and exports of goods and services) and the savings gap (the difference between investment and domestic savings) and assumed the larger gap to be the effective constraint on economic growth. Maizels' a priori assumption that the trade gap was the larger of the two gaps provided that the effective constraint on growth was the foreign trade sector of the economy.[17]

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[17] Alfred Maizels, Exports and Economic Growth of Developing Countries (Cambridge: Cambridge University Press, 1968), p. 8.

Maizels also examined the relationship between GDP and foreign exchange availability (export earnings and net capital inflows) for selected Sterling Area economies. Regression analysis for eighteen Sterling Area countries from 1950-63 found that GDP was more highly correlated with export earnings alone than with total foreign exchange availability. Also, a significant relationship between foreign exchange availability and fixed capital investment was found.[18] However, a systematic comparison of the varying effects of the individual sources of foreign exchange was not attempted by Maizels.

Massell's Studies

The problem of international economic instability was examined in two studies conducted by Benton F. Massell. The earlier study (1970) dealt with the problem of export instability. It examined the relationship between instability in export proceeds and a set of variables that characterize a country's economic structure. The study examined export receipts of fifty-five countries for the period 1950-66. Thirty-six less developed countries and nineteen developed countries (DC's) were included in the sample. Regression analysis of cross-sectional data was used to explain intercountry differences in export instability in terms of nine structural variables. The nine

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[18]Ibid., p. 9.

explanatory variables included in the model were: commodity concentration, geographic concentration, specialization on food, specialization on raw materials, export market share, domestic consumption of exported goods, size of the export sector, per capita income, and a dummy variable to distinguish between developed and less developed countries. It was found that geographic concentration, per capita income, export market share, specialization in raw materials, and domestic consumption of exported goods had no statistically significant impact as an explanatory variable for export instability. Specialization of food and commodity concentration had the greatest impact as an explanatory variable for export instability. The variables, however, tended to offset one another. LDC's tended to experience greater instability because of their greater product concentration but less instability because of their heavier dependence on food. The study also suggested that LDC's experienced greater instability than DC's.[19] On the other hand, the effect of the size of the export sector on export instability was not fully explained by the model devised in the study.

Massell's later study (1972) was done in corroboration with Scott R. Pearson and James B. Fitch and served as the primary basis for the present study. It examined

[19] Benton F. Massell, "Export Instability and Economic Structure," The American Economic Review, LX (September, 1970), 628.

the impact of annual changes in foreign exchange receipts
on three indicators of economic development: imports,
investment, and gross national product. The individual
impact of the three components of foreign exchange avail-
ability (exports of goods and services, public capital
inflow, and private capital inflow) including both current
and lagged values of the explanatory variables were exam-
ined by pooling both cross-sectional and time-series data.
Massell hypothesized that the level of economic activity
in an LDC is limited by foreign exchange availability and
that various sources of foreign exchange may differ in
their impacts on the level of economic activity.[20]

Massell found that foreign exchange receipts had
significant short-run effects on imports, investment, and
gross national product. All components of foreign exchange
receipts except lagged public capital inflow were found
to have a significant impact on the level of imports.
For the investment regression, only lagged and current
private capital were a significant influence. In the GNP
regression, both current exports and current private cap-
ital inflow were found to make an important contribution
to GNP. The results thus indicate that the three types
of foreign exchange receipts differ in the timing and

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[20] Benton F. Massell, Scott R. Pearson, and James
B. Fitch, "Foreign Exchange and Economic Development:
An Empirical Study of Selected Latin American Countries,"
The Review of Economics and Statistics, LIV (May, 1972),
209.

magnitude of their effects. In terms of over-all impact, private capital inflow had the greatest effect on all three indicators of economic development. Public foreign capital resulted in a smaller net increase in imports and investment and had no effect on GNP. Export receipts were less effective than capital inflows in stimulating imports and had only a small impact on investment. Exports had a greater effect on GNP than did public capital inflow but less than private capital inflow. It was also found that foreign exchange had a larger effect on the domestic economy of the LDC's in the first year rather than the second year lagged relation.[21] In fact, second year effects were often insignificant. Thus, it was found that instability in foreign exchange availability had an important effect on the domestic economies of the LDC's and that the sources of foreign exchange availability differed in their impacts on the process of economic development.

Summary of Related Studies

The present study is patterned primarily after the studies of Massell and MacBean. This study is not concerned with the causes of foreign exchange instability, per se, but concentrates instead on the consequences of foreign exchange availability to the LDC's.

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[21]Ibid., p. 212.

Of the seven empirical studies discussed above, the ones conducted by the UN, Joseph Coppock, Alasdair MacBean, and Benton F. Massell investigated the causes of international instabilities for various developed and under-developed countries. Although these studies do not directly correspond to the study undertaken here, they provide necessary background information and shed light on the subject of instabilities deriving from international trade.

The studies presented by Alfred Maizels, Benjamin Cohen, Alasdair MacBean, and Benton F. Massell, Scott R. Pearson, and James B. Fitch concentrated on the consequences or effects of international instabilities for the less developed countries. Alasdair MacBean investigated only export instability and found that instability in export proceeds did not inevitably lead to domestic troubles. Generally, export instability had no significant adverse consequences on the domestic economies or growth prospects of selected LDC's. In his study, Benjamin Cohen dealt with the effects of foreign capital and larger export earnings on the economic development of certain LDC's. He found that both larger exports and larger foreign capital inflows contributed significantly to increases in total GNP. This indicates the existence of a significant relationship between foreign investment and export earnings on the one hand and GNP on the other. Alfred Maizels examined the relationship between GDP and total foreign exchange

availability. His study revealed that export earnings alone were more highly correlated with GDP than was total foreign exchange availability. However, a significant relationship between foreign exchange availability and fixed capital investment as well as GDP was found to exist. Finally, in their examination of foreign exchange availability and economic development, Massell, Pearson, and Fitch showed that foreign exchange earnings did, indeed, have significant effects on imports, investment, and GNP. When the components of foreign exchange availability were broken down, all except lagged public capital inflow were found to contribute to increases in imports. However, only lagged and current private capital inflows contributed to increases in investment, and only current exports and current private capital inflow added to increases in GNP. Therefore, Massell, Pearson, and Fitch's study revealed the existence of a significant relationship between foreign exchange availability and economic development within the LDC's. Three of these studies agree that foreign exchange and economic development are related and that a lack of foreign exchange constrains economic activity within the LDC's. However, one study indicates that fluctuations in export earnings (as the largest component of total foreign exchange) do not adversely affect the domestic economies of selected LDC's.

The above seven studies indicate the level and scope of research performed on the problem of instabilities

deriving from international trade (both instability in total foreign exchange and in exports alone). The scope of existing research in this area of development is not extensive. Studies are limited in both time period and countries included in the analyses. This, of course, is partially due to a lack of available data for the LDC's. But, even those countries and years for which data are available have not been fully investigated. Furthermore, studies which have been conducted in this area of development have produced conflicting results. This can be attributed, at least in part, to differences in measures of instability, sources of data, and countries and years investigated. This study, however, hopes to provide a partial bridge in the gap of existing research and to contribute to the existing studies by providing an empirical investigation of more recent data.

CHAPTER III

THE EMPIRICAL STUDY

In a study of the consequences of fluctuations
in foreign exchange earnings on the domestic economic
activity of the LDC's, it is helpful to supplement casual
empiricism and logical deduction with an actual empirical
examination of the problem. With such a study, it must
be noted that limitations upon available statistical data
for the less developed countries exist and thus create
some doubt as to the reliability of the statistics.[22]
Consequently, the studies based upon such data are subject
to certain reservations. This fact must be noted when
using such statistics so that one does not become over-
confident of the consequent empirical results.

The present empirical study examines the effect
of annual changes in foreign exchange receipts on two
indicators of domestic economic activity and development
for selected less developed countries. Multiple linear
regression analysis is used in the study with statistical
data from sixteen less developed countries being regressed.

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[22]Limitations of economic statistics are discussed
in Oskar Morgenstern's On the Accuracy of Economic Obser-
vations (Princeton: Princeton University Press, 1963);
see, e.g., chapters two, three, and five.

The analysis differs from earlier studies by examining the individual effects of three sources of foreign exchange availability on the domestic activity of individual LDC's, by increasing the sample of observations under study, and by examining a time series and a cross-section of countries both individually as well as in the aggregate.

