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DEVELOPMENT ALTERNATIVES
FOR
LATIN AMERICA

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Economic Development Report No. 29,
(Revised) April 1967.

Presented at the D.A.S. Conference, Sorrento, Italy,
September, 1967.

PROJECT FOR QUANTITATIVE RESEARCH
IN ECONOMIC DEVELOPMENT
Center for International Affairs,
Harvard University,
Cambridge, Massachusetts.

A.I.D. Contract # 1543

DEVELOPMENT ALTERNATIVES FOR LATIN AMERICA[1/]

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For nearly two decades discussions of Latin American development have focussed on problems of structural imbalance and their possible cures. Prebisch began the discussion in 1951 when he argued that continued dependence on primary exports would place limits on further Latin American growth /14/. While those limits appear to have been real, especially for exporters of tropical agricultural products, the alternative then advocated by Prebisch and pursued throughout Latin America -- import substitution through industrialization -- has run into increasing difficulties. Industrial growth, despite protection and other preferential policies, has been no more rapid in Latin America than in other parts of the world.[2/] Apart from initial spurts due to import

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[1/] Paper presented to the University of Chicago Conference on Key Problems of Economic Policy in Latin America, November, 1966. Our research was supported by the Center for International Affairs at Harvard University and by the U.S. Agency for International Development. Neither has any responsibility for the analyses or conclusions presented. We wish to thank Allan Samansky, who programmed the model through many stages of increasing complexity; Mirtha Liem who gathered most of the data; and Christopher Clague, who prepared the productivity projections contained in Table 2. We are also indebted to Som Liem for his advice on trade patterns, to Belle Cole for editorial assistance, and to Jane Canter, Doris Dodge, and Edith Hagelin for their assistance in compiling the results of the study.

[2/] From 1948 to 1961, manufacturing industry grew at 5.6% in Latin America as compared to 7% in all the less developed countries, /18, p. 156/.

substitution, it has been limited by the slow growth of the other sectors of the economy.

Policy making in Latin America has suffered from the lack of an overall analytical framework to show the interdependence among measures aimed initially at different objectives, such as improving the trade balance, industrializing or controlling inflation. Recently, however, several valuable studies have described the structural limitations on development possibilities in major countries.[1/] Each shows the external sector to have been a critical element both in explaining past difficulties and in determining future prospects.

The present paper will utilize the insights from more detailed studies to develop an aggregative model that brings out the relations between the internal and external factors in economic development. The model will be used for three purposes:

(1) to interpret recent development performance; (2) to indicate in quantitative terms some of the requirements of accelerated growth; and (3) to provide a framework for the discussion of alternatives facing the United States and the Latin American countries. One section of the paper is devoted to each of these topics.

1/ Particularly the analyses by Diaz of Argentina /7/, Baer of Brazil /2/, Mamalakis and Reynolds of Chile /12/, Solis of Mexico /16/, and Sheahan /15/ and Vanek /21/ of Colombia.

I. LATIN AMERICAN DEVELOPMENT, 1950-1965: AN ECONOMETRIC INTERPRETATION

Much of the debate about future development policy in Latin America stems from differences in the interpretation of past events. While the Economic Commission for Latin America /19/ tends to interpret recent history almost entirely in terms of the limited capacity to import, many outside observers stress more orthodox factors such as the failure to mobilize savings and to allocate investment to more productive uses.

Although the average rate of growth in Latin America in the past fifteen years has been similar to that in Asia and Africa, a recent study by one of the present authors /4/ suggests that Latin American development may have been subject to a somewhat different set of structural limitations. A comparison of fourteen Latin American countries with seventeen less developed countries in Asia and Africa over the period 1957-62 shows the following differences:

(1) The median marginal savings rate for the Latin American group was .10, while that for the others was twice as large.

(2) The ratio of imports to GNP was declining in 10 of the 14 Latin American countries, while it was increasing in a majority of the others.

(3) Although Latin America is more favorably endowed with resources in relation to population than most underdeveloped economies, the median incremental capital-output ratio was somewhat higher in Latin America than elsewhere.

Although the period of observation is too short and the data too crude to support any firm conclusions, these comparisons suggest the need for a more comprehensive analysis. It is only in such a framework that individual elements of savings, investment and trade performance can be evaluated.

A. The Analytical Framework

A number of recent studies, /1, 3, 4, 5, 13, 21/ have analyzed the process of development in terms of two scarce factors, foreign exchange and capital. In the short run these are complementary inputs, and their availabilities constitute separate limits to growth. With a given structure of demand and production, each level of GNP has a set of minimum import requirements, and the availability of foreign exchange -- from exports or external capital -- sets a limit to the income level that can be attained. Similarly, the availability of investment funds -- from domestic savings or external capital -- determines a separate limit to the growth of output.

A simple model based on these assumptions is utilized by Chenery and Strout /4/ to determine the inflow of external capital required to sustain a given increase in GNP. The basic approach is to define for each country a prospective "savings gap" and a prospective "trade gap", corresponding to the rate of growth and the economic structure assumed. The prospective savings gap is the difference between the gross investment required to attain the specified growth

target and the gross savings which the domestic economy is capable of generating. The prospective trade gap is the difference between the value of the imports which are required at the specified level of GNP and the value of the exports which the economy can produce and sell. Since both prospective gaps must be filled if growth is to be realized, the external capital requirement is determined by the larger of the two.

The amount of foreign capital actually supplied fills both gaps simultaneously, so that in retrospect the two are necessarily equal. The model must include an assumption as to how this equalization occurs. If the prospective trade gap is the larger of the two, actual savings are assumed to fall short of potential savings -- e.g. through lower taxes or more liberal consumer credit. If the prospective savings gap is the larger, actual imports are assumed to be greater than those required for growth -- e.g. through imports of non-essential consumer goods.[1/]

[1/] The possibility of other adjustments -- in exports or in capital-intensities -- is discussed by McKinnon /13/ and Cohen /5/. Our model does allow (see Section II) for the undertaking of some more capital-intensive investment projects when potential savings would otherwise go unrealized. As to trade adjustments, we would argue that in any given year most countries -- especially producers of highly specialized raw materials or foodstuffs -- find it more rewarding to adjust to the availability of foreign exchange by increasing their imports rather than by consuming their own potential exports.

The present study is based on estimates for a fifteen year period. This statistical base enables us to extend the Chenery-Strout model by introducing several additional variables into the structural equations in an attempt to bring out their interdependence more fully. Our most significant modifications of the model are:

(1) the use of an investment function dependent on the rate of growth;

(2) the inclusion of investment and consumption as separate determinants of import requirements (replacing the single income variable in the equations for most countries), and the introduction of substitution effects into the import function;

(3) the inclusion of the level of exports and capital inflow as determinants of savings.

There remains an inherent difficulty in trying to estimate the structural relations of the model from historical data. The two-gap theory suggests that such estimates may have a pessimistic bias.[1/] When the two prospective gaps are not equal and foreign capital fills the larger, we necessarily observe a less-than-full-potential performance with respect to the smaller. Extrapolation of such performance may lead to an underestimate of growth potential if the gap which was

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[1/] This bias may help explain the lower performance shown by Latin America in the indicators mentioned above.

smaller historically appears to become dominant in the projections.[1] To offset this bias we have usually chosen the more optimistic of conflicting estimates of a given relationship.

B. Estimation of the Model

We have estimated performance by sixteen Latin American countries with regard to the two gaps based on experience over the years 1950-1965. The countries are the nineteen members of the Alliance for Progress, less Uruguay, Haiti and the Dominican Republic. During the period for which the estimates were made the GNP of the 16 countries rose from 37.7 billion (1962) dollars to $73.4 billion, the equivalent of a compound rate of growth of 4.9% per year. Population rose from 142 to 211 million, equivalent to 2.9% per year, so that the growth of GNP per capita was 2%.

Development over the period has not been smooth for most of the countries concerned. The trend in the rate of growth has been steadily downward, from a per capita rate of 2.3% in 1950-55 to 2.0% in 1955-60 and 1.5% in 1961-65.[2] Frequent interruptions in growth -- due partly to political instability and downturns in aggregate demand but often to shortages of

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[1] The same problems plague efforts to determine from statistics which constraint -- savings or foreign exchange -- was most important in holding back a country's growth. Inadequate savings and taxation (for a given level of investment) can generate a balance of payments crisis, and a heavy dependence on imported raw materials and capital goods can choke off investment (and observed savings as well) when foreign exchange earnings fall.

[2] A recovery of the per capita rate to more than 2.5% in 1964 and 1965 cannot be taken as convincing evidence of a reversal of the trend, since it mainly reflects the resumption of growth in Argentina and Brazil after the slump of the previous two years. The overall growth rate declined again in 1966.

essential imports -- have been a major retarding force.[1/]

Our estimates of the elements determining the two gaps during this period -- capital requirements, savings, imports and exports -- may provide some insights into the inadequacies of past performance as well as a basis for projections of future growth.

The principal variables used in the analysis are defined in Table I.

1. Capital Requirements

Several recent discussions of the capital-output ratio /9, 11, 17/ have concluded that it should be expected to be -- and almost always is -- lower at higher rates of growth. There are three reasons why such a relationship should hold:

(i) During times of rapid growth capacity is likely to be utilized faster than it is created, while during slow growth it is often created faster than it is utilized.

(ii) Increases in other factors -- labor, available resources, and technology -- play a large part in determining the growth of output, and to some extent these elements may vary independently of investment.

(iii) When higher growth rates are based on greater investment, the part of gross investment used to replace old equipment and to construct social overhead facilities usually represents a smaller share of the total.

1/ Of the major countries of the region, only Mexico and Peru have been largely free of the stagnation or cyclical fluctuations of exports earnings which have contributed to the interruption of growth elsewhere.

TABLE I

Major Variables[1]

V	=	Gross National Product
M	=	Imports of Goods and Services[2]
E	=	Exports of Goods and Services[2]
F	=	Capital Inflow ($\equiv$ M - E)
I	=	Gross Domestic Investment
S	=	Gross Domestic Savings (= I - F)
R	=	Reserves of Foreign Assets
r	=	Growth rate of GNP

1/ All values are in millions of 1962 dollars. Trade variables are converted from current dollar values to 1962 dollars via the deflator for the export component of United States GNP. Values thus represent purchasing power in terms of United States exports.

2/ Imports and exports are measured net of flows of investment income.

The third reason provides a theoretical basis for the formulation of the capital-output function that we have adopted, although the statistical estimates reflect all three elements to some extent. We postulate a constant capital-output ratio (k') for directly-productive net investment with a one year lag and a constant share (z) of current income devoted to replacement plus social overhead investment. Investment in any year may then be represented by the equation:

$$(1) \quad I_t = k' \Delta V + zV_t,$$

where $\Delta V = V_{t+1} - V_t$.

Since the conventional <u>incremental</u> capital-output ratio (k_t) is defined as $I_t/\Delta V$, and since next year's growth rate (r_{t+1}) is defined as $\Delta V/V_t$, division of (1) by ΔV yields an equation for k_t as a decreasing function of r_{t+1}:

$$(2) \quad k_t = k' + z/r_{t+1}.$$

In this formulation the true <u>marginal</u> capital-output ratio -- that relevant to increases in the level of investment in any given year -- is k'.[1/]

[1/] That is, $dI/dV_{t+1} = k'$ which is most easily derived by substituting for ΔV and differentiating (1), treating V_t as predetermined.

