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STUDY ON
CAPITAL FORMATION

and

CAPITAL ALLOCATION

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CAPITAL FORMATION AND CAPITAL ALLOCATION

The following paper, Some Observations on Capital Formation, Capital Allocation, and Economic Progress in Bolivia, is the result "...of a research project on capital formation with special reference to the industrial and housing capital markets."

As the title indicates the paper is selective rather than exhaustive. In it I have touched both on aspects of the mainly macroeconomic problem of capital formation and the microeconomic problem of capital allocation. Partly because it is not comprehensive and partly because it ranges over a very broad area, I feel that few Mission and GOB personnel will be interested in the entire paper although a fair number may find one or more sections useful.

Guided by data limitations and the principle of comparative advantage, the paper tends to be theoretical rather than descriptive. Still, my subject is the Bolivian economy and my objective is to offer some useful suggestions for the Mission and GOB.

In conducting the research for this paper, I have had enlightening discussions with USAID personnel attached to the Capital Development Branch and the Economics Branch. Most deeply implicated through their willingness to read and offer suggestions on various parts of the paper are Andrew A. Wilson, Julius P. Schlotthauer and Wendell L. Belew, all members of the Economics Branch, USAID/Bolivia.

For most hardnosed economists the function of external economic assistance is to "prime the LDC's pump" so she may "take off" and realize her heretofore latent potential for economic progress. Specifically, two major objectives of USAID and GOB should be (1) to maximize the sustainable GNP growth rate,^{1/} and, eventually (2) to eliminate Bolivia's need for foreign economic assistance. Realization of these goals depends in part on the rate of capital formation and the allocation of the stock of capital. With reference to the Bolivian economy these relationships are the subject of this paper.

CAPITAL FORMATION

Capital formation can affect a country's rate of economic growth in two related but conceptually separate ways. It is a component of aggregate demand for national output and it is a determinant of potential supply of national output. First, consider capital formation as a demand component temporarily ignoring its contribution to supply.

Provided a nation has idle resources, a permanent increase in the demand for any kind of its national output including demand for capital goods will result in additional employment, output and income which in turn induces additional demand setting off a second round of expan-

sion followed by a third and so on. But capital formation in a less developed country is not likely to set off such a growth spurt--at least within its own borders. The difficulty is that the LDC often must import capital goods so that the multiplier effect is enjoyed by the exporting country rather than the importing LDC.^{2/} When the demand for capital goods does happen to coincide with domestic production capabilities the LDC will realize a faster growth rate as long as the economic system has the potential for additional output. And unlike other components of aggregate demand, capital formation uniquely increases potential output while it contributes to aggregate demand.

The relationship between capital formation and potential output is complex. It depends on the useful life expectancy of a unit of new capital, the extent to which technological change is embodied in new capital, and the relationship between capital productivity and the rate of change in capital. These are indirect effects as well. Capital formation permits more output and income and finally saving which is the basis for additional capital formation and output. Therefore, the incremental saving-income ratio partially determines the eventual change in output from capital formation. Moreover, there is the very important possibility that this saving-income ratio may rise naturally in response to economic growth or conditionally upon receipt of financial assistance for new capital.

In the broadest sense the two sources of capital formation are the domestic economy and the foreign sector. For domestic generation of capital the national economy must save, that is, it must produce more than it currently consumes. The residual may either be physical capital, or other goods and services which are traded internationally for physical capital. In addition to domestic saving, capital may also be supplied directly by the foreign sector through investments, loans and grants.^{3/}

DOMESTIC SAVING AS A SOURCE OF CAPITAL FORMATION

Judging by the significant revisions and the internal peculiarities^{4/} the official series for domestic saving is probably neither accurate nor even reliable where reliability means that the series although erroneous, moves in the same direction and approximate magnitude as actual domestic saving.