The hypothesis under consideration is that foreign exchange availability affects the over-all level of economic activity within the LDC's and that different sources of foreign exchange may differ in their effects on the domestic economy of the country. To test this hypothesis, the effect of changes in foreign exchange on investment and gross national product is examined. Furthermore, the sources of foreign exchange receipts are divided into three classifications: (1) exports, (2) net private capital inflow, and (3) net public capital inflow.[23] It is believed that investment and gross national product as the dependent variables are individually affected by the three independent variables--exports, net public capital inflow, and net private capital inflow.

The sample consisting of sixteen Latin American, Central American, and Asian countries was chosen on the basis of those underdeveloped countries included in the previous studies of MacBean (1966) and Massell (1972). The samples included in these two individual studies were

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[23]Massell, Pearson, and Fitch; "Foreign Exchange and Economic Development," p. 209.

consolidated, and exclusion of multiple and overlapping countries from both studies as well as further delimitations because of data availability resulted in a total cross-sectional sample of sixteen countries. The sample consisted of Argentina, Brazil, Ceylon, Colombia, Costa Rica, Cyprus, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, Uruguay, and Venezuela. These countries were originally chosen for inclusion in the studies because of data availability and because of the large percentage of their foreign trade sectors to the total national products. The countries chosen possessed high ratios of trade to GNP and thus were likely to be sensitive to short-term changes in foreign exchange earnings. Although limited to a particular group of countries, the general application and methods of analysis could be extended to other LDC's.

In order to confine the statistical analysis to manageable proportions and to keep the study within the scope of available resources, the countries and years under study were naturally limited. Depending upon the availability of balance of payments data within the above sample of countries, the time series for the sample varied from a low of eleven years in Cyprus (for the current year regression and consequently ten years for the lagged regression) to a high of twenty years in Costa Rica, Ecuador, Mexico, Peru, and Venezuela (for the current year regression and consequently nineteen years for the lagged regression).

No data before 1950 were included and data for most countries went up to 1971.[24]

The relevant variables included in the study are annual changes in Y, gross national product; annual changes in I, investment as indicated by annual gross fixed capital formation; annual changes in X, exports of goods and services; annual changes in G, net public foreign capital inflow, i.e., the net change in official and banking long-term and short-term liabilities and assets including official capital and gold and allocation of SDR's as well as official donations on transfer payments account; annual changes in P, net private foreign capital inflow, i.e., net private donations on transfer account, net changes in private long-term and short-term liabilities and assets, net changes in private capital, and net errors and omissions. The three explanatory variables--exports, public capital inflow, and private capital inflow--were defined so that their sum was equal to total foreign exchange earnings in the aggregate for each country at any given time. This information was taken from the source of the International Financial Statistics, 1970/71 Supplement.

The regression equations for each country and each year are written as follows:

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[24]A total listing of years and corresponding countries covered in the study are shown in Appendix B. (See infra, p. 62).

Current Year Relationship:

$$\Delta GNP = a_0 + a_1 \Delta X + a_2 \Delta P + a_3 \Delta G \tag{1}$$

$$\Delta I = u_0 + u_1 \Delta X + u_2 \Delta P + u_3 \Delta G \tag{2}$$

Lagged Relationship:

$$\Delta GNP_t = a_0 + a_1 \Delta X_{t-1} + a_2 \Delta P_{t-1} + a_3 \Delta G_{t-1} \tag{3}$$

$$\Delta I_t = u_0 + u_1 \Delta X_{t-1} + u_2 \Delta P_{t-1} + u_3 \Delta G_{t-1} \tag{4}$$

In regressing current year values of the explanatory independent variables against both gross national product and gross fixed capital formation, the problem of direction of influence or cause arises. It is the contention of this study that the direction of influence flows from foreign exchange availability to GNP and gross fixed capital formation. In other words, it is thought that changes in foreign exchange availability, i.e., exports, public capital inflow, and private capital inflow affect GNP and investment and that the reverse causal relationship does not exist. The causal relationship under investigation makes logical economic theoretical sense and the opposite one does not (at least not for some of the variables being investigated).

One of the most basic equations in economic theory says that GNP is equal to consumption expenditures plus investment expenditures plus government expenditures plus exports minus imports. Accepting this relationship, it

is obvious that the level of exports contributes to GNP.
It is difficult, however, to find any justification for the
idea that changes in GNP cause changes in exports. Thus,
only one causal relationship involving exports and GNP can
be theoretically justified. Also, exports would logically
contribute to investment because exports could aid in fi-
nancing capital-goods imports. However, the opposite di-
rection of influence could also conceivably exist.

Secondly, both public and private capital inflows
would likely affect the level of investment within a country
since such inflows are often designated specifically for
investment projects. Capital formation, however, would
probably not affect public and private capital inflows.

Finally, public and private capital inflows would
affect GNP because the various components of these inflows
(e.g., foreign aid and investment expenditures) contribute
to both consumption and investment expenditures and con-
sequently GNP. However, GNP would probably not affect the
level of public and private capital inflows to a great
extent.

Because of this problem, lagged explanatory var-
iables are also regressed against the variables of GNP and
gross fixed capital formation (GFC) in order to better see
the direction of influence of the relevant variables.
In this relationship, the explanatory variables are lagged
one year behind the two dependent variables in order to
better substantiate direction of change. Thus, not only

theory, but also chronology make it impossible for the direction of influence to occur but in one direction. In addition, if fluctuations or changes in foreign exchange earnings are an important cause of changes in domestic economic welfare, i.e., GNP and GFC, then some sequential relationship should be evident. Changes in GNP and GFC should follow changes in exports, private capital inflow, and public capital inflow in the same period or with a short lag. Therefore, both the current period and a lagged period for the explanatory variables will be examined.

Gross national product, investment, and exports are measured in the respective national currencies of the LDC's (in constant 1963 measures). Public and private capital inflows are, however, measured in constant 1963 United States dollars. Such an inconsistency was necessary because of a lack of uniformly compiled data and also because of a difficulty in converting currencies by way of foreign exchange rates. This discrepancy should not impair the results of the study, however, since changes in the variables and not absolute magnitudes are being measured. Significant relationships will appear irrespective of the currency; the coefficients only will be different.

As mentioned previously, changes in variables, not the original values themselves, are used in this study. Such a measure would tend to be more correct than the absolute values of variables (considering the doubtful reliability of statistics in underdeveloped countries).

Secondly, first differences of variables are used to reduce
autocorrelation of error terms among the variables since
a long-term upward trend in variables is recognized over
the period studied.

Data and statistics used in the study are annual
data since these are the most available, most accurate,
and most commonly used in empirical studies of economic
variables. Furthermore, the use of annual data is probably
justified because of the widely accepted convention of
annual budgeting and balance of payments accounting.

Empirical Results

Equations (1)-(4) were estimated using the ordinary
least squares method of regression. The estimated equations
are shown in tables 1-4 while the R^2 values are presented
in tables 5 and 6. The Durbin-Watson test for autocorre-
lation was performed and results were found to be negative
or inconclusive in all cases except for that of Peru in the
lagged GNP regression. In the regression of Peru for GNP,
either a variable was missing or error in the data appeared
to be cumulative and not random as assumed. Consequently,
doubt as to the significance of the relationship for this
particular regression is present. Serial correlation for
most of the regressions, however, presented no serious
problems to the study. Results of the Durbin-Watson tests
are shown in table 7 and table 8 of this study.

Little evidence was found to indicate serious

TABLE 1

ESTIMATED REGRESSION COEFFICIENTS FOR SELECTED COUNTRIES
(WITH GFC AS THE DEPENDENT VARIABLE—CURRENT REGRESSION)

Country	Constant	Exports	Private Capital Inflow	Public Capital Inflow
Argentina	0.56	0.54 (1.99)[c]	0.01 (1.44)	0.01 (1.62)
Brazil	491.25	0.29 (0.66)	0.63 (0.83)	0.11 (0.21)
Ceylon	68.62	0.34 (1.01)	2.99 (0.68)	2.29 (2.00)[c]
Colombia	.72	0.42 (2.52)[b]	0.01 (2.27)[b]	0.01 (1.51)
Costa Rica	-1.94	0.54 (4.38)[a]	5.34 (7.11)[a]	3.69 (3.62)[a]
Cyprus	1.27	0.26 (1.19)[c]	0.52 (4.68)[a]	0.50 (4.54)[a]
Ecuador	.05	0.53 (2.74)[b]	0.01 (2.93)[b]	0.01 (3.37)[a]
El Salvador	12.39	.0.27 (1.36)	1.13 (2.49)[b]	1.29 (2.07)[c]
Guatemala	-1.44	0.68 (3.03)[a]	1.00 (3.82)[a]	1.06 (3.23)[a]
Honduras	10.13	0.03 (0.19)	0.45 (0.99)	0.63 (0.80)
Mexico	1.93	0.69 (1.65)	0.01 (2.92)[b]	0.01 (1.67)
Nicaragua	15.60	0.35 (1.85)[c]	1.08 (0.71)	2.59 (1.46)
Panama	3.46	0.65 (2.08)[c]	0.20 (0.62)	0.24 (0.73)
Peru	1.06	0.16 (0.62)	0.01 (1.00)	0.01 (1.77)
Uruguay	.20	0.56 (4.16)[a]	0.01 (4.96)[a]	0.01 (4.61)[a]
Venezuela	0.44	-0.08 (-0.29)	0.01 (2.80)[b]	0.01 (1.13)

[a]Significant at the 1% level.