The time series data from which such a relationship might be estimated are typically interrupted by several cycles, beginning with incremental capital-output ratios which are abnormally high (or even negative) and ending with ratios which are abnormally low. This variation seems to reflect changes in the utilization of capacity, whether due to fluctuations in aggregate demand or to shortages of imported raw materials. In an effort to eliminate some of this effect we identified such cycles (with reference to six-year moving averages) and obtained single ratios for each one by aggregating the total investment and change in GNP over the period. Observations for individuals years or cycles were weighted by the number of years they represented and the ratios regressed on the reciprocal of the average growth rate over the period.[1/]

The regression results indicate that all but one of the Latin American countries showed lower values of k_t during periods of higher growth. We could not hope to eliminate through aggregation over cycles all of the variability attributable to changes in capacity utilization, and we made no attempt to estimate the effects of changes in other factors of production.

1/ The estimating equation was the same as that used by Strout in his cross section study. We found that it generally fit our time series data better than a linear regression on the rate of growth. While the model assumes a one-year lag in the relationship of investment to change in income, the ratios included in the regression analysis were unlagged.

In an effort to approximate the direct influence of variations in investment of the incremental ratio for purposes of projection, we made two adjustments in the regression results. The first was to reduce the estimated value of z (the responsiveness of k_t to the growth rate) by one half. We further constrained the marginal ratio (k'), to be no less than two, which is not appreciably lower than the lowest average incremental ratios found in the study, 2.47 and 2.64. This constraint determined the values of k' (and hence z) for six countries.[1/] (See Table A-1 for the full regression results and Table 3 for the modified relationships.)

Figure 1 shows the results for four countries, including those with the lowest and the highest average incremental ratios (El Salvador and Argentina) and those with the greatest and least responsiveness to the growth rate (Argentina and Venezuela). The unbroken curves describe the regression results, while the broken curves -- cutting the former at the point of the two means -- describe the modified relationship included in the model.[2/] The greatest contrast is between the curve for Argentina, with only a few points covering cycles

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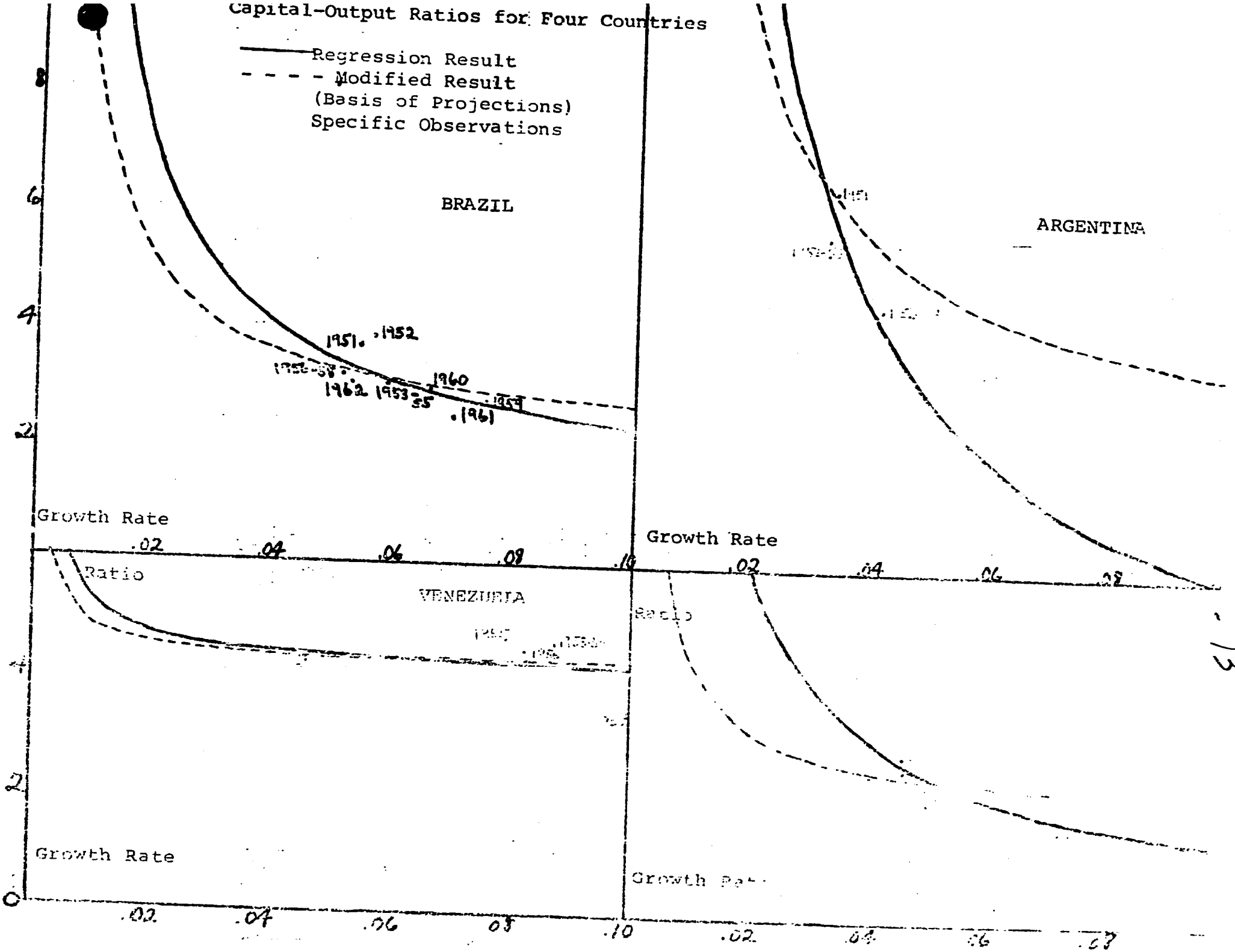
[1/] For each of these adjustments the value of the parameter not being adjusted was determined by the condition that the equation continue to indicate the mean incremental capital-output ratio at the mean value for the reciprocal of the growth rate.

[2/] The two broken curves on the left have half the slope as the regression curves, while the two on the right show slopes of less than one-half. The latter were bound by the constraint on the marginal ratio, which makes the broken curves asymptotically approach two as r grows. The actual observations from which the curves were estimated are also shown.

Capital-Output Ratios for Four Countries



of several years and a very steep slope, and that for Venezuela, with shorter cycles and an almost constant ratio. One might predict with some confidence that Venezuela's incremental ratio would continue in the neighborhood of four, barring major changes in the pattern of investment, but one can be less sure what Argentina's would be at higher rates of growth. Projections based on the past average incremental ratio of nearly seven, however, would certainly overstate the capital requirements of accelerated development. Our calculations are intended as an approximate correction for such an overstatement.

2. Savings

Over the 15 years covered by our estimates, the savings figures for Latin America confirm the poor performance we have already noted for the 1957-62 period. Average savings rose only from 16.3% in 1951 to 16.9% in 1964, although per capita GNP rose by nearly 50%. A simple regression of savings (S) on GNP (V) for this period showed the average savings rate declining in 13 out of 16 countries.

Our interpretation of the savings experience of this period follows the implications of the two-gap analysis, along lines already explored by Vanek /21/ and Landau /10/. When the trade gap is dominant, foreign exchange is the scarce factor of production. Since investment is highly dependent upon imports (see below), domestic investment opportunities will vary closely with the availability of foreign exchange, and

domestic savings can be expected to vary in response to those opportunities. In such circumstances, then, we would expect exports (E) to have an unambiguously positive effect on savings; i.e. $\partial S/\partial E > 0$. Inflows of external capital (F) have two kinds of immediate effects: while they also raise exchange availabilities, and hence can increase both investment and savings, at the same time they can serve as a one-to-one substitute for domestic savings in financing investment. If $\partial S/\partial E$ approximates the pure foreign-exchange effects on savings, we should expect the combined foreign-exchange and savings-substitution effects of increased capital inflows ($\partial S/\partial F$) to be approximately $\partial S/\partial E - 1$. So long as $\partial S/\partial E$ is less than one, then, we would expect the sign of $\partial S/\partial F$ to be negative.[1/]

1/ Several points concerning this argument should be noted:

a) Since required imports are only a fraction of additional investment -- typically 1/3 in the estimates presented below -- $\partial S/\partial E$ may be greater than one, so that $\partial S/\partial F$ may be positive.

b) The case best described in the text is that in which the level of F is determined autonomously, i.e., independently of the current balance of payments situation. The argument is less clearcut when F is largely determined by the response of reserves or emergency loans to current levels of exports and imports.

c) As Landau argues, this relationship does not imply that the total effect of external capital is to reduce domestic savings. The relationship described - $\partial S/\partial F$ - assumes that income is held constant. But external capital also increases income (as the model as a whole indicates) and domestic savings increases with income. Even if $\partial S/\partial F$ were negative, the total impact on savings - $\partial S/\partial F + \partial S/\partial Y \cdot \partial Y/\partial F$ - would undoubtedly be positive, especially when the cumulative effects on income are considered.

We tested these relationships by fitting a regression equation in which gross domestic savings (S) were assumed to be a function of GNP (V), the inflow of foreign capital (F) and the share of exports in GNP (E/V).[1] (The results are shown in Table A-2.) In 12 out of 16 cases the impact of additional foreign capital on savings was found to be negative, and in every case but two the impact of the export share was positive. Over the period studied, the foreign capital inflow has increased for almost all countries, and the export share has decreased. The net impact of both trends has been to reduce the level of savings in relation to income from that which might otherwise have been observed. The multiple regressions suggest that if both foreign capital and the export share had been constant - so that savings would have been a function of GNP alone - then only three of the countries would have shown a marginal savings rate less than the average. Furthermore, the equations in this form give marginal propensities to save which are higher than those given by the simple regressions for all but three countries --

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[1] The export share was used to minimize problems of collinearity between exports and GNP. There are dangers of spurious (negative) correlation between foreign capital and savings, since the latter is defined to be gross domestic investment less capital inflow. We proceeded in spite of this, since we were not interested in defining the size of the relationship but in eliminating its effect. For those few countries -- Panama, Mexico, and Nicaragua -- where the coefficient on foreign capital has an absolute value greater than .75, we run some risk that we are estimating investment rather than saving.

Guatemala, Peru and Venezuela -- which are also exceptional in other ways. Guatemala and Peru are two of the three countries whose export share correlates positively with time, and Venezuela's export share rose dramatically during much of the period. These trends in exports and foreign capital, then, suggest an explanation for the stagnation of Latin American savings over the past 15 years.

These results are by no means conclusive evidence that the trade gap has been dominant for most of the Latin American countries. In the first place, the regressions performed for each country covered the whole period, yet one gap may not have been dominant all of the time. In the second place, the responsiveness of savings to exports is also consistent with the dominance of the savings gap if one hypothesizes a higher marginal propensity to save in the export sector. This might occur if the wide fluctuations in export income fell mainly on profits, or if they created a general "permanent income" effect of the sort described by Friedman /8 /. The negative direct impact of capital inflows on savings, however, is harder to explain under the assumption of a dominant savings gap. This impact is significant at the 1% level of confidence for four of the 16 countries and at the 6% level for an additional two.[1/]

1/ We also tried estimating equations in which savings were considered a function of non-export income, export income and foreign capital. While less reliable, they indicated for every country a marginal propensity to save from export income greater than that from non-export income. The average for the former was .601, for the latter only .057. In two cases, Mexico and Argentina, the propensity to save from export income was greater than one and in four cases greater than .6, results which are more easily interpreted as stemming from a binding trade gap.