Provided that the reader fully understands the data limitations, he is invited to examine Annex A for regression analyses of total and sectoral domestic saving. The results of Annex A can be summarized in a few sentences. Total domestic saving varies positively with gross domestic product (GDP). The probability that the positive relationship is merely a sampling error is less than .01. Over the 1953 to 1965 interval, the marginal propensity to save GDP is .13. Variations in net taxes and therefore government saving were not "explained" as completely as variations in household saving and enterprise saving. Household saving varies positively with disposable

income and negatively with the rate of change in prices. Enterprise saving also varies with the rate of change in prices, but these two variables are positively related probably due to the tendency for prices paid by enterprises to lag behind prices received by enterprises. Other regression coefficients are insignificant at the .05 level.

It is not surprising that total domestic saving from 1962 to 1965 has been falling increasingly short of the domestic saving levels in the Government of Bolivia's Ten Year Plan for 1962-1971. It is interesting, though, that even if the Plan's optimistic projections for national output had been realized, estimates of domestic saving based on the regression equations are still far short of Plan domestic saving levels. This means that the Plan saving levels depend on considerable structural changes in the economy. Without these behavioural and institutional developments satisfactory economic growth in Bolivia cannot be realized unless foreign capital inflows fill the gap separating investment requirements and domestic saving.

THE ROLE OF FOREIGN CAPITAL: EXTENSION OF THE CHENERY & ECKSTEIN ANALYSIS 5/

Using Chenery's two-gap development model, Peter Eckstein estimated that \$49.3 million of foreign capital would be needed in Bolivia in 1966 to sustain her rather low 1957-64 annual GNP growth rate of 3.48%. This required foreign capital input is the difference between the investment needed to realize a growth rate of 3.48% and expected domestic saving at the target GNP level implied by that growth rate; in Chenery's terms it is the savings gap. In the Chenery-Eckstein analysis, foreign capital inputs also relieve another constraint on economic growth--the LDC's trade gap which is the excess of expected imports at the target GNP level over expected exports. However, in the case of Bolivia, the trade gap of \$30.5 million is automatically filled by the \$49.3 million needed to close the savings gap.

The kind of model Chenery and Eckstein use can be manipulated to answer a variety of interesting questions for USAID and GOB regarding the relationships between foreign capital, economic growth, and the structure of the domestic economy.

The variables and parameters for a variant of the Chenery-Eckstein model are:

- SGt = savings gap in period "t"
- It = investment required to sustain the target growth rate for period "t".
- St = domestic saving forthcoming at the target GNP level in "t"
- GNPt = target GNP in "t"
- TGt = trade gap in "t"
- Mt = imports forthcoming at the target GNP level in "t".
- Xt = exports in "t"

- a = intercept of the saving function
- s = marginal propensity to save GNP
- k = marginal capital - output ratio
- h = intercept of the import function
- m = marginal propensity to import
- r = target GNP annual growth rate
- x = exports annual growth rate

In the simplified version of the Chenery model the savings gap is:

$$\begin{aligned}
 SG_t &= I_t - S_t \\
 &= k(GNP_t - GNP_{t-1}) - (a + s GNP_t) \\
 &= k \left[(1+r)GNP_{t-1} - GNP_{t-1} \right] - \left[a + s(1+r)GNP_{t-1} \right] (*) \\
 SG_t &= \left[r(k-s) - s \right] GNP_{t-1} - a
 \end{aligned}$$

and the trade gap is:

$$\begin{aligned}
 TG_t &= M_t - X_t = h + mGNP_t - (1+x)X_{t-1} \\
 TG_t &= h + m(1+r)GNP_{t-1} - (1+x)X_{t-1} (**)
 \end{aligned}$$

The equations marked with asterisks will be used throughout the analysis in this section.