[b]Significant at the 5% level.

[c]Significant at the 10% level.
  (Figures in parentheses are t-ratios).

36

TABLE 2

ESTIMATED REGRESSION COEFFICIENTS FOR SELECTED COUNTRIES
(WITH GFC AS THE DEPENDENT VARIABLE--LAGGED REGRESSION)

Country	Constant	Exports	Private Capital Inflow	Public Capital Inflow
Argentina	0.58	0.60 (2.40)[b]	0.00 (1.57)	0.00 (2.09)[c]
Brazil	638.51	.13 (0.39)	−1.13 (−2.02)[c]	−0.45 (−1.16)
Ceylon	76.66	.50 (1.48)	−7.11 (−1.04)	0.00 (0.00)
Colombia	0.96	.29 (1.25)	0.00 (−1.10)	0.00 (−0.55)
Costa Rica	35.38	.44 (1.79)	.38 (1.24)	−0.21 (−0.11)
Cyprus	1.21	.50 (1.05)	−0.20 (−0.84)	−0.19 (−0.80)
Ecuador	.08	.24 (1.26)	.01 (3.38)[a]	0.01 (3.72)[a]
El Salvador	16.81	.27 (1.13)	−0.26 (−0.46)	0.00 (0.00)
Guatemala	2.54	.56 (1.93)[c]	0.80 (2.15)[b]	.11 (0.26)
Honduras	5.85	.38 (2.76)[b]	−0.20 (−0.39)	.27 (0.38)
Mexico	2.64	.58 (1.20)	.01 (1.23)	0.00 (0.64)
Nicaragua	29.69	.12 (0.60)	1.11 (0.69)	−1.65 (−0.89)
Panama	2.78	.69 (2.12)[c]	−0.06 (−0.15)	0.29 (0.91)
Peru	.61	.40 (1.18)	0.00 (0.74)	0.00 (0.21)
Uruguay	.34	.37 (2.10)[c]	−0.00 (−0.16)	0.00 (0.00)
Venezuela	0.36	0.16 (0.40)	0.00 (0.27)	0.00 (0.93)

aSignificant at the 1% level.

bSignificant at the 5% level.

cSignificant at the 10% level.
 (Figures in parentheses are t-ratios).

TABLE 3

ESTIMATED REGRESSION COEFFICIENTS FOR SELECTED COUNTRIES
(WITH GNP AS THE DEPENDENT VARIABLE—CURRENT REGRESSION)

Country	Constant	Exports	Private Capital Inflow	Public Capital Inflow
Argentina	3.00	3.21 (2.86)b	0.00 (0.56)	0.00 (0.76)
Brazil	2873.74	2.55 (1.87)c	-2.03 (-0.85)	-1.48 (-0.93)
Ceylon	428.54	2.44 (3.54)a	-9.18 (-1.03)	3.85 (1.39)
Colombia	4.18	1.57 (1.63)	.01 (0.83)	.01 (1.08)
Costa Rica	132.78	1.38 (4.58)a	5.60 (3.03)a	6.08 (2.42)b
Cyprus	.02	1.75 (2.38)b	.41 (1.05)	.36 (0.96)
Ecuador	.76	2.03 (2.95)a	.02 (2.07)c	.02 (1.45)
El Salvador	59.64	1.30 (2.71)b	1.82 (1.68)	.18 (0.12)
Guatemala	22.29	3.97 (3.39)a	2.85 (2.09)c	.54 (0.32)
Honduras	10.13	.03 (0.19)	.45 (0.99)	.63 (0.80)
Mexico	12.54	3.22 (2.66)b	.04 (2.93)a	.02 (1.25)
Nicaragua	200.60	.38 (0.73)	1.06 (0.25)	-1.91 (-0.38)
Panama	19.46	1.64 (3.67)a	.09 (0.20)	.11 (0.23)
Peru	6.24	1.70 (2.45)b	-0.01 (-0.20)	.05 (2.40)b
Uruguay	2.26	4.43 (7.03)a	.03 (2.52)b	.03 (3.88)a
Venezuela	1.38	0.79 (2.25)b	0.00 (0.00)	-0.01 (-0.37)

aSignificant at the 1% level.

bSignificant at the 5% level.

cSignificant at the 10% level.
(Figures in parentheses are t-ratios).

TABLE 4

ESTIMATED REGRESSION COEFFICIENTS FOR SELECTED COUNTRIES
(WITH GNP AS THE DEPENDENT VARIABLE--LAGGED REGRESSION)

Country	Constant	Exports	Private Capital Inflow	Public Capital Inflow
Argentina	3.91	1.21 (0.94)	-0.01 (-0.46)	0.01 (1.59)
Brazil	2865.20	3.07 (2.73)[b]	-1.43 (-0.80)	0.00 (0.00)
Ceylon	465.23	0.00 (0.00)	3.77 (0.23)	8.80 (1.26)
Colombia	5.68	.19 (0.17)	0.00 (0.34)	-0.01 (-0.82)
Costa Rica	177.31	1.11 (2.63)[b]	4.34 (1.56)	-0.65 (-0.20)
Cyprus	7.36	.84 (0.74)	-4.27 (-0.48)	-0.38 (-0.68)
Ecuador	1.03	.57 (0.66)	.02 (2.57)[b]	0.02 (1.45)
El Salvador	102.89	.27 (0.54)	-0.98 (-0.92)	1.22 (0.70)
Guatemala	101.45	-0.86 (-0.51)	-1.31 (-0.60)	-0.33 (-0.13)
Honduras	71.68	.42 (0.37)	-4.30 (-1.02)	3.06 (0.52)
Mexico	14.91	2.41 (1.72)	.03 (1.82)[c]	.02 (0.94)
Nicaragua	205.71	.50 (0.93)	-1.21 (-0.28)	4.98 (0.98)
Panama	26.04	1.35 (2.96)[b]	-0.51 (-0.96)	0.38 (0.84)
Peru	7.00	1.38 (1.61)	.03 (2.34)[b]	-0.01 (-0.31)
Uruguay	4.30	2.10 (2.02)[c]	.02 (0.88)	.01 (0.58)
Venezuela	1.70	0.25 (0.48)	0.00 (0.74)	0.01 (0.44)

[a]Significant at the 1% level.

[b]Significant at the 5% level.

[c]Significant at the 10% level.
(Figures in parentheses are t-ratios).

39

TABLE 5

R^2'S AND F RATIOS FOR CURRENT AND LAGGED REGRESSIONS (WITH GFC AS THE DEPENDENT VARIABLE)

Country	R^2	F Ratio	F Table 1%	F Table 5%
Current				
Argentina	.27	1.74	3.16	5.09
Brazil	.11	0.42	3.34	5.56
Ceylon	.30	1.57	3.29	5.42
Colombia	.48	4.66[b]	3.13	5.01
Costa Rica	.77	17.46[a]	3.16	4.94
Cyprus	.79	8.71[a]	3.59	6.22
Ecuador	.56	6.48[a]	3.13	5.01
El Salvador	.52	3.27	3.41	5.74
Guatemala	.75	6.02[a]	3.16	5.09
Honduras	.09	1.23	3.29	5.42
Mexico	.38	3.22[b]	3.10	4.94
Nicaragua	.23	1.39	3.16	5.09
Panama	.29	1.61	3.24	5.29
Peru	.26	1.83	3.10	4.94
Uruguay	.76	11.31[a]	3.29	5.42
Venezuela	.36	3.04	3.10	4.94
Lagged				
Argentina	.36	2.48	3.20	5.18
Brazil	.35	1.62	3.41	5.74
Ceylon	.19	1.27	3.34	5.56
Colombia	.17	0.92	3.16	5.09
Costa Rica	.21	1.32	3.13	5.01
Cyprus	.21	0.52	3.71	6.55
Ecuador	.66	9.00[a]	3.16	5.09
El Salvador	.18	0.97	3.49	5.95
Guatemala	.33	2.09	3.20	5.18
Honduras	.45	2.67	3.34	5.56
Mexico	.21	1.31	3.13	5.01
Nicaragua	.21	1.16	3.20	5.18
Panama	.35	1.97	3.29	5.42
Peru	.09	0.48	3.13	5.01
Uruguay	.31	2.41	3.34	5.56
Venezuela	.12	0.68	3.13	5.01

[a]Significant at the 1% level.