When using the regression results to project savings behavior, we have assumed that the observed coefficients on GNP and export share describe the potential savings behavior of the economy and have therefore omitted the coefficient on foreign capital. Our formula for potential saving (S) is thus:

$$(3)\quad (S)_t = (S)_{t-1} + \alpha\, \Delta V + \gamma\, \Delta\, E/V$$

where the Δ s refer to changes between the previous period (t-1) and the current. Values of α and γ used in making the projections are given in tables 3 and A-5.

3. Exports

Conclusions concerning the growth of exports are highly contingent on the base period selected. When the exports of goods and services of 15 Latin American countries (excluding Venezuela) for 1963 are compared with those of 1951 (the peak of the Korean War boom), a compound growth rate of only 2.4% is implied. A comparison with 1955 (when the boom had collapsed) suggests a rate of 2.9% and with 1957 a rate of 3.3%. Even the latter is not impressive, however, since it represents a per capita growth of export earnings of only 0.4% and a decline in the ratio of exports to GNP.

Using regression analysis to compute individual national growth rates for exports only partly solves the problem. The export rates in Table A-3 show faster growth in the 1957-64 period than in the whole period since 1950 for 12 of the 16 countries.[1/] The figures also show how mixed Latin American

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[1/] The estimating equations expressed the logarithm of exports as a function of time.

export performance since 1957 has been. The Central American countries have had good results, second only to Peru's extraordinary growth, Mexico, Argentina and Chile also show impressive recovery rates. Venezuela, Brazil and Colombia, however, have all experienced declines in exports, the former because of a stagnation in oil earnings and the latter two because of the severe fall in world coffee prices.

The model used for projections treats the export growth rate as largely exogenous.[1/] In attempting to summarize the varied experience of recent years in a single "historical" growth rate for each country (presented in Table 3) we used an average of the generally low 1950-64 growth rates and the higher 1957-64 rates. The effect is to give a double weight to the more recent experience.[2/]

The formula for exogenous exports used in the projections is simply:

$$(4)\quad E_t = E_o (1 + \varepsilon)^t$$

4. Imports

The Chenery-Strout model treats import requirements as a linear function of income. We have introduced several additional variables, which considerably improve both the

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1/ An export sector somewhat responsive to the trade situation of the country is assumed for the "high performance" projections, as described in Section II.

2/ Instead of extrapolating the recent decline in coffee prices, we computed the Colombian figure by including the 1957-64 experience as the average of the current-price and constant-price growth rates. The same procedure for Brazil yields a growth rate of only .3%, but we applied a lower limit of 1% for the projections.

explanation of past variation and the sensitivity of the projection model.

a) Recognizing the greater dependence of the Latin American economies on imports of investment goods, we have measured separate import propensities for increases in consumption and investment. As expected, virtually all of the countries showed higher propensities to import from increases in investment expenditure.

b) When foreign exchange is scarce, governments tend to make it more expensive and less plentiful to potential importers, inducing the substitution of domestic goods for imports within the existing productive structure. As surrogates for these price and availability effects, we used two direct measures of the availability of foreign exchange to the economy -- reserves of gold and foreign exchange (R) at the beginning of the year, and earnings from the exports of goods and services (E) during the course of the year.[1/] Imports over the period respond positively to both measures -- perhaps slightly more to reserves -- for every country but one (Peru). Since both exports and reserves were a declining share of GNP over the period for most countries, the estimated propensities to import from additional income (or additional consumption and investment) are generally higher when the foreign exchange variables are included in the model. For example, a simple regression of imports on

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[1/] To reduce problems of multicollinearity, reserves and current exports were expressed in the estimating equations as shares of current GNP.

GNP for Colombia over the period 1951-60 yields a marginal propensity to import of only 4.4%. When income is disaggregated and the estimates include the effects of declining ratios of exports and reserves to GNP, the import propensities become 11% for consumption and 55% for investment.

While the inclusion of a measure of long run import-substitution through changes in the structure of production usually enhances the descriptive power of our equations, we could not at this time incorporate such a measure in our import projection model.[1/] The propensities estimated, then, should be understood to be somewhat smaller than purely short-run propensities might be because they incorporate a demonstrable long run import-substitution effect.

Denoting required imports by (M), the equation used in the projections was:

$$(M)_t = (M)_{t-1} + \mu.\Delta V + \varkappa.\Delta C + \phi.\Delta I + \omega.\Delta E/V + \pi.\Delta R/V,$$

where the Δs refer to changes between the previous period and the current. Either the pair of parameters $\varkappa$ and ϕ or the

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[1/] For most countries over the period covered the rising share of GNP devoted to manufacturing seemed to provide the best single index of the ability to replace imports with domestic production. When such a variable is included in the disaggregated estimating equations, it assumes the hypothesized negative sign for all the countries but Argentina, Peru and Ecuador. Often the effect of inclusion is to raise the import coefficients for consumption and investment, suggesting a crude measure of the differences between actual import propensities and those which would have been realized in the absence of long-run import substitution.

parameter μ is zero in any given application of the equation. The parameter values actually used appear in Table 3.[1/]

5. A Summary of Development Performance

The regressions discussed above provide a better basis for evaluating the development performance of the past 15 years than do the simpler indicators commonly used. The results for both savings performance and investment requirements give a more favorable impression of the prospects for accelerated growth than do cruder measures of savings rates and capital coefficients. The corrected marginal propensities to save out of GNP which emerge from our multiple regressions are higher in almost all cases than those which appear in simple regressions over a period of falling export shares and rising capital inflows. The estimated marginal capital-output ratios indicate lower capital requirements for directly-productive net investment than are indicated by incremental ratios based on all forms of gross investment. However, the import results give a less favorable impression of growth prospects. They suggest that the propensities to import from additional income may be higher than those observed during a period of falling reserve and export shares, and

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[1/] For the projections the simplifying assumption is made that actual reserves remain constant at the level of the base period.

that propensities to import from additional investment expenditure may be higher still.

The relationship between the trade and the savings equations described by the regression results tends to support the hypothesis of trade-gap dominance. For example, let us consider Colombia, for which both Sheahan /15/ and Vanek /21/ describe a marked balance of payments bottleneck. Our estimates for the savings and import functions[1/] are:

$$\Delta(S) = .21\ \Delta V + .50\ \Delta E$$

$$\Delta(M) = .55\ \Delta I + .11\ \Delta C + .42\ \Delta E + .33\ \Delta R.$$

These equations indicate that a reduction of exports of $1 would reduce potential savings and investment by 50 cents and would directly reduce imports by .42 cents, with some further reduction attributable to the decline in investment. While these results may exaggerate the long-term effects of export changes because they are fitted to short-term variations, they illustrate the effects of export limitations on savings and imports.

1/ The parameter estimates are taken directly from Table 3, using the 1966 value of V = $5,300 million from Table A-4.

II. DEVELOPMENT ALTERNATIVES, 1967-1976.

The model estimates from the previous section can be used to bring out some of the requirements for accelerated growth in Latin America. In describing them we will be primarily concerned with the relationships between the two limiting factors in the model -- investment and imports -- under various growth rates. The basis for the analysis will be a set of four projections for each of the sixteen countries, using two sets of growth rates (I and II) and two sets of performance parameters (A and B) for each country.

A. Bases for the Projections

1) Growth Targets.

It is necessary to begin by specifying a set of target growth rates for each country, recognizing that they can only be a first approximation and are subject to further checks on their feasibility. These targets should reflect both the unsatisfactory character of the growth record of most Latin American countries in recent years and the difficultires of pushing growth beyond limits ultimately determined by the economic institutions of each country.

There are many indications that the economic performance of recent years does not satisfy reasonable aspirations for social progress in most Latin American countries. Without offering any precise definition of such progress, we suggest that it should include the achievement of relatively full

and productive employment of the labor force over the next decade. In the absence of other methods of redistributing income, reductions in unemployment and underemployment serve as indicators both of better income distribution and of increases in potential output.

The most striking indication of the unsatisfactory nature of recent development is the rapid movement of population to the cities, far in excess of the demand for labor in productive uses. Latin American population is expanding at 3% per year, and the cities, with roughly one-half of the present population, are receiving roughly two-thirds of this increase. The demand for labor in manufacturing activities, itself often restricted by high, union-imposed wages, has not kept up with this growth, resulting in an excessive shift of employment to the more accessible service sectors.

Since there are almost no reliable unemployment estimates in Latin America, changes in labor productivity in each productive sector must serve as an indicator of under-employment. Between 1950 and 1960 productivity in agriculture increased at the equivalent of 1.8% per annum, and in industry, in mining and utilities at the equivalent of 2.5% per annum. In fully-employed economies comparable increases would also have taken place in the service sectors. Instead, there has been a marked fall in the average productivity of this sector, reflecting its absorption of an excessive share of the surplus labor supply. The fall in productivity in services alone suggests

a level of underemployment equivalent to 10% of the labor force, and the comparison with agriculture suggests that a substantial part of the problem of underemployment has been shifted from the countryside to the cities.

Projection B in Table 2 shows that an overall GNP growth rate of 5% over the next ten years would permit almost no increase in productivity in the service sector. A 6% growth rate would permit annual increases of 2%, which would still be lower than increases in other sectors, suggesting that an even higher rate would be required to prevent the problems of unemployment and underemployment from becoming more serious than they already are.

These rates should be compared with the "historical" (or I) growth rates for each country derived from trends for 1950 to 1965 and presented in Table 3. These rates vary from 2.8% for Argentina to 6.9% for Venezuela, and when projected over the next ten years, indicate a 5.2% growth rate for the region as a whole.

A set of higher (or II) rates were selected to illustrate optimistic but feasible targets. These were based on two criteria: (1) they should generate an overall rate of growth compatible with no worsening of the unemployment situation; (2) they should represent a comparable degree of acceleration for each country, reflecting the likelihood that a country with a low historical rate would experience less difficulty in increasing its rate by a given absolute amount than a

TABLE 2

Growth in Active Population, Employment and Productivity,[1] 1950-1975.

SECTOR	Active Population 1950 (millions)	Growth 1925-1950	Increase in Employment 1950-1960	%	1960-1965	%	1965-1975	%	Productivity Growth[2] 1950-1960	1960-1965	1965-(A)	1975 (B)
A. Agriculture (Share)	28.2 (53%)	1.4%	4.0 (27%)	1.3%	2.4 (25%)	1.5%	8.0 (31%)	1.7%	2.1	1.0	2.4	2.2
B. Industry, Mining, Utilities (Share)	12.5 (23%)	2.7	4.9 (32%)	3.4	2.3 (29%)	2.6	8.8 (35%)	3.9	2.6	2.5	3.0	2.5
C. Services (Share)	12.4 (23%)	2.8	6.2 (41%)	4.1	4.9 (51%)	5.0	8.6 (34%)	3.7	0.1	-1.0	2.0	0.3
TOTAL	53.1	2.0	15.1	2.5	9.5	2.7	25.4	2.9	2.1	1.4	3.0	2.1

1/ Source: United Nations, (E.C.L.A.) (20).

2/ The "A" projections to 1975 assume 6% in GNP and are based on the E.C.L.A. Analysis. The "B" projections assume 5% growth in GNP. Total productivity increases are greater than the weighted average of the sectoral increases because workers are assumed to be shifting from low-productivity sectors into industry.