1. Development Gaps and the Rate of Economic Growth.

What are the changes in the development gaps, and therefore the required foreign capital inputs, as the target rate of GNP growth for Bolivia is increased? The first partial derivatives of the gaps with respect to the growth rate give us the following estimates:

$$\frac{\partial SG}{\partial r} = (k-s) GNP_{t-1}$$

$$\frac{\partial TG}{\partial r} = m GNP_{t-1}$$

GNP_{t-1} , $(k-s)$ and m are all positive for any known or conceivable economy. Therefore as expected both gaps are increasing functions of the growth rate, r . Ecksteins' estimates for Bolivia are:

$k = 4.69$ (Based on the regression results summarized in the preceding section, my own estimates would be considerably smaller. In discussing his estimates of "s" Eckstein writes: "Values for Bolivia, Costa Rica, Guatemala and Panama were compromises among several conflicting estimates". Ibid. p.34)

$s = 0.22$

$m = 0.23$

Let $GNP_{t-1} = GNP 1966 = \$666.1$ million.

Plugging these values into the partial derivatives, a one percentage point increase in Bolivia GNP growth rate, say from 5% to 6% yields,

$$\begin{aligned}\Delta SG &= \$29.8 \text{ million} \\ \Delta TG &= \$ 1.5 \text{ million}\end{aligned}$$

Two interesting and useful conclusions can be drawn from these estimates. First, the savings gap is much more responsive to growth rate changes than the trade gap. Recall that Eckstein estimated Bolivia's savings gap to be almost \$19 million larger than her trade gap even at the very low and politically unsatisfactory growth rate of 3.48%. At higher growth rates the difference between the savings gap and the trade gap for Bolivia will be considerably larger because the former is more responsive to changes in the growth rate than the latter. A second conclusion which should be interesting to Mission policymakers is that the Bolivian economy requires a rather healthy additional dose of annual foreign capital to raise its GNP growth rate. A one percentage point increase in the growth rate requires an estimated \$29.8 million in additional foreign capital.

2. Trends in the Development Gap and the Rate of Economic Growth.

What is the relationship between the GNP growth rate and the changes in the development gaps over time? The Mission ought to know whether Bolivia will need more, less or the same foreign capital annually if she is to maintain various target rates of GNP growth. For the savings gap to remain constant through time (and equal to the constant as in equation (*)), the coefficient of GNP_{t-1} must be equal to zero. That is:

$$r(k - s) - s = 0$$

$$r = \frac{s}{k - s}$$

Using Eckstein estimates of "k" and "s" for Bolivia

$$r = \frac{.22}{4.69 - .22} = .049$$

For the trade gap to remain constant through time (and equal to the constant h in equation (**)), $m(1+r)GNP_t - 1 - (1+x)X_{t-1} = 0$

Using Eckstein's estimates and letting $X_{t-1} = 1966 = \$150.4$ million:

$$.23(1 + r) \$666.1 - (1 + .05) \$150.4 = 0$$

$$r = .031$$

Therefore any GNP growth rate greater than 4.9% will cause the savings gap to increase over time, similarly, the trade gap will expand each year if the GNP growth rate exceeds 3.1%.

In that Bolivia's savings gap is larger than her trade gap, a growth rate greater than 4.9% will require increasing annual capital inputs while a growth rate between 3.1% and 4.9% will require decreasing capital inputs. In the latter case, the development gaps will approach each other rapidly if the growth rate is close to 3.1% and slowly if the growth rate is near 4.9%; the rate of approach varies because the savings gap is much more responsive to the growth rate than in the trade gap.

3. Rate of GNP Growth and the Structure of the Economy.

What effects do Bolivian structural changes have on economic growth if the foreign capital input is held constant over time? In the preceding section it was estimated that any growth rate of over 4.9% in Bolivia would require increasing annual foreign capital inputs. The alternative to increasing foreign capital is structural change in the domestic economy.

It was noted above that the savings gap \bar{g} is constant over time (and equal to a) if:

$$r = (k - s) - s = 0$$

$$r = \frac{s}{k - s}$$

The partial derivatives of "r" with respect to "k" and "s" show how the GNP growth rate responds to change in the marginal capital-output ratio and the marginal propensity to save, respectively, when the foreign capital input is held constant at a .

$$\frac{\partial r}{\partial s} = \frac{k}{(k - s)^2} \quad \frac{\partial r}{\partial k} = - \frac{s}{(k - s)^2}$$

Using these partial derivatives estimates can be made of the response of the growth rate to changes in the savings rate and the capital-output ratio.