[b]Significant at the 5% level.

TABLE 6

R^2'S AND F RATIOS FOR CURRENT AND LAGGED MIGRATIONS
(WITH GNP AS THE DEPENDENT VARIABLE)

Country	R^2	F Ratio	F Table 1%	F Table 5%
		Current		
Argentina	.40	3.16		
Brazil	.43	2.55		
Ceylon	.54	4.27[b]		
Colombia	.22	1.41		
Costa Rica	.60	8.02[a]		
Cyprus	.53	2.64		
Ecuador	.42	3.57[b]		
El Salvador	.49	2.87		
Guatemala	.50	4.60[b]		
Honduras	.25	0.36		
Mexico	.44	4.10[b]		
Nicaragua	.11	0.58		
Panama	.53	4.57[b]		
Peru	.39	3.35[b]		
Uruguay	.80	16.89[a]		
Venezuela	.29	3.35		
		Lagged		
Argentina	.20	1.10		
Brazil	.44	3.05		
Ceylon	.13	0.81		
Colombia	.09	0.42		
Costa Rica	.33	2.49		
Cyprus		0.34		
Ecuador		.00		
El Salvador		.55		
Guatemala	.03	.15		
Honduras	.10	0.36		
Mexico	.25	1.65		
Panama		0.46		
Peru	.34	4.38[b]		
		1.85		
Uruguay		.42		
Venezuela		.73		

[a] Significant at the 1% level.

[b] Significant at the 5% level.

TABLE 7

DURBIN-WATSON STATISTICS FOR CURRENT AND LAGGED REGRESSIONS
(WITH GFC AS THE DEPENDENT VARIABLE)[a]

Country	d	d_U	d_L	$4-d_U$	$4-d_L$
Current					
Argentina	1.33	1.42	.71	2.58	3.29
Brazil	2.48	1.48	.49	2.52	3.51
Ceylon	1.36	1.46	.59	2.54	3.41
Colombia	0.90	1.41	.74	2.59	3.26
Costa Rica	2.05	1.41	.77	2.59	3.23
Cyprus	2.50	1.49	.40	2.51	3.60
Ecuador	2.06	1.41	.74	2.59	3.26
El Salvador	1.51	1.49	.45	2.51	3.55
Guatemala	1.53	1.42	.71	2.58	3.29
Honduras	2.38	1.46	.59	2.54	3.41
Mexico	1.86	1.41	.77	2.59	3.23
Nicaragua	2.16	1.42	.71	2.58	3.29
Panama	1.68	1.44	.63	2.56	3.37
Peru	2.05	1.41	.77	2.59	3.23
Uruguay	1.68	1.46	.59	2.54	3.41
Venezuela	1.40	1.41	.77	2.59	3.23
Lagged					
Argentina	1.49	1.43	.67	2.57	3.33
Brazil	1.56	1.48	.52	2.52	3.48
Ceylon	1.23	1.47	.55	2.53	3.45
Colombia	2.00	1.42	.71	2.58	3.29
Costa Rica	2.55	1.41	.74	2.59	3.26
Cyprus	1.74	1.49	.42	2.51	3.58
Ecuador	2.42	1.42	.71	2.58	3.29
El Salvador	1.81	1.48	.49	2.52	3.51
Guatemala	1.53	1.43	.67	2.57	3.33
Honduras	2.43	1.47	.55	2.53	3.45
Mexico	1.32	1.41	.74	2.59	3.26
Nicaragua	1.80	1.42	.67	2.58	3.33
Panama	1.34	1.46	.59	2.54	3.41
Peru	1.81	1.41	.74	2.59	3.26
Uruguay	2.15	1.47	.55	2.53	3.45
Venezuela	1.74	1.41	.74	2.59	3.26

[a]All values are indicated for the 1% significance level.

The acceptable range for the d statistic is as follows:
$d_U < d < 4-d_U$.

42

TABLE 8

DURBIN-WATSON STATISTICS FOR CURRENT AND LAGGED REGRESSIONS (WITH GNP AS THE DEPENDENT VARIABLE)[a]

Country	d	d_U	d_L	$4-d_U$	$4-d_L$
Current					
Argentina	0.90	1.42	.71	2.58	3.29
Brazil	1.51	1.48	.49	2.52	3.51
Ceylon	0.88	1.46	.59	2.54	3.41
Colombia	0.97	1.41	.74	2.59	3.26
Costa Rica	1.74	1.41	.77	2.59	3.23
Cyprus	3.23	1.49	.40	2.51	3.60
Ecuador	1.37	1.41	.74	2.59	3.26
El Salvador	1.22	1.49	.45	2.51	3.55
Guatemala	2.19	1.42	.71	2.58	3.29
Honduras	2.60	1.46	.59	2.54	3.41
Mexico	1.19	1.41	.77	2.59	3.23
Nicaragua	1.10	1.42	.71	2.58	3.29
Panama	1.04	1.44	.63	2.56	3.37
Peru	0.55	1.41	.77	2.59	3.23
Uruguay	1.82	1.46	.59	2.54	3.41
Venezuela	0.98	1.41	.77	2.59	3.23
Lagged					
Argentina	1.34	1.43	.67	2.57	3.33
Brazil	1.29	1.48	.52	2.52	3.48
Ceylon	1.02	1.47	.55	2.53	3.45
Colombia	1.08	1.42	.71	2.58	3.29
Costa Rica	1.76	1.41	.74	2.59	3.26
Cyprus	2.62	1.49	.42	2.51	3.58
Ecuador	0.99	1.42	.71	2.58	3.29
El Salvador	2.09	1.48	.49	2.52	3.51
Guatemala	1.96	1.43	.67	2.57	3.33
Honduras	2.39	1.47	.55	2.53	3.45
Mexico	1.59	1.41	.74	2.59	3.26
Nicaragua	1.17	1.42	.67	2.58	3.33
Panama	2.02	1.46	.59	2.54	3.41
Peru[b]	0.85	1.41	.74	2.59	3.26
Uruguay	1.34	1.47	.55	2.53	3.45
Venezuela	1.10	1.41	.74	2.59	3.26

[a]All values are indicated for the 1% significance level.

[b]Positive serial correlation was found to exist.

The acceptable range for the d statistic is as follows: $d_U < d < 4-d_U$.

43

problems of multicollinearity. However, correlation between
independent variables was somewhat high in a few cases,
especially for both the current and lagged regression of
Cyprus. Two other cases possessing high correlation between
independent variables were Nicaragua and Peru in both the
current and lagged regressions. The presence of multi-
collinearity in these regression equations results in an
inability to distinguish between variables. The problem,
therefore, adds doubt to the significance of the estimated
regression equations and the contribution of each indepen-
dent variable for those particular countries affected by
multicollinearity.

No test for heteroscedasticity was performed.
However, its presence would not bias the results but merely
reduce the power of the test.

The estimated regression coefficients for the
current regression equations with gross fixed capital for-
mation (GFC) as the dependent variable are presented in
table 1 with t ratios in parentheses. The corresponding
R^2 values are shown in table 5. The R^2's range from a
value of .09 to .79. The values of the R^2's are found to
be significant at the 1 per cent level for Costa Rica
(R^2=.77), Cyprus (R^2=.79), Ecuador (R^2=.56), Guatemala
(R^2=.75), and Uruguay (R^2=.76) and at the 5 per cent level
for Colombia (R^2=.48) and Mexico (R^2=.38) as determined
by the F-test. Thus, seven of the sixteen regressions
were found to have significant over-all relationships.

As indicated by table 1 in the GFC regression for
the sixteen countries examined and on the basis of t-tests,
current year exports are significant at the 1 per cent
level for only three countries (Uruguay, Costa Rica, and
Guatemala) and significant at the 5 per cent level for
only two countries (Colombia and Ecuador). The coefficients
for these five countries range from .42 for Colombia to .68
for Guatemala indicating that an average unit increase in
exports generates a somewhat smaller increase in GFC (at
least for those countries which proved to be significant).
Eleven countries are therefore found to be insignificant
for this regression.