TABLE 3

Historical Parameters and Growth Rates (for Projections I-A)

COUNTRY	Equation	(5) Imports					(3) Savings		(2) Capital Requirements,		(4) Exports	GNP growth
	Parameter	μ	χ	ϕ	ω	π	α	γ	k'	Z	ϵ	r
	Independent Variable	ΔV	ΔC	ΔI	$\Delta E/V$	$\Delta R/V$	ΔV	$\Delta E/V$	Inter-cept	r_{t+1}	time	time
1. Argentina		-	.025	.260	-	-	.350	6659	2.00	.143	.036	.028
2, Bolivia		.028	-	-	228	-	.228 3/	-	2.05	.071 5/	.019	.035
3. Brazil		.054	-	-	-	26,047	.241	7790	2.18	.055	.010 2/	.058
4. Chile		-	.141	.410	2299	4,423	.143	430	2.00	.041	.043	.035
5. Colombia		-	.108	.553	2196	1,752	.210	2652	2.00	.105 4/	.025	.046
6. Costa Rica		-	.262	.468	117	77	.160 1/	-	2.32	.067	.025	.054
7. Ecuador		-	.052	.900 2/	489	336	.170	139	2.00	.074	.030	.045
8. El Salvador		-	.280 1/	.420 1/	-	-	.189 3/	-	2.00	.025	.051	.050
9. Guatemala		-	.141	.599	574	270	.191 3/	-	3.01	-	.055	.045
10. Honduras		-	.261	.301	174	185	.140	-	3.10	.018	.034	.042
11. Mexico		-	.092	.140	3640	8,144	.220	10330	2.02	.057	.049	.060
12. Nicaragua		-	.169	.900 2/	-	-	.160	143	2.08	.046	.071	.051
13. Panama		.403	-	-	193	-	.198	-	2.00	.048	.072	.058
14. Paraguay		-	.177	.338	260	24	.140	56	2.96	.067	.017	.031
15. Peru		-	.165 1/	.600 1/	-	-	.123	1491	2.00	.143	.055 4/	.053
16. Venezuela		.250 1/	-	-	-	-	.270	-	4.26	.005	.025	.069

1/ Modified from regression results.

2/ Constrained value. (Also, all (k') = 2.00, except Chile)

3/ Adapted from Landau findings.

4/ Based on estimates of A.I.D. economists.

5/ Based on past country performance and average L.A. performance.

country whose growth rate was already very high. Based on the experience of the Latin American and other developing countries, we took 8% to be an approximate upper limit to growth. We then defined an optimistic-but-attainable target as an increase to a rate one-half of the way between the historical rate and 8%. For Argentina, this meant 5.37% and for Venezuela 7.46%. These "accelerated growth" targets (given in Table A-5) indicate a rate of 6.3% for the region as a whole over the next ten years.[1/]

2) Performance Parameters

We have defined "historical" (or A) performance for capital requirements, savings potential, import requirements and export in the manner described in Section I and with the parameters listed in Table 3. To describe "high performance" we then estimated an optimistic-but-attainable (or B) set of parameters for all except capital requirements. The new elements of this set appear in Table A-5.

a) Imports and Exports

Our original import function assumes that countries respond to shortages of foreign exchange by making short-run adjustments in their imports, most readily in their purchases of consumer goods. The import coefficients estimated

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[1/] As in the Chenery-Strout model, target growth rates may not be immediately realized due to a constraint on the rate of growth of investment. Based on the highest sustained growth of investment observed in Latin America we have set this constraint at 15%, which results in a phase of transition from historical to accelerated rates of GNP growth.

for consumption and investment expenditure reflect the development of import-substituting industries over the period, but the equations do not separately identify the effects of this development. The model in this form thus lacks a mechanism by which shortages in foreign exchange can induce long-run adjustments -- the accelerated development of export-generating or import-substituting industries.

The policies typically undertaken to bring about such adjustments include currency devaluation or decisions on investment allocation. To approximate the workings of such policies we assume that a country faced with a prospective trade gap in excess of its prospective savings gap will direct a part of current investment toward reducing next year's trade gap. We assume that investment in such lines will be enough to reduce next year's trade gap by a specified share of the current excess trade gap. This share is the parameter h in table A-5 and is set at 3/4 for most countries. Thus, we presuppose an imperfect adjustment to current conditions and no foresight as to future conditions. For illustrative purposes we divide the effect of this investment equally between exports and import substitutes. We also assume that such investment cannot exceed 30% of total gross domestic investment and that it entails a capital-output ratio which is 20% higher than that applied to ordinary investment.[1/] Meeting these additional investment

---

[1/] A similar set of assumptions is used in Model 2 of /4/. The latter assumption reflects the probability that the domestic currency has been overvalued, which makes export proceeds smaller and imports more competitive with domestic substitutes than would an equilibrium exchange rate.

requirements raises domestic savings levels closer to the full potential and represents the substitution of an input which is available for one which is constraining growth.[1/]

b) Savings and Investment Performance

Based on reasoning similar to that used in setting growth targets, we judged increases in marginal savings rates in relation to the highest observed performance of other developing economies.[2/] "High savings" was defined for each country as movement to a rate halfway between the historical rate and 35%. Thus Chile, with an historical rate of 14.3%, was assumed to be able to increase to 24.7% while Venezuela, with an historical rate of 27%, was assumed to be capable of moving a shorter absolute distance, to 31%. This ability to divert a substantially larger share of increased income to savings was considered possible only if annual increases in income were larger. Hence "high savings" performance is associated in the projections only with accelerated growth rates (II-B projections).

The investment functions for the B projections are unchanged from the historical estimates, since they already include an adaptation to higher growth. The incremental capital-output ratio for the whole region indicated at the "historical" growth rates is 3.6 and at the "accelerated" growth rates is 3.4.

1/For Brazil, Chile and Colombia, we had the benefit of specific export projections done by AID economists Robert Muscat, John Holsen and Frank Masson respectively. We converted each to a single growth rate. Since they were already quite optimistic we used them in conjunction with a value of h of only .25.

2/ See Chenery and Strout /4/, Table 1.

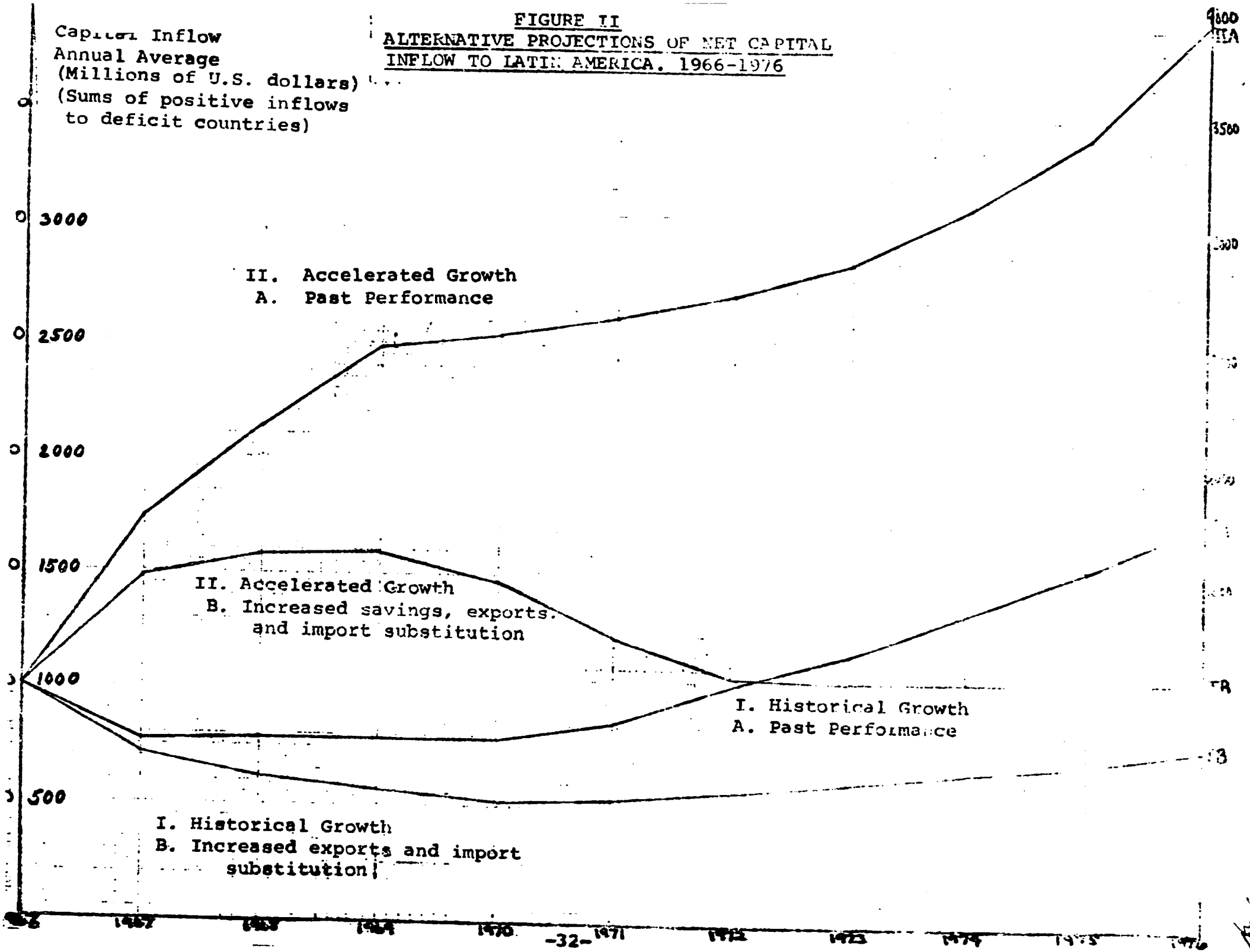


FIGURE II
ALTERNATIVE PROJECTIONS OF NET CAPITAL INFLOW TO LATIN AMERICA, 1966-1976

B. Alternative Projections

The external capital requirements of each of the four projections are shown in Figure II.[1] The projections start from values for 1966, which, instead of being measured directly, are computed from recent trends.[2]

The I-A projection shows the result of growth at historical rates with historical performance. This requires a gradual increase in capital inflows after 1970, primarily to fill growing trade gaps.

The I-B projection describes growth at the same rates but with better export and import-substitution performance. The structural imbalance of the I-A case is here progressively eliminated, and external capital requirements are determined largely by savings performance.

The II-A projection shows the clear incompatibility of past developmental performance with accelerated growth rates. Both savings gaps and trade gaps increase rapidly with capital inflow requirements, reaching $2.5 billion per year within three years and $4.0 billion within ten years.

---

[1] In defining capital inflows (and service imports) we have considered outflows of investment income to be capital items, to be offset against inflows of direct investment. Our inflow figures are thus smaller by that amount than the more conventional deficit on current account. Both figures are given in table A-8 of the Appendix for the years 1961-65. In aggregating we have added only the inflows to deficit countries and have not assumed that the outflows from surplus countries make any contribution to filling those deficits.

[2] Specifically, averages for GNP, investment, exports and imports were computed for the years 1963-65 and attributed to 1964. Extrapolations to 1966 were based on the historical parameters of the model.

The II-B projection assumes that at accelerated growth rates the Latin American countries will not only be able to improve their trade performance but will also be able to save a larger share of a faster-growing income. External capital requirements increase rapidly for a few years, as more countries come to invest the full share of GNP required for the realization of target growth rates. By 1970, however, the growth of average savings rates is enough to reduce savings gaps in several major countries (notably Argentina and Brazil) and thus to reduce the need for foreign capital. The requirements of the principal countries in this projection are shown in Figure III and in Table A-7.