Response of the GNP Growth Rate to an increase of .01 in "s" for Various Values of "s" and "k"

k \ s	.1	.2	.3
3	.0036	.0038	.0041
4	.0026	.0028	.0029
5	.0021	.0022	.0023

Response of the GNP Growth Rate to a Unit decrease in "k" for Various Values of "s" and "k"

k \ s	.1	.2	.3
3	.012	.026	.041
4	.007	.014	.022
5	.004	.009	.014

A one percentage point change in Bolivia's marginal propensity to save, say from .15 to .16, increases her GNP growth rate by somewhere between one-fifth and two-fifths of a percentage point depending on the values of "s" and "k". Using Eckstein's estimates of "s" (.22) and "k" (4.69), the growth rate increases by .23 of one percent for a one percentage point increase in the savings rate.

A unitary decrease in the marginal capital-output ratio, say from 4 to 3, increases the GNP growth rate by somewhere between two-fifths of a percentage point and four percentage points depending on the values of "s" and "k". Using Eckstein's estimates of "s" and "k" for Bolivia, the growth rate increases by 1.1 percentage points for a unitary decrease in the marginal capital-output ratio.

4. The Savings Gap and the Structure of the Economy.

How much can Bolivia's savings gap and therefore the required foreign capital input for Bolivia be reduced as the structure of the economy changes given a constant GNP growth rate? Armed with the answer to this question the Mission would be more knowledgeable about where to apply leverage and what value to place on it. Partial derivatives of the savings gap with respect first to the marginal

propensity to save and second to the capital-output ratio show how structural changes in the economy can be used to reduce foreign economic assistance for a constant Bolivian growth rate.

$$SG_t = [r(k - s) - s] GNP_{t-1} - a$$

$$\frac{\partial SG_t}{\partial s} = -r GNP_{t-1} - GNP_{t-1}$$

$$\frac{\partial SG_t}{\partial k} = r GNP_{t-1}$$

Suppose for example "r", the GNP growth rate, is .05 and $GNP_{t-1} = GNP_{1966} = \666.1 million. Then an increase in "s", the marginal propensity to save, of .01 reduces the savings gap by \$7.0 million. Similarly a reduction in "k" of .1 reduces the savings gap by \$3.3 million. This tends to confirm what all of us know intuitively; the Mission as well as others contributing economic assistance should push hard for structural change not only to improve the economic well-being of Bolivia, but also to reduce the required foreign capital inputs. The returns to such a policy appear to be quite significant.

In my view the need for structural change in Bolivia cannot be over-emphasized. As we have seen, it may be the source of increased growth, reduced need for foreign capital or some combination of the two. Particularly as the U.S. continues to rethink her role abroad, countries like Bolivia must accelerate their rate of economic development as insurance against even more severe reductions in foreign assistance in the future.

The trend away from grants in favour of loans has also increased the urgency for structural change in all less developed countries, but particularly in Latin America. Annex B of this paper shows that Bolivia can very profitably accept loans on the favourable terms which presently prevail. However, it remains to be demonstrated that GOB can capture enough of the returns and in foreign exchange to meet interest and amortization payments without considerable disruption of economic, and perhaps political activity. Again, structural change, this time in the shape of fiscal reform, seems to be a requirement for economic progress in Bolivia.

CAPITAL ALLOCATION

Nearly non-productive "monuments" to economic development in the form of fixed capital are not unusual in less-developed countries. Examples include modern multi-lane highways which will remain underutilized for decades and plush airport terminals which are fully automated in the midst of widespread underemployment and unemployment.

Occasionally a firm or even an entire industry will acquire the plant and equipment necessary for operation only to learn that internal plus external demand is inadequate at profitable prices. In other instances capital outlays are made in spite of a shortage of the necessary complementary resources, particularly skilled labour. These are examples of capital misallocation, and in effect, they represent the squandering of capital formation.