Secondly, current private capital inflows are sig-
nificant for four countries (Uruguay, Cyprus, Costa Rica,
and Guatemala) at the 1 per cent level and significant
for five countries (El Salvador, Colombia, Mexico, Ecuador,
and Venezuela) at the 5 per cent level. Coefficients for
these nine countries range from .01 for Venezuela to 5.34
for Costa Rica. Generally, however, coefficients for this
variable tend to be rather low (except in Costa Rica, El
Salvador, Cyprus, and Guatemala) indicating that an increase
in private capital inflows generates a very small amount of
gross fixed capital formation.

The third variable, net public capital inflow, is
significant at the 1 per cent level for only five countries
(Guatemala, Costa Rica, Cyprus, Ecuador, and Uruguay) and
insignificant for the remainder. Coefficients for the

significant variables range from a low of .01 to 3.69.
This relationship shows no definitive general trend for
coefficients of public capital inflows.

For the current GFC regression, current exports
serve to make an important contribution to GFC in at least
five of the sixteen countries investigated (those which
are significant at either the 5 per cent or 1 per cent
level). Current private capital inflows contributed sig-
nificantly to GFC in at least nine of the sixteen countries
while current public capital inflows contributed to GFC
in only five of the countries. The R^2's for the regressions
were significant in only seven of the countries.

The lagged regression with GFC as the dependent
variable shows only one case in which the R^2 is significant
according to the F-test, namely that of Ecuador with a
R^2 of .66. All other R^2's are lower than this although
insignificant. Estimated regression equations are shown
in table 2, and R^2's are presented in table 5.

Exports are a significant variable contributing
to GFC in only two cases (Argentina and Honduras) at the
5 per cent level for the lagged regression. Lagged private
capital inflows were significant at the 1 per cent level
in the case of Ecuador and significant at the 5 per cent
level for Guatemala. For lagged public capital inflow,
only one case is significant, namely that of Ecuador for
the 1 per cent level. Thus, it appears that the lagged

regression does not explain enough cases to be significant in the study.

The estimated regression coefficients for the current regression equations with GNP as the dependent variable are presented in table 3 with t ratios in parentheses. The corresponding R^2's (and F ratios) are shown in table 6. The R^2 values are shown to be significant at the 1 per cent level for Costa Rica (R^2=.60) and Uruguay (R^2=.82) and significant at the 5 per cent level for Ceylon (R^2=.54), Ecuador (R^2=.42), Guatemala (R^2=.50), Mexico (R^2=.44), Panama (R^2=.53), and Peru (R^2=.39) as indicated by the F-test. As indicated by table 3 in the GNP regression for the sixteen countries examined, current year exports are significant at the 1 per cent level for six countries (Ceylon, Costa Rica, Ecuador, Guatemala, Panama, and Uruguay) and significant at the 5 per cent level for six countries (Argentina, Cyprus, El Salvador, Mexico, Peru, and Venezuela). Coefficients range from .79 to 4.43.

Secondly, current private capital inflow is significant for only two countries (Costa Rica and Mexico) at the 1 per cent level and significant for only Uruguay at the 5 per cent level. Coefficients range from .03 to 5.60 (usually being somewhat low).

Finally, current public capital inflow is significant for only Uruguay at the 1 per cent level and significant for two countries (Peru and Costa Rica) at the 5 per cent level. Coefficients range from .03 to 6.08.

However, for the lagged regression with GNP as the dependent variable, only one R^2 is significant, namely that of Panama. Changes in exports are a significant explanatory variable of the change in GNP in only three cases (Brazil, Costa Rica, and Panama) at the 5 per cent level. Private capital inflow is significant in only two cases (Ecuador and Peru) at the 5 per cent level while public capital inflow is not significant for any country. Thus, this lagged regression does not contain much explanatory power in the model. The lagged regression coefficients are presented in table 4 and the corresponding R^2's are shown in table 6.

The analysis presented here considers the contribution of foreign exchange availability to economic development in a selected group of LDC's. The results are influenced by the particular sample of countries and years included in the study. The results and their corresponding implications are not uniform among all of the countries investigated. This, however, can be expected since not all of the countries are identical in their social, political, and economic characteristics.

Examining the regression in which GNP is the dependent variable, exports and public and private capital as sources of foreign exchange availability are not significantly important in the lagged regression. Not only are the R^2 values low, but in the majority of the cases

they did not even attain statistical significance. Add-
itionally, the low level of t statistics associated with
the estimated coefficients for the regression equations
casts serious doubts over its validity, even as to sign.
Thus, the mixture of negative and positive coefficients
for the same variable in the same regression with different
countries cannot be relied upon to be completely valid.

However, the results with GNP as the dependent
variable in the current regression indicate that foreign
exchange availability has a significant short-run effect
on GNP (at least in some of the countries). The individual
sources of foreign exchange differ in their relative im-
pacts on national product.

It appears that export receipts are the most effec-
tive means of stimulating GNP as indicated by the regression
coefficients. Export receipts are a significant explanatory
variable of GNP in thirteen of the sixteen countries and
thus can be said to make a significant contribution to
GNP. Private capital inflows are the second most impor-
tant explanatory variable contributing to GNP (significant
in at least five of the sixteen countries) as indicated
by the regression coefficients. Public capital inflows,
however, are important as an explanatory variable in only
three cases. Thus, in the aggregate, the most important
explanatory variable of GNP is exports followed by private
and public capital inflows respectively. Private and pub-

lic capital do not contribute as much as an explanatory variable as does exports. The findings in the GNP regression tend to corroborate those of Massell, Pearson, and Fitch and thus contrast with the over-all results of MacBean. The fact that public capital inflow has less of an effect on GNP can be explained in at least two ways. First, public borrowing for government expenditures is often used to increase the current level of the country's infrastructure which might not indicate increases in GNP. Secondly, the effects may not be seen on the country's development for several years after the initial financing.[25]

Again in the GFC regression with lagged variables, exports and public and private capital inflows all fail to sufficiently explain changes in GFC. The current regression again has significant explanatory power for the dependent variable GFC. In the aggregate, current private capital inflow appears to make the most important contribution to GFC. In nine of the sixteen countries, current private capital inflow is important in determining GFC. This would appear plausible since most private capital inflows would be expected to occur for investment purposes and would probably occur rather quickly.[26] Both exports and public capital inflows are important as an explanatory variable in at least five countries and appear to be similar

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[25]Massell, Pearson, and Fitch; "Foreign Exchange and Economic Development," p. 211.

[26]Ibid., p. 211.

in the magnitude of their effects.   Therefore, it appears
that foreign exchange receipts have significant short-run
effects on GNP and GFC (at least for some of the countries
which were examined).

CHAPTER IV

CONCLUSION

Although the study reveals the existence of a sta-
tistically significant relationship between foreign exchange
availability and domestic economic welfare within certain
LDC's, certain weaknesses are also found within the study.
First, a lack of available data and consistent statistical
series combined with problems in converting currencies via
exchange rates necessitated the use of various national
currencies in the study. In addition, U.S. dollars was
the only available measure in a consistent series for two
of the variables, namely that of public capital inflow and
private capital inflow. This inconsistency should not have
impaired the results of the study, but it did make inter-
country comparisons among variables more difficult.

A second weakness of the study is the existence
of autocorrelation and multicollinearity in some of the
regressions. Autocorrelation is, however, found in only
one case. Therefore, since autocorrelation appears in
only one regression, its over-all effect is not important.
Evidence of multicollinearity is also found in a few cases
of the regression. Thus, the study and its results are
weakened slightly by the existence of autocorrelation and

multicollinearity in these few cases, as discussed above.

Finally, although the present study attempts to explain and relate foreign exchange availability to its effect on the economic growth and development of the LDC's, it does not include the role of stocks of foreign exchange available to the countries, i.e., foreign exchange reserves. Foreign exchange reserves available to the LDC's are able to even out fluctuations in current foreign exchange receipts. Thus, significant growth and development occasioned by increases in GNP or gross fixed capital formation may occur during years lacking adequate current foreign exchange receipts (as defined in this study). This would seem to indicate that foreign exchange availability and development were not highly correlated. However, growth within the LDC's could be supplemented by drawing down on the existing stock of foreign exchange reserves. Generally, foreign exchange reserves are relatively small for the LDC's.[27] Nonetheless, without taking reserves into account, total foreign exchange availability is not accurately measured, and the relation between foreign exchange and growth is neither totally proven nor disproven.

The need for further research to overcome the weaknesses of this study would seem to be apparent. Further studies would be useful to determine the importance of foreign exchange reserves on the process of economic growth.

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[27]See, e.g., table 9 of this study for an indication of the size of foreign exchange reserves.