C. Effects of Variations in Internal Performance

To bring out the partial relationships in the model and to explore the requirements for accelerated growth at less than the full B level of performance, we have taken the II-A projection and analyzed how it would be affected by changes in single performance parameters. Our performance variations were as follows:

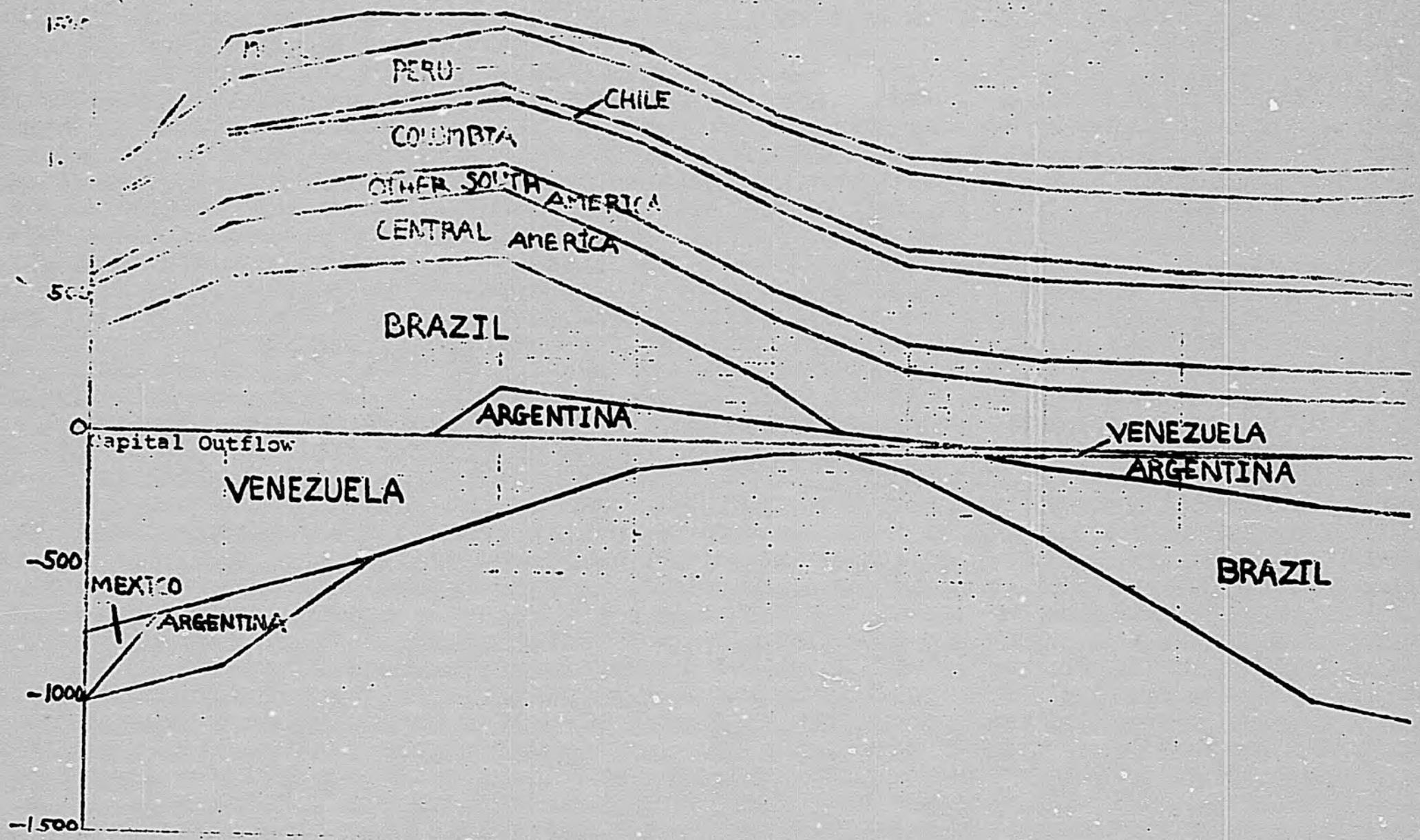
(1) Savings. The potential marginal savings rates (α) for each country were varied together in eight equal intervals from the historical values to .35.

(2) Exports. The export growth rates (ε) for each country were varied a percentage point at a time between -2% and +6% from the "historical" rates.

FIGURE III.

CAPITAL INFLOWS AND OUTFLOWS

Accelerated Growth with Maximum Performance (II-B)



(3) Capital requirements. The marginal capital coefficients (k') were varied at 4 equal intervals from -25% to +25% of the standard values.

The effects of these individual parameter variations on average capital inflows over the decade are shown in Figures IV, V, and VI. In each case the starting point (projection II-A) is marked for reference.

The figures illustrate the limited effect of improving performance with respect to one gap alone. Figure IV shows the effect of raising the potential marginal savings rate. Initial increases have a considerable impact on external capital requirements, but additional increases have less and less. As the savings potential improves, actual savings and foreign capital requirements are increasingly determined by a dominant trade gap. Similarly, even though faster export growth is assumed to have a positive impact on the savings gap as well as the trade gap, Figure V shows that overall export growth rates as high as 9% are alone unable to reduce the average external capital requirements of accelerated growth below $1.8 billion per year.[1/] In such circumstances a policy of "trade, not aid" would be insufficient to permit substantial increases in growth rates.

[1/] A recent analysis by Cohen /6/ sets the range of Latin American export growth at -2.2% to +8.2% through 1970. Figure V indicates that an 8.2% export growth rate through 1976 would require an average annual inflow of $1.9 billion, if there were no improvement in import and savings performance.

FIGURE IV.

Variation in Savings Performance

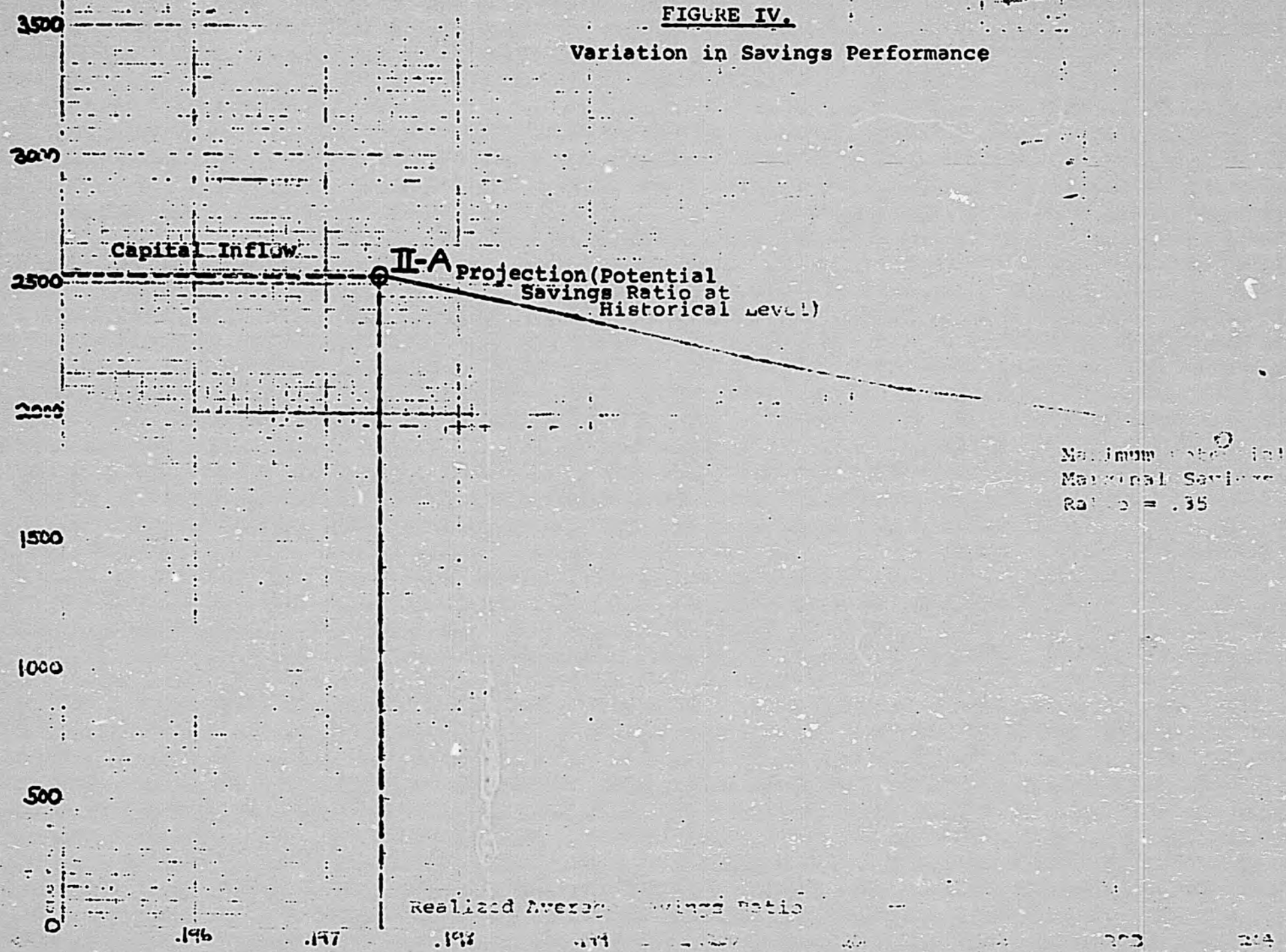
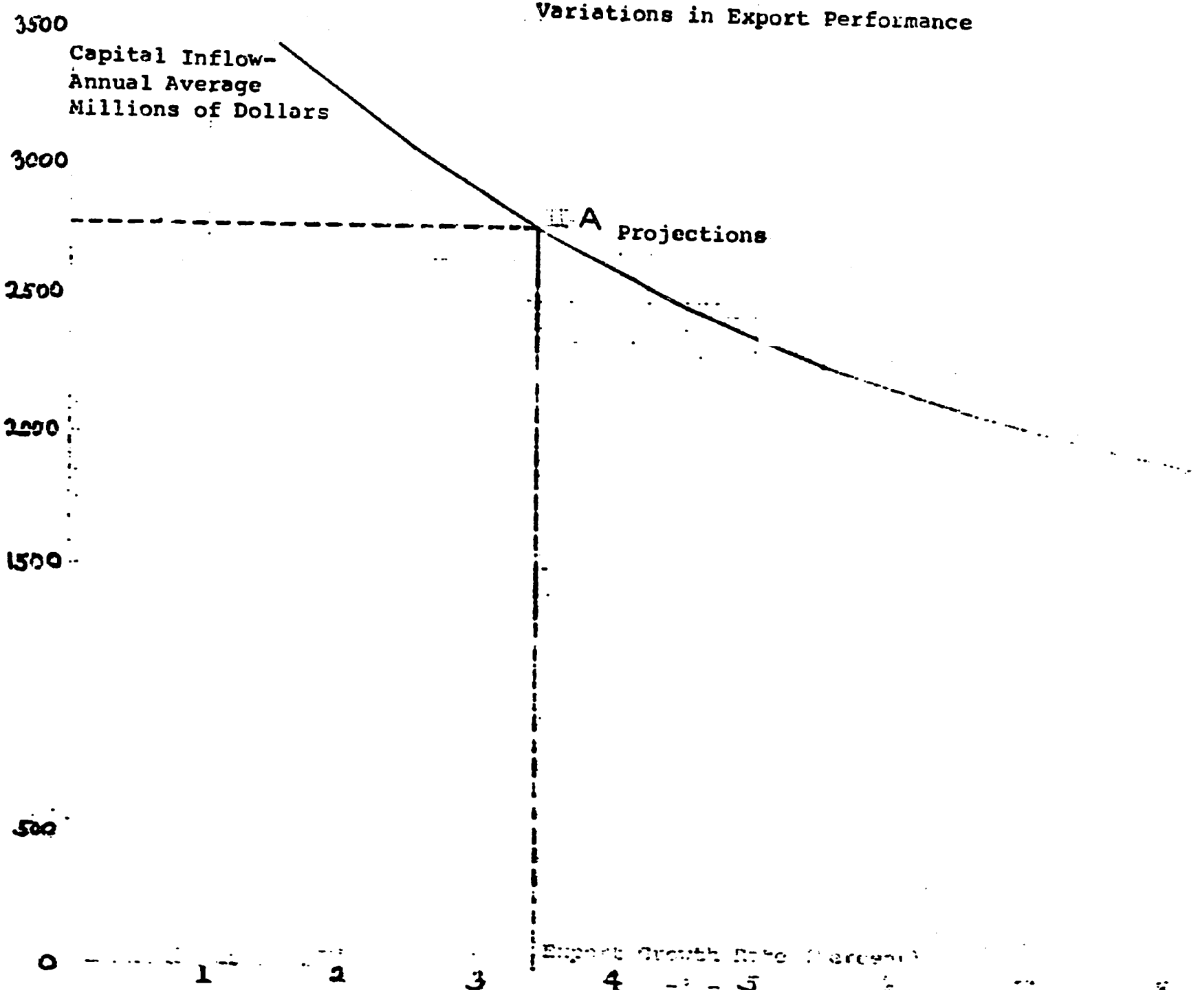


FIGURE V.