While it is easy to find examples of capital misallocation, it is virtually impossible to specify how a nation's capital would be optimally allocated or even where in the economy the next piece of capital ought to go to have the maximum impact. Certainly on the basis of my short stay in Bolivia I am not so knowledgeable that I can determine which industries and regions of the country ought to be encouraged. Nevertheless, I do believe an economist can pinpoint institutional arrangements that are likely to cause capital misallocation and he can suggest policy which will tend to improve the allocation of future additions to the capital stock.

I have adopted this approach in the following section on the operation of the Bolivian loanable funds market. That analysis is followed by a final section on the economic effects of changing the allocation of capital between housing and other uses.

THE LOANABLE FUNDS MARKET

The allocation of physical capital in Bolivia depends in large part on the operation of the Bolivian loanable funds market. This market is affected by a number of Bolivian laws and other institutional arrangements which are clearly intended to promote economic progress through a higher rate of capital formation and improved allocations of the stock of capital. It is my contention that some of these laws and other arrangements may not have the intended effects. Legal maximum interest rates, specialized lending banks, and subsidized interest rates are three such circumstances which are considered in that order below.

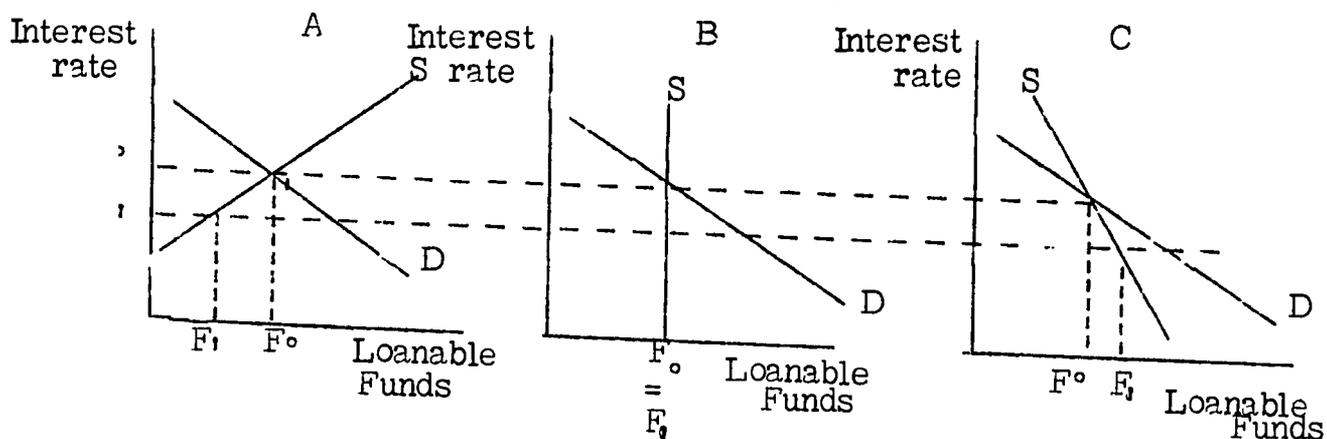
Excluded from the present analysis is an important class of investment projects--that class which involves "external real economies and diseconomies." These projects are special in the sense that they affect the input-output relationships of other firms or the goods-welfare relationships of consumers. That is, the effects of such projects "spill over" into firms and consumers whose interests are not represented in the decision-making process. These spillover effects can lead to resource misallocation unless projects with positive (negative) external effects are encouraged (discouraged) by GOB and the Mission through differential treatment in interest rates, taxes, grants, or technical assistance. My own feeling is that GOB and the Mission should not assign this task to the loanable funds market. As will be demonstrated below present efforts along these lines almost surely do more harm than good. The problem is that there is no simple set of rules governing the lending

policies of credit institutions which automatically takes into account external effects. Therefore the following analysis and policy recommendations refer to the vast majority of projects in which external effects are either non-existent or relatively unimportant. ✓

LEGAL MAXIMUM LENDING RATES

Reducing interest rates lowers the cost and therefore increases the demand for