TABLE 9

INTERNATIONAL RESERVES AND FOREIGN EXCHANGE RESERVES
OF SELECTED UNDERDEVELOPED COUNTRIES FOR 1970
(in Millions of U.S. Dollars)

Country	International Reserves	Foreign Exchange Reserves	Country	International Reserves	Foreign Exchange Reserves
Argentina	673.0	343.0	Guatemala	78.3	58.7
Brazil	1187.0	962.0	Honduras	20.2	19.9
Ceylon	43.0	43.0	Mexico	744.0	385.0
Colombia	206.0	189.0	Nicaragua	49.2	47.6
Costa Rica	16.3	7.9	Panama	303.8	299.6
Cyprus	209.0	183.6	Peru	329.4	275.4
Ecuador	83.2	64.1	Uruguay	175.0	14.0
El Salvador	62.7	45.4	Venezuela	1021.0	472.0

Source: International Monetary Fund, International
Financial Statistics 1970/71 Supplement
(London: IMF Publications, 1971), pp. 104-237.

54

Also, more detailed case studies of individual countries would be useful in order to obtain a better view of the problem of foreign exchange availability and economic growth.

This study has focused upon the relationship between foreign exchange availability and economic growth in under-developed countries. Surprisingly, the results of the study have agreed with those from the studies of both Massell, Pearson, and Fitch and MacBean. Massell examined total foreign exchange availability and found that foreign exchange and its availability to the LDC's does, indeed, affect the internal economies of the LDC's. He found that a lack of foreign exchange tends to constrain development and growth for the less developed nations and that the sources of foreign exchange differ in the timing and magnitudes of their effects. The present study also finds a significant relationship between foreign exchange availability and GNP and GFC as indicators of domestic welfare within the LDC's for a large part of the sample under study.

MacBean, on the other hand, found no strong over-all relationship between export earnings and GNP as an indicator of domestic economic activity. However, he did recognize the existence of a somewhat weak relationship between export earnings and GNP in certain LDC's. On the basis of his empirical study, MacBean concluded that significant fluctuations in export proceeds do not inevitably lead to grave internal problems for the LDC's. Although foreign exchange shortages may be a problem to certain LDC's, it

is not always true that the problem affects growth. Thus,
MacBean determined that a shortage of export earnings might
be a serious problem for the economies of certain countries
and not for others because of certain inherent character-
istics of the respective countries. This conclusion ex-
tended to total foreign exchange earnings is again consis-
tent with the results of the present study. Empirical
research has indicated that a significant relationship
between foreign exchange availability and domestic welfare
of certain less developed countries does, indeed, exist.
However, this relationship is not true for all countries.

The present study has neither definitively refuted
nor corroborated the original hypothesis. Instead, the
findings of the study indicate that the relationship be-
tween foreign exchange availability and economic growth
in the LDC's is neither simple nor unique. It has been
shown that the impact of foreign exchange availability
on the domestic economies of the LDC's is not uniform among
all countries. It cannot be expected that changes in for-
eign exchange availabilities will have identical effects
on the economies of countries differing in size, political
and social conditions, income levels, importance of the
foreign sector to the whole economy, or stage of total
development. The study has again emphasized the unique
character of each of the less developed nations and the
importance of individually examining each specific situation
and problem before beginning treatment.

Finally, it is hoped that the results of the study may find some use in policy. This could occur in two ways. First, it might be possible to stimulate economic development in certain developing countries by changing the composition of foreign exchange receipts depending upon the relative impacts of the three sources of foreign exchange on growth prospects. Secondly, resources spent for policy measures to increase foreign exchange availability to certain LDC's might be better used elsewhere, especially if the economy of the particular country were insensitive to changes in foreign exchange availability. Whether the findings of the study have useful policy implications or not, the study and its results do indicate the need for further research on individual countries and on the general topic of development and foreign exchange availability.

APPENDIXES

APPENDIX A

NOTE ON STATISTICAL SOURCES AND METHODS

Statistical data used in the preceding study are described throughout the study. Nevertheless, it is appropriate at this point to again present the major sources of information used in the statistical analyses and comment upon their accuracy. The principal sources of information consisted of: International Financial Statistics, the monthly publication of the International Monetary Fund; International Financial Statistics, 1970/71 Supplement; The Statistical Yearbook, an annual United Nations' publication; and the Yearbook of National Accounts Statistics, an annual United Nations' publication.

The statistical material currently available for underdeveloped countries (including those countries used in this study) is often of doubtful reliability. Methods of classifying items, especially those items within the balance of payments records change over time; exchange rate changes cause difficulties in compiling statistics; exchange rates themselves are difficult to convert to a single base, and statistical time series are either inadequate in length or inconsistent and thus result in gaps and incomparable statistical data. Nonetheless, the data come from the

59

most reliable sources available--the United Nations and the International Monetary Fund who collect them from official sources in the individual countries, and are adequate for the present study (provided that reservations concerning their reliability are recognized).

Because normal sources of statistical error probably affect changes in the total measures of variables less than the absolute magnitudes themselves, measures of fluctuations and changes in significant economic variables for under-developed countries can be regarded as having greater re-liability than the absolute magnitudes themselves. However, the reliability of the statistical data is limited and un-doubtedly affects the outcome of empirical studies which use such data.

Research work of both individuals and institutions could be facilitated by standardization of various cate-gories of statistical series, reconciliation of various series, and extension of such changes backward as well as forward in time in order to lengthen the usable time series. Users of such statistics can rarely make these changes as well or as accurately as can the original compilers of the data.

Statistical results are naturally subject to tests upon their reliability. The usual statistical tests of significance, namely t tests and F tests, as well as the Durbin-Watson test for autocorrelation, and notice of

significant intercorrelations among the independent var-

iables to check for multicollinearity were applied to the

statistical results obtained from the regression. A 5 per

cent significance level is used in the tests of statistical

significance, unless otherwise stated. The result is

accepted as statistically significant if it attains this

level of significance and rejected as unproven if it does

not meet this significance level.

Partial regression coefficients are tested for

significance to determine whether they are significantly

different from zero. For example, using the regression

equation, $Y = 2.26 + 4.43X_1 + 0.03X_2 + 0.03X_3$, we determine

if the individual partial regression coefficients, $b_1 = 4.43$

and $b_2 = .03$ and $b_3 = .03$, are significant by use of the t test.

If one of the partial regression coefficients are not sig-

nificant, it suggests that there is no regression relation

between the dependent variable (Y) and the independent

variable with the non-significant coefficient; that is, we

cannot be 95 per cent sure that there is any relationship

whatsoever.[28]

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[28]Taro Yamane is a good source for further infor-
mation on tests of significance for multiple linear re-
gression models in Statistics, An Introductory Analysis
(3rd ed.; New York: Harper & Row, Publishers, 1973), Chap-
ter 23.

APPENDIX B

COUNTRIES, THEIR CURRENCIES, AND YEARS INCLUDED IN CURRENT AND LAGGED REGRESSIONS

Country	Currency	Current Regression	Lagged Regression
Argentina	Pesos	1952-69	1953-69
Brazil	Cruzeiros	1956-69	1957-69
Ceylon	Rupees	1957-71	1958-71
Colombia	Pesos	1952-70	1953-70
Costa Rica	Colones	1952-71	1953-71
Cyprus	Cyprus Pounds	1961-71	1962-71
Ecuador	Sucres	1952-70	1953-70
El Salvador	Colones	1959-71	1960-71
Guatemala	Quetzales	1954-71	1955-71
Honduras	Lempiras	1957-71	1958-71
Mexico	Pesos	1952-71	1953-71
Nicaragua	Cordobas	1954-71	1955-71
Panama	Balboas	1956-71	1957-71
Peru	Soles	1952-71	1953-71
Uruguay	Pesos	1956-70	1957-70
Venezuela	Bolivares	1952-71	1953-71

GROSS NATIONAL PRODUCT, EXPORTS, GROSS FIXED CAPITAL FORMATION,
PRIVATE AND PUBLIC CAPITAL INFLOWS OF SELECTED COUNTRIES[a]
(Measured in Current Prices)

Year	GNP	GFC	X	P	G
Argentina (Pesos)[b]					
1952	1.12	.21	.06	207	175
1953	1.29	.23	.09	-11	-356
1954	1.45	.24	.08	-101	0
1955	1.71	.30	.10	12	197
1956	2.17	.40	.24	128	1
1957	2.71	.55	.27	160	141
1958	3.85	.77	.33	5	251
1959	7.37	1.26	.89	91	-105
1960	10.02	2.08	1.03	365	-167
1961	11.91	2.68	.94	272	301
1962	14.77	3.18	1.55	-29	299
1963	18.45	3.28	2.07	-207	-25
1964	25.66	4.24	2.16	82	-118
1965	36.04	6.17	2.78	-3	-221
1966	44.91	7.90	3.55	-230	-30
1967	58.71	10.71	5.36	234	-418
1968	68.32	13.04	5.48	128	-113
1969	80.42	15.72	6.41	5	216
Brazil (Cruzeiros)[c]					
1955	800	100	1	81	-21
1956	1000	100	1	132	-202
1957	1200	200	1	216	88
1958	1500	200	1	94	-21
1959	2000	400	1	277	60
1960	2740	470	170	207	314
1961	4040	700	280	202	74
1962	6550	1190	340	56	435
1963	11860	2100	1160	12	202
1964	22910	3810	1730	-103	77
1965	36430	5410	3250	124	-333
1966	53230	8200	4080	136	4
1967	70699	10324	4738	97	256
1968	98958	16635	6867	577	-29
1969	131883	21949	10144	865	-498

[a]Symbols in table are defined at end of appendix.