Variations in Export Performance



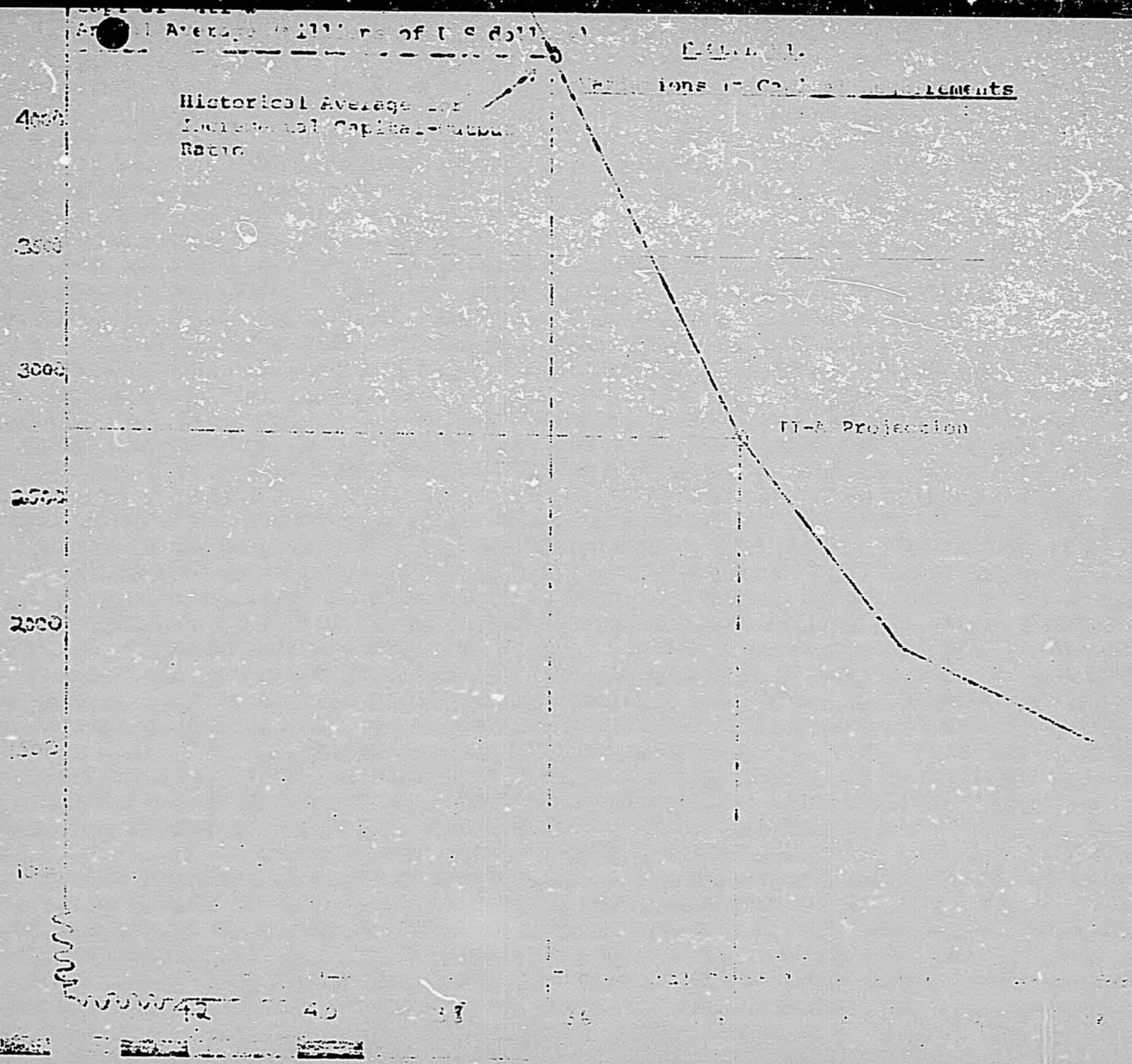
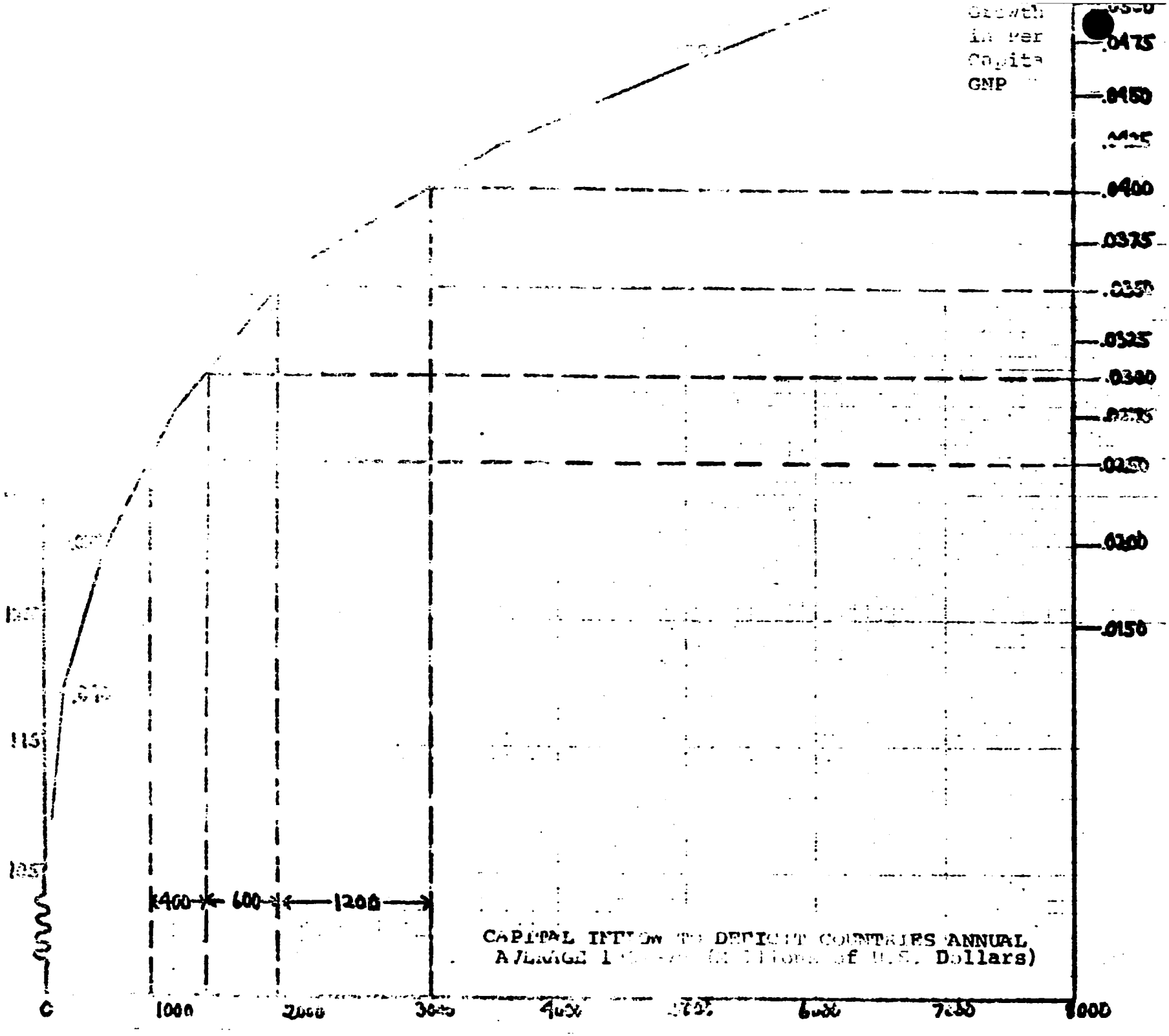

Historical Average
Ratio
4000
3000
2000
42

Figure VI shows a somewhat greater sensitivity of external capital requirements to variations in the marginal capital-output ratio. For example, external capital requirements are $1 billion more when the overall incremental capital-output ratio is at its historical level than when it is at the level indicated by our formula. This suggests the extent to which projections based on historical ratios may overstate the capital requirements of faster growth.

In order to determine the productivity of external assistance at constant performance levels we have also varied the growth rate for each country, keeping the optimistic performance assumptions of projection II-B. The results are summarized in Figure VII. To raise per capita growth rates from 2.5% (the Alliance Target) to 3.0% (Projection II-B) would cost an additional $400 million a year in external capital over the decade. Further increments of 0.5% in the average rate of growth become increasingly costly. Thus, movement between 3.0% and 3.5% would require an additional $600 million, and movement between 3.5% and 4.0% an additional $1200 million unless performance improved further.


Growth in Per Capita GNP
.0475
.0450
.0400
.0375
.0325
.0300
.0150
400
600
1200
0
1000
2000
3000
4000
6000
7000
8000
CAPITAL INFLOW TO DEFICIT COUNTRIES ANNUAL AVERAGE
(Millions of U.S. Dollars)

III. THE REQUIREMENTS OF ACCELERATED GROWTH

The policy requirements of accelerated growth may be seen in another light by examining the cumulative values of the principal aggregates in the model for each of the four projections. These are given in Table 4. (Further details for 1972 and 1976 are given in Table A-6). They show that, if there were no improvement in historical performance, more than one-third of the increase in investment required to accelerate growth would have to be financed by a net inflow of external capital. By contrast, high or "B" performance would permit accelerated growth to occur with only a nominal increase in the cumulative capital inflow. It would be excessively optimistic to assume full "B" performance for all countries. A projection to 1976 midway between II-A and II-B, however, indicates an increment in cumulative investment of more than $40 billion and an additional annual GNP of $15 billion in return for a net additional capital inflow of $8 billion. Thus 20% of the additional investment would be financed from external capital and 80% from domestic savings, the proportions originally envisioned by the Alliance for Progress.