[b]GNP, GFC, and X are measured in billions of pesos;
P and G are measured in millions of U.S. dollars.

[c]GNP, GFC, and X are measured in millions of cruzeiros;
P and G are measured in millions of U.S. dollars.

Year	GNP	GFC	X	P	G
Ceylon (Rupees)[d]					
1956	5329	815	1963	-12.0	-33.8
1957	5555	858	1875	-13.0	73.6
1958	5894	6943	1845	-22.6	72.8
1959	6325	6995	2016	-8.1	77.0
1960	6640	979	2011	-3.8	54.6
1961	6648	959	1908	-2.5	29.8
1962	6960	1022	1966	-.2	30.9
1963	7180	1072	1903	-5.8	43.7
1964	7817	1124	1938	-11.5	53.4
1965	8102	1062	2095	-5.5	-1.6
1966	8331	1175	1865	-13.3	82.1
1967	9002	1344	1849	-2.1	65.8
1968	10596	1560	2165	-20.1	77.0
1969	11656	2207	2154	.6	139.9
1970	12718	2360	2237	-8.7	66.1
Colombia (Pesos)[e]					
1952	9.57	1.33	1.29	-58	8
1953	10.65	1.79	1.68	-27	-12
1954	12.68	2.16	1.91	14	11
1955	13.18	2.38	1.64	-23	143
1956	14.77	2.53	1.85	-14	26
1957	17.59	2.64	2.70	-236	159
1958	20.29	3.34	3.89	-79	20
1959	23.34	3.91	4.07	34	-94
1960	26.45	4.85	4.16	88	-4
1961	30.03	5.58	3.92	9	134
1962	33.70	6.14	4.15	86	89
1963	42.71	7.17	5.17	54	92
1964	52.96	8.65	6.38	101	42
1965	59.90	9.50	6.94	48	-23
1966	72.37	12.30	8.92	201	89
1967	81.61	14.73	9.95	82	7
1968	94.42	18.82	12.52	132	59
1969	108.28	21.23	14.68	92	121
1970	127.00	25.85	18.52	229	181

[d]GNP, GFC, and X are measured in millions of rupees;
P and G are measured in millions of U.S. dollars.

[e]GNP, GFC, and X are measured in billions of pesos;
P and G are measured in millions of U.S. dollars.

Year	GNP	GFC	X	P	G
Costa Rica (Colones)[f]					
1952	1569	297	451	-3.4	-5.5
1953	1761	318	502	-7.8	-2.5
1954	1917	314	536	-14.4	3.0
1955	2086	362	528	-1.7	2.3
1956	2161	403	477	9.0	10.4
1957	2341	442	595	11.4	8.5
1958	2410	455	646	6.8	2.1
1959	2539	498	553	12.3	13.5
1960	2744	525	613	4.1	16.0
1961	2894	526	617	3.7	16.0
1962	3118	663	729	22.1	-.3
1963	3413	725	755	23.2	10.9
1964	3533	660	887	19.9	12.7
1965	3867	897	896	65.0	11.2
1966	4149	863	1072	41.2	11.3
1967	4486	914	1168	68.5	-9.5
1968	4935	1012	1445	52.7	-7.0
1969	5548	1155	1552	77.1	-17.0
1970	6357	1390	1842	59.5	20.5
1971	6808	1634	1968	104.8	9.4
Cyprus (Cyprus Pounds)[g]					
1960	105.8	12.6	28.9	15.5	7.2
1961	114.9	12.6	30.0	28.0	-10.4
1962	121.6	14.0	33.7	23.7	.9
1963	127.0	14.4	35.7	31.1	-4.7
1964	117.4	15.5	31.1	9.5	.6
1965	144.1	17.5	44.0	20.5	-11.7
1966	152.1	17.3	51.1	23.5	-15.9
1967	167.8	18.7	34.6	27.3	-17.4
1968	182.6	20.9	65.6	63.2	-52.9
1969	210.7	24.0	75.7	41.2	-21.5
1970	216.4	25.8	81.2	59.1	-23.7
1971	244.4	29.9	93.3	81.0	-48.1

[f] GNP, GFC, and X are measured in millions of Colones; P and G are measured in millions of U.S. dollars.

[g] GNP, GFC, and X are measured in millions of Cyprus pounds; P and G are measured in millions of U.S. dollars.

Year	GNP	GFC	X	P	G
Ecuador (Sucres)[h]					
1952	8.55	.81	1.71	-23.1	-9.6
1953	9.06	1.00	1.72	-20.5	7.9
1954	10.17	1.38	2.15	-5.1	5.1
1955	10.74	1.54	2.07	-17.1	18.3
1956	10.90	1.56	2.10	11.2	13.5
1957	11.63	1.56	2.38	7.5	-1.5
1958	12.05	1.52	2.31	13.2	-.2
1959	12.62	1.73	2.45	7.2	-2.3
1960	13.74	1.90	2.53	-.2	20.4
1961	14.62	2.05	2.52	1.3	27.6
1962	15.67	1.96	3.08	8.4	12.1
1963	17.10	2.15	3.02	16.0	-4.9
1964	18.93	2.34	3.25	23.5	7.1
1965	20.22	2.41	3.62	6.7	22.7
1966	22.22	2.52	3.73	17.2	5.9
1967	24.47	2.97	4.04	37.9	3.1
1968	26.72	3.77	4.26	48.5	27.4
1969	30.11	4.74	4.18	118.8	19.8
1970	34.31	5.45	5.44	108.7	29.8
El Salvador (Colones)[i]					
1958	1379	166	318	-7.9	6.3
1959	1340	160	308	-9.2	8.3
1960	1413	204	289	15.7	12.9
1961	1496	168	324	-2.6	5.3
1962	1590	173	375	8.6	-6.9
1963	1681	202	410	24.5	-7.2
1964	1853	263	477	35.9	-7.7
1965	1975	296	529	16.0	9.9
1966	2093	326	521	29.6	21.2
1967	2198	323	567	28.0	7.3
1968	2273	248	585	20.7	2.8
1969	2362	274	556	20.3	13.0
1970	2544	308	619	15.5	10.9
1971	2656	344	627	32.2	10.3

[h]GNP, GFC, and X are measured in billions of Sucres; P and G are measured in millions of U.S. dollars.

[i]GNP, GFC, and X are measured in millions of Colones; P and G are measured in millions of U.S. dollars.

Year	GNP	GFC	X	P	G
Guatemala (Quetzales)[j]					
1953	728	60	104	-12.1	.5
1954	774	60	108	-3.2	2.1
1955	806	80	113	9.1	-3.6
1956	896	134	133	13.1	11.6
1957	933	150	129	14.7	24.6
1958	967	136	122	7.4	42.6
1959	1028	112	122	22.4	17.8
1960	1033	102	132	15.1	10.5
1961	1064	109	129	9.3	13.9
1962	1132	107	135	6.0	17.0
1963	1249	125	180	17.1	3.7
1964	1277	159	195	47.7	-2.0
1965	1315	174	224	33.9	8.2
1966	1365	167	263	11.6	10.0
1967	1425	192	236	51.2	20.1
1968	1573	221	270	42.4	15.0
1969	1680	231	305	33.0	-6.4
1970	1864	239	354	20.9	-6.4
1971	2001	265	349	67.8	-6.3
Honduras (Lempiras)[k]					
1956	641	84	157	2.7	3.5
1957	687	94	139	6.6	7.1
1958	715	92	150	.5	8.8
1959	749	89	148	-4.3	6.0
1960	774	96	136	8.4	5.3
1961	786	87	157	-8.3	7.8
1962	837	113	174	-3.6	6.3
1963	860	127	179	7.4	9.4
1964	911	131	202	12.5	4.9
1965	1006	146	273	9.8	.9
1966	1069	168	309	20.6	2.9
1967	1144	198	335	28.4	4.9
1968	1247	212	387	33.0	7.9
1969	1297	252	367	19.8	18.1
1970	1360	272	384	34.7	35.7
1971	1444	271	405	5.8	26.2

[j] GNP, GFC, and X are measured in millions of Quetzales; P and G are measured in millions of U.S. dollars.