Bilateral and multilateral loans under the Alliance have thus far served only to offset the reductions in net capital from other sources. The net resource transfer to Latin America from 1961 to 1964 has been somewhat lower than the $400 million average of the previous six years due to the rapidly rising

TABLE 4

Cumulative Values, 1967-76 (without Venezuela 16)

	I. HISTORICAL GROWTH		II. ACCELERATED GROWTH	
	A. Past Performance	B. Increased Exports Import Substitution	A. Past Performance	B. Maximum Performance
Gross National Product (V)	968.7	968.7	1,029.6	1,029.6
Gross Domestic Investment (I)	173.5	173.7	214.8	215.7
Gross Domestic Saving (S)	167.4	175.5	188.9	206.2
Exports (Goods & Services) (E)	107.7	118.9	107.7	120.2
Imports (Goods & Services) (M)	113.8	117.1	133.5	129.0
Capital Inflow (Deficit Countries) (F)	10.8	6.3	26.7	12.7
Increment in Savings 1/	-	+8.1	+13.4	+38.8
Increment in Capital Inflow 1/	-	-4.5	+20.4	+1.9
Increment in Investment 1/	-	+0.2	+41.1	+62.2
Increment in GNP 1/	-	0	+60.9	+60.9

1/ Increments relative to I-A.

Figures in Billions of 1962 dollars.

outflow of interest and profits (See Table A-8). Even with improvements in Latin American performance it is unlikely that there will be much acceleration in the rate of growth without some increase in the net flow of resources to the region. Our projections suggest, however, that such an increase need only be temporary. If an increased inflow of capital stimulates improved domestic developmental performance, the long-run external resource costs of accelerated growth may be less than those of continued historical growth rates with past performance. Both donors and recipients of aid would benefit from the additional initial effort required of each.

In the aggregative terms of the present analysis, there are two principal internal requirements of growth over 6%. The first is the redirection of sufficient investment to exchange-earning or saving lines.[1/] The second is the increase in marginal savings rates to something on the order of 24%. While our earlier analysis makes us more optimistic as to the possibilities of such an increase than the disappointing performance of the past decade would seem to justify, substantial effort will still be required.

In the long run the most attractive approach is undoubtedly to secure an increase in exports and a reduction in import requirements for the region as a whole through the progressive integration of the Latin American economies. Even with optimistic assumptions about trade performance, however, it is clear that the range of choice among feasible standards of performance is not large. Increases in savings, exports and aid will <u>all</u> be needed to achieve growth rates for the region that will provide adequate employment and a rising level of living for its rapidly expanding population.

[1/] For most countries this will probably involve more export expansion and import substitution in agriculture than further import substitution in industry.

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APPENDIX

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TABLE A-1

Regressions for Capital Requirements.

COUNTRY	mean k	mean $\frac{1}{r}$	k'	z
1) Argentina	6.68	32.63	-3.12	.3004
2) Bolivia 1/	(4.69)	28.74	(2.05)	(.1424)
3) Brazil	3.15	17.42	1.22	.1109
4) Chile	3.18	28.82	.80	.0826
5) Colombia	4.90	21.78	.20	.2155
6) Costa Rica	3.70	20.52	.94	.1345
7) Ecuador	3.64	22.25	-.42	.1825
8) El Salvador	2.47	19.19	.23	.1166
9) Guatemala	3.01	29.02	3.66	-.0224
10) Honduras	3.61	24.04	2.77	.0350
11) Mexico	3.00	17.12	1.04	.1144
12) Nicaragua	3.00	20.07	1.17	.0912
13) Panama	2.64	13.23	.93	.1292
14) Paraguay	5.16	33.16	.76	.1326
15) Peru	4.68	18.70	-4.70	.5016
16) Venezuela	4.35	16.45	4.17	.0109

Observations were weighted by number of years described. Formula: $k = k' + \frac{2}{r}$

1/ No regression performed. Mean for k is taken from Chenery-Strout results. z used is Latin American average.

TABLE A-2
Regressions for Savings.

COUNTRY	Intercept	V	R_2	Intercept	V	E/V	F	R_2	Years	Correlation with time E/V	Correlation with time F
1) Argentina	-998.2	0.30	0.50	-2481.	.37	6659.	-.50	.82	1951-64	-.04	-.09
	(-1.4)	(4.01)		(-417.7)	(6.99)	(2.02)	(1.95)				
2) Bolivia	-233.7	.531	.28	375.4	.595	664.	+.644	.66	1952-61	-.58	+.70
		(2.42)			(3.33)	(2.10)	(.72)				
3) Brazil	270.5	.158	.87	-1863.	.241	7990.	+.067	.88	1950-63	-.96	-.01
		(9.87)			(4.52)	(1.63)	(.29)				
4) Chile	35.4	0.10	.44	-203.	.143	430.	-.416	.48	1950-64	-.37	+.70
		(3.7)			(3.58)	(0.25)	(-1.06)				
5) Colombia	447.2	.09	.34	-471.5	.21	2652.	-.36	.72	1950-64	-.86	+.41
	(4.08)	(3.14)		(-2.88)	(6.40)	(3.96)	(-1.84)				
6) Costa Rica	72.34	-0.03	0.	+ 16.5	.05	102.	- .26	.17	1950-63	-.82	+.86
	(8.08)	(-1.16)		(1.56)	(1.23)	(0.46)	(-0.47)				
7) Ecuador	4.60	0.16	.92	-33.8	.17	139.	-.14	.94	1950-64	-.24	+.49
	(0.54)	(13.15)		(-3.36)	(13.11)	(1.73)	(-1.30)				
8) El Salvador	107.84	-0.07	0.	-18.2	.08	173.	-.95	.88	1950-64	-.08	+.68
	(3.39)	(-1.25)		(-1.42)	(3.12)	(1.39)	(-9.96)				
9) Guatemala	10.77	0.09	.45	-88.4	.07	870.	+.22	.69	1950-64	+.15	+.63
	(0.49)	(3.77)		(-4.40)	(2.70)	(3.31)	(0.94)				
10) Honduras	56.01	-0.01	0.	-38.3	.10	254.	-.25	.69	1950-64	-.59	+.53
	(4.18)	(-0.18)		(-3.33)	(3.72)	(3.50)	(-1.08)				
11) Mexico	166.14	0.14	.66	-1835.6	.22	10330.	-.76	.88	1950-64	-.65	+.44
	(0.56)	(5.62)		(4.64)	(9.46)	(2.06)	(-4.29)				
12) Nicaragua	22.28	0.08	.19	-39.4	.16	143.	-1.09	.78	1950-64	+.50	+.78
	(1.89)	(2.34)		(-5.89)	(3.95)	(2.15)	(-4.58)				
13) Panama	-12.11	.152	.72	+18.4	.198	-103.	-1.15	.95	1954-64	-.27	+.53
		(5.45)			(14.0)	(-1.10)	(-4.10)				
14) Paraguay	0.06	0.13	.48	-11.9	.14	56.5	+.04	.39	1950-64	-.74	+.66
	(0.01)	(3.95)		(-0.55)	(2.57)	(0.30)	(0.10)				
15) Peru	5.9	0.231	.76	-46.4	.125	1426.	-.05	.80	1950-63	+.11	-.49
		(6.87)			(2.05)	(1.80)	(-0.19)				
16) Venezuela	1692.3	0.09	.36	1642.9	.08	-126.	.17	.33	1950-64	-.38	-.29
	(13.72)	(3.26)		(7.63)	(2.66)	(-0.14)	(-0.76)				

Formula: $S = \text{Intercept} + \alpha V$

Formula: $S = \text{Intercept} + \alpha V + \gamma E/V + BF$

Bracketed figures are number of standard deviations from zero.

TABLE A-3

Regressions of Exports on Time.

COUNTRY	Early Base Years	ε	1955 Base End Year	ε	1957 Base End Year	ε	Average ε Early 1957 Bases	1957-63/4 at Constant (1955) Prices
1) Argentina	1951-64	1.6	1964	3.9	1964	5.6	3.6	4.4
2) Bolivia	1950-64	-2.2	1964	.8	1964	6.0	1.9	-3.5
3) Brazil	1950-63	-1.8	1963	-1.9	1963	-1.0	-1.4 1/	3.4
4) Chile	1950-64	2.5	1964	2.6	1964	6.2	4.3	3.7
5) Colombia	1950-64	.5	1964	-1.2	1964	-0.2	.2 1/	4.7
6) Costa Rica	1950-63	2.6	1963	2.7	1963	2.4	2.5	8.2
7) Ecuador	1950-64	4.0	1964	2.4	1964	1.9	3.0	5.5
8) El Salvador	1950-64	5.1	1964	3.7	1964	5.2	5.1	9.3
9) Guatemala	1950-64	4.9	1964	4.3	1964	6.2	5.5	9.2
10) Honduras	1950-64	2.1	1964	4.2	1964	4.7	3.4	5.8
11) Mexico	1950-64	4.4	1964	3.1	1964	5.5	4.9	4.2
12) Nicaragua	1950-64	6.9	1964	4.8	1964	7.4	7.1	9.6
13) Panama	1950-64	5.0	1964	5.1	1964	9.4	7.2	11.6
14) Paraguay	1950-64	1.2	1964	1.9	1964	2.2	1.7	7.7
15) Peru	1950-63	9.6	1963	9.4	1963	12.3	10.9	9.9
16) Venezuela	1950-64	5.7	1964	1.2	1964	-0.8	2.5	3.0

1/ For these two coffee producers we represented 1957-63 with the average of the physical and dollar indices.

ε = compound growth rate of exports.

Formula: $E_t = E_o (1 + \varepsilon)^t$

TABLE A-4

Base Year (1966) Values

COUNTRY	GNP	Required Imports	Exports	Investment	Potential Savings	Capital Inflow	Population	Gap Assumed Dominant[1]
1) Argentina	11,506	1,335	1,614	2,113	2,567	-280	22.03	(Trade)
2) Bolivia	693	126	100	102	56	45	4.34	Saving
3) Brazil	22,397	1,568	1,658	4,064	3,697	367	84.72	Saving
4) Chile	5,932	717	705	660	757	12	8.71	Trade
5) Colombia	5,308	847	698	1,199	960	239	18.54	Saving
6) Costa Rica	564	161	119	106	56	50	1.56	Saving
7) Ecuador	1,055	147	169	174	210	-22	5.10	(Trade)
8) El Salvador	839	220	197	103	87	23	3.00	Trade
9) Guatemala	1,412	246	203	191	151	43	4.57	Trade
10) Honduras	500	110	108	75	75	3	2.33	Trade
11) Mexico	18,280	1,941	1,943	3,296	3,315	-2	42.17	(Trade)
12) Nicaragua	552	171	152	85	59	26	1.70	Saving
13) Panama	643	248	228	98	99	20	1.28	Trade
14) Paraguay	398	59	50	64	57	9	1.98	Trade
15) Peru	3,261	824	780	813	713	100	12.02	Saving
16) Venezuela	7,161	1,678	2,641	1,641	2,396	-755	9.08	(Saving
sum	80,500	10,398	11,365	14,784	15,254	938[2]	223.15	

1/ Determined by projections from average 1964 to 1966 using historical parameters. Gaps assumed equal in 1964. Countries with capital outflows bracketed.

2/ Sum of positive inflows.

TABLE A-5

PARAMETERS FOR ACCELERATED GROWTH, HIGH PERFORMANCE PROJECTIONS (II-B)[1]

COUNTRY	Equation Parameters Independent Variables:	Savings α V	Savings γ E/V	Exports ϵ time	GNP Growth r time	Exchange-Savings-Investment h
1) Argentina		.350	6669	.036	.054	.750
2) Bolivia		.289	-	.019	.057	.750
3) Brazil		.296	7790	.072[2]	.069	.250
4) Chile		.247	430	.074[2]	.058	.250
5) Colombia		.280	2652	.058[2]	.063	.250
6) Costa Rica		.255	-	.025	.067	.750
7) Ecuador		.260	139	.030	.063	.750
8) El Salvador		.270	-	.051	.065	.750
9) Guatemala		.271	-	.055	.063	.750
10) Honduras		.245	-	.034	.061	.750
11) Mexico		.285	10330	.049	.070	.750
12) Nicaragua		.255	143	.071	.066	.750
13) Panama		.274	-	.072	.069	.750
14) Paraguay		.245	56	.071	.056	.750
15) Peru		.237	1491	.055[2]	.067	.750
16) Venezuela		.310	-	.025	.075	.750

1/ I - B projections use the same import and capital requirements parameters as I - A projections (Table 3).

2/ Based on projections of A.I.D. economists.

TABLE A-6

Alternative Projections for 1972 and 1976 - (billions of U.S. dollars)

	Base Year	I-A Historical Growth Past Performance.		I-B Historical Growth, Increased exports, and import substitution		II-A Accelerated Growth: Past Performance		II-B Accelerated Growth: Increased savings, exports, and import substitution	
		1972	1976	1972	1976	1972	1976	1972	1976
GNP (V)	80.5	108.6	133.2	108.6	133.2	114.9	148.3	114.9	148.3
Exports (E)	11.4	14.0	16.1	15.1	18.4	14.0	16.1	15.2	18.8
Imports (M)	11.2	14.4	17.1	14.8	17.5	16.7	19.8	16.2	18.9
Savings (S)	14.9	20.3	24.5	21.1	26.5	22.6	29.0	24.5	32.9
Investment (I)	14.8	20.7	25.5	20.7	25.6	25.3	32.7	25.4	32.846
GNP growth rate (r)	-	5.1%	5.2%	5.1%	5.2%	6.1%	6.3%	6.1%	6.3%
Export growth rate (ε)	-	3.5%	3.5%	4.9%	4.9%	3.5%	3.5%	4.9%	5.1%
I share of GNP (I/V)	.184	.191	.192	.191	.192	.221	.221	.221	.221
S share of GNP (S/V)	.185	.187	.184	.194	.199	.197	.196	.221	.222
Capital Inflow as share of investment (F/I)	-	.049	.069	.028	.030	.107	.121	.042	.033

TABLE A-7

Average Values for Major Countries 1967-76 (Billions of U.S. dollars)

	GNP	Gross Domestic Investment	Gross Domestic Savings	Exports	Imports	Capital Inflow
BRAZIL						
I. Historical Growth A. Past Performance	30.87	5.59	5.33	1.75	2.01	.25
II. Accelerated Growth B. Maximum Performance	32.44	6.64	6.67	2.48	2.45	.21
CHILE						
I. Historical Growth A. Past Performance	7.20	.80	.76	.90	.94	.04
II. Accelerated Growth B. Maximum Performance	7.80	1.19	1.14	1.08	1.13	.05
COLOMBIA						
I. Historical Growth A. Past Performance	6.86	1.35	1.11	.80	1.04	.24
II. Accelerated Growth B. Maximum Performance	7.43	1.75	1.47	1.00	1.28	.28
MEXICO						
I. Historical Growth A. Past Performance	25.55	4.56	4.53	2.55	2.59	.04
II. Accelerated Growth B. Maximum Performance	26.74	5.33	5.24	2.61	2.69	.09
PERU						
I. Historical Growth A. Past Performance	4.39	1.10	.86	1.06	1.30	.24
II. Accelerated Growth B. Maximum Performance	4.66	1.29	1.03	1.06	1.32	.26

TABLE A-8

Gross and Net Capital Flows to Latin America (excluding Venezuela) 1961-1965

	Average 1955-60	1961	1962	1963	1964	1965
I. SOURCES						
A. Normal Long-Term Capital						
1. U.S. Government (Gross)						
a. Grants		836	676	704	716	785
b. AID loans		150	174	234	222	301
c. P.L.480, Titles I & IV		108	187	214	233	280
d. Eximbank		140	79	85	145	38
e. Social Progress Trust Fund		437	217	123	60	99
2. IBRD (Gross)		1	19	48	56	67
3. IDB (Gross)		101	153	251	219	157
4. Direct Investment (Net)		5	37	71	122	108
5. Other (Including Supplier Credits)		390	441	332	399	-
6. Total Long-Term		920	968	684	964	-
7. Amortization of Long-Term Loans		2,252	2,275	2,042	2,420	
8. Net Long-Term Capital (6-7)	963	-810	-922	-855	-1,004	
B. Net Compensatory Loans	202	1,442	1,353	1,187	1,416	
C. Net Short-Term Loans	128	271	251	176	-309	
D. Net Financing (A+B+C)	1,293	202	151	98	278	
		1,914	1,754	1,461	1,384	
II. USES						
E. Net Resource Transfer to L.A.	403	858	767	0	-89	
F. Outflow of Profits and Interest	552	832	835	821	1,007	
G. Current Account Deficit (E+F)	955	1,690	1,602	821	918	569
H. Changes in Reserves	+17	-74	-456	+308	+52	+488
I. Errors and Omissions and Capital Outflow	321	298	608	332	414	

SOURCE: Ernest Chase, Agency for International Development, based on IMF data for balance of payments. Figures include all 19 Alliance countries except Venezuela, which has had an outflow of capital during this period.

A-9. The Projection Model

For Basic Variables see Table I (Page 9 above).

1) Savings Gap

(a) Investment Requirements

i) Variables:

$(I)_t$ = basic investment requirements

k_t = lagged incremental capital-output ratio (applied to investment of current year)

r_t = realized rate of growth of GNP (V)

ii) Constants (for each set of projections):

$\bar{r}$ = target rate of growth of GNP

$\bar{i}$ = constraint on rate of growth of investment (I)

$\bar{k}$ = lagged incremental capital-output ratio corresponding to the target rate of growth, $\bar{r}$.

k' = lagged marginal capital-output ratio

z = share of current GNP devoted to replacement and social overhead investments

iii) Relationships

$$(I)_o = I_o$$

$$r_t = \frac{V_t - V_{t-1}}{V_{t-1}}$$

$$k_t = k' + \frac{z}{r_{t+1}}$$

$$(I)_t = \text{the lesser of } \begin{cases} \overline{rk}\, V_t \\ [1+\overline{I}]\, I_{t-1} \end{cases}$$

$$V_{t+1} = V_t + \frac{(I)_t}{k_t}$$

iv) Comments

$(I)_t = I_t$ except when exchange saving investment is occurring (see below).

When the $\overline{I}$ constraint is not operative, GNP will grow at the target rate, $\overline{r}$. When the constraint is operative, the rate of growth will be given by

$$r_{t+1} = \frac{\frac{(I)_t}{V_t} - z}{k'}$$, which is the marginal capital-output ratio applied to the share of GNP devoted to net directly-productive investment.

(b) <u>Potential Savings</u>

i) Variables

$(S)_t$ = potential savings

E_t/V_t = share of export earnings in GNP

ii) Constants

α = propensity to save from additional GNP

γ = effect of changes in export share on savings

iii) Relationships

$$(S)_o = I_o - M_o + E_o \quad (= I_o - F_o)$$

$$(S)_{t+1} = (S)_t + \alpha(V_{t+1} - V_t) + \gamma(E_{t+1}/V_{t+1} - E_t/V_t.$$

c) Gap Determination

i) Variable

$(F_s)_t$ = prospective savings gap

ii) Relationship

$(F_s)_t = (I)_t - (S)_t$.

2. Trade Gap

a) Exchange-Saving Production

i) Variables

V_{mt} = "exchange-saving production (induced export expansion or import substitution)

I_{mt} = investment in exchange-saving production (see section 4 for determination of I_{mt}).

ii) Constant

b = premium on capital-output ratio applied to I_{mt} (b = 1.2).

iii) Relationships

$$V_{mt} = \sum_{t=1}^{t-1} I_{mt}/bk_t$$

$$I_t = (I)_t + (1 - \frac{1}{b}) I_{mt}.$$

b) Import Requirements

i) Variables

$(M)_t$ = required imports

C_t = consumption

ii) Constants

μ = propensity to import from additional GNP

χ = propensity to import from additional consumption

$\emptyset$ = propensity to import from additional basic investment

ω = effect on imports of changes in the export share [E/V]

π = effect on imports of changes in the ratio of reserves to GNP [R/V]

$\overline{R}$ = average level of reserves in 1963-65, used for a level of reserves assumed constant throughout projections.

λ = portion of V_{mt} devoted to import substitution (λ=.5).

iii) Relationships

$$(M)_o = M_o$$

$$C_t = V_t - (I)_t$$

$$(M)_{t+1} = (M)_o + \mu[V_{t+1}-V_o] + \chi[C_{t+1}-C_o] + \emptyset[(I)_{t+1}-(I)_o] + \omega[E_{t+1}/E_o/V_o] + \pi[\overline{R}/V_{t+1}-\overline{R}/V_o] - \lambda V_{m(t+1)}$$

iv) Comment

The definition of consumption was used rather than the more accurate (V-S), for ease of computation in making the projections.

c) <u>Exports</u>

i) Constant

ϵ = exogenous growth rate of exports [E]

ii) Relationship

$$E_t = E_o(1+\epsilon)^t + (1-\lambda)V_{mt}.$$

d) <u>Gap Determination</u>

i) Variable

$(F_E)_t$ = prospective trade (or export) gap

ii) Relationship

$(F_E)_t = (M)_t - E_t$.

3) <u>Capital Inflow Requirements</u>

F_t = the larger of $\begin{cases} (F_s)_t \\ (F_E)_t \end{cases}$

$M_t = E_t + F_t$

$S_t = I_t - F_t$

4) <u>Exchange-saving Investment</u>

i) Constants

j = constraint on share of total basic investment $[(I)]$

h = share of current year's excess trade gap $[(F_E)_t - (F_s)_t]$ which I_{mt} is designed to fill in following year.

ii) Relationships

If $(F_E)_t \leq 0$, then $I_{mt} = 0$.

If $(F_E)_t > 0$, and $(F_s)_t \leq 0$, then I_{mt} = the lesser of $\begin{cases} hbk_t[(F_E)_t] \\ j(I)_t \end{cases}$

If $(F_E)_t > 0$, and $(F_s)_t > 0$, and:

if $(F_s)_t \geq (F_E)_t$, then $I_{mt} = 0$

if $(F_E)_t > (F_s)_t$, then

$$I_{mt} = \text{the lesser of} \begin{cases} hbk_t[(F_E)_t - (F_s)_t] \\ j(I)_t \end{cases}$$

iii) Comments

Exchange saving investment is seen as occurring only in response to a positive trade gap which is greater than the savings gap and as being designed to reduce the present trade gap part of the way to the present savings gap or, if that gap is negative, to zero.

The values utilized for h, b and j are such that the greater capital requirements of exchange saving investment [the difference between I_t and $(I)_t$, as given by I_{mt} and j] will never be greater than the "excess gap." This insures that, while exchange-saving investment will bring realized savings closer to the level of potential savings, it will not generate a need for more capital than can be provided by potential savings and the capital inflow required by the prospective trade gap.

5) <u>Population Growth</u>

i) Variable

N = population

ii) Constant

p = growth rate of population

iii) Relationship

$N_t = N_o (1+p)^t$