[k] GNP, GFC, and X are measured in millions of Lempiras; P and G are measured in millions of U.S. dollars.

Year	GNP	GFC	X	P	G
Mexico (Pesos)[1]					
1952	58.6	8.2	8.2	-55	26
1953	58.4	8.1	8.0	87	35
1954	71.5	10.1	11.5	-21	44
1955	87.3	12.6	14.7	76	-230
1956	99.3	16.8	16.0	210	-96
1957	114.2	19.1	15.2	265	31
1958	127.2	18.9	15.3	136	129
1959	136.2	19.6	15.9	211	-50
1960	154.1	23.2	16.6	354	-21
1961	163.8	24.1	17.8	228	0
1962	177.5	24.8	19.4	130	-13
1963	192.2	28.0	20.9	252	-51
1964	224.6	36.6	22.5	453	-41
1965	244.7	39.0	24.7	315	83
1966	274.5	45.5	26.9	311	80
1967	304.3	52.9	27.0	605	30
1968	332.8	65.7	28.3	734	23
1969	374.9	72.8	32.7	471	138
1970	418.7	82.2	33.9	857	190
1971	455.4	84.6	36.6	1061	-148
Nicaragua (Cordobas)[m]					
1954	2018	377	391	-1.0	7.7
1955	2139	376	534	-6.4	.6
1956	2173	348	475	.3	8.8
1957	2383	346	550	11.2	-.3
1958	2377	334	596	7.7	5.7
1959	2421	358	721	-2.6	-2.0
1960	2626	330	536	5.7	5.6
1961	2823	345	574	.8	6.4
1962	3104	458	717	12.4	.9
1963	3311	513	867	27.1	13.1
1964	3848	661	1016	20.0	-5.4
1965	4210	755	1177	43.7	-14.0
1966	4395	891	1167	33.5	11.9
1967	4731	870	1244	45.9	24.1
1968	5353	874	1317	33.1	13.0
1969	5651	1014	1295	28.6	14.2
1970	6098	1026	1465	36.9	8.4
1971	6606	1083	1531	37.7	10.8

[1]GNP, GFC, and X are measured in billions of pesos; P and G are measured in millions of U.S. dollars.

[m]GNP, GFC, and X are measured in millions of Cordobas; P and G are measured in millions of U.S. dollars.

Year	GNP	GFC	X	P	G
Panama (Balboas)[n]					
1955	313.7	33.4	115.9	2.1	-1.1
1956	326.7	47.2	115.4	15.7	11.5
1957	361.7	55.9	119.5	11.0	9.2
1958	370.6	52.1	109.0	18.9	20.9
1959	389.7	54.2	118.2	16.7	9.2
1960	401.9	61.4	127.3	11.8	14.1
1961	453.2	80.4	146.3	9.4	7.0
1962	495.6	85.4	179.5	9.7	10.8
1963	550.8	96.6	197.0	1.9	29.1
1964	595.4	87.8	210.8	-7.9	5.7
1965	644.1	100.1	240.2	14.9	13.4
1966	702.7	142.1	268.2	21.5	12.9
1967	778.0	152.7	301.7	3.5	11.1
1968	836.2	173.5	330.0	3.5	6.5
1969	920.1	200.7	362.9	-16.5	40.6
1970	1019.4	255.6	390.1	-38.3	40.2
1971	1160.0	301.3	419.9	-6.2	41.9
Peru (Soles)[o]					
1952	21.10	4.40	4.20	27	9
1953	22.70	5.30	4.30	24	27
1954	26.30	4.50	5.40	4	-5
1955	28.90	5.50	6.00	-8	17
1956	32.40	7.70	6.80	83	16
1957	35.50	8.90	7.10	96	62
1958	39.50	9.20	7.80	95	22
1959	46.30	8.40	10.10	72	-34
1960	55.50	9.50	13.50	36	-38
1961	62.30	12.30	15.30	57	-41
1962	71.70	15.10	16.70	41	5
1963	78.70	15.10	16.80	105	-12
1964	95.00	15.40	20.50	0	-5
1965	113.00	19.20	20.60	83	81
1966	134.00	22.60	24.20	111	142
1967	152.80	23.40	27.40	139	180
1968	181.30	24.10	38.20	-75	116
1969	198.30	25.40	40.40	-36	44

[n]GNP, GFC, and X are measured in millions of Balboas; P and G are measured in millions of U.S. dollars.

[o]GNP, GFC, and X are measured in billions of Soles; P and G are measured in millions of U.S. dollars.

Year	GNP	GFC	X	P	G
Uruguay (Pesos)P					
1956	5.15	.69	.53	12.0	-17.8
1957	6.10	.96	.50	25.3	63.7
1958	6.60	.71	.77	-22.4	5.6
1959	8.84	1.01	.96	4.5	45.2
1960	13.54	2.00	2.00	32.3	42.9
1961	17.23	2.77	2.47	59.5	-36.8
1962	18.71	2.94	2.19	-5.9	77.4
1963	22.17	2.88	2.83	-2.4	6.5
1964	32.26	3.39	3.93	-13.3	19.6
1965	51.86	5.55	9.50	-27.6	-41.2
1966	98.22	10.55	15.67	-126.9	77.3
1967	164.47	21.30	23.10	11.9	4.3
1968	360.45	33.20	54.90	-24.9	-1.4
1969	492.50	50.10	64.90	-2.5	-7.2
1970	596.20	64.00	72.40	10.7	44.2
Venezuela (Bolivares)q					
1952	12.53	4.01	4.51	-440	-66
1953	13.35	4.28	4.71	-438	-45
1954	14.77	4.99	5.20	-505	-5
1955	15.99	4.41	5.91	-592	-50
1956	17.93	5.10	6.91	201	-164
1957	20.60	5.95	8.52	516	-11
1958	22.49	5.96	7.83	-81	127
1959	23.67	6.06	7.80	26	51
1960	23.57	4.80	8.27	-541	159
1961	24.68	4.29	9.07	-503	-52
1962	26.80	4.64	10.20	-357	-95
1963	29.33	5.00	10.92	-280	-275
1964	32.41	6.27	11.38	-170	-107
1965	34.43	6.97	11.65	-181	78
1966	36.12	7.43	11.28	-200	93
1967	38.35	7.93	11.98	-195	-49
1968	38.78	10.17	12.25	105	-49
1969	40.54	10.71	12.20	27	89
1970	44.15	10.67	12.76	-60	-176
1971	49.15	12.33	14.92	153	-221

PGNP, GFC, and X are measured in billions of pesos; P and G are measured in millions of U.S. dollars.

qGNP, GFC, and X are measured in billions of Bolivares; P and G are measured in millions of U.S. dollars.

Symbols in the above table are as follows: GNP=gross national product, GFC=gross fixed capital formation, X=exports, P=private capital inflow, and G=public capital inflow.

APPENDIX D

RELATIVE IMPORTANCE OF EXPORTS AND IMPORTS TO DOMESTIC ECONOMIES AND WORLD MARKETS OF SELECTED COUNTRIES (1970)

Country	Exports as % of GDP	Imports as % of GDP	Exports as % of world exports	Imports as % of world imports
Argentina	7.0	6.9	.63	.58
Brazil	6.1	7.4	.98	.97
Ceylon	15.8	18.0	.12	.13
Colombia	8.7	11.9	.26	.29
Costa Rica	24.4	33.5	.08	.11
Cyprus	20.8	45.7	.04	.08
Ecuador	15.9	16.8	.08	.08
El Salvador	22.4	20.9	.08	.07
Guatemala	15.7	14.9	.11	.10
Honduras	24.4	31.5	.06	.07
Mexico	4.2	7.3	.50	.84
Nicaragua	20.1	22.8	.06	.07
Panama	10.6	34.1	.04	.12
Peru	16.6	12.2	.37	.20
Uruguay	12.1	14.2	.08	.08
Venezuela	25.0	17.9	.95	.68

Source: International Monetary Fund, International Financial Statistics 1970/71 Supplement (London: IMF Publications, 1971), pp.xxxii-xxx.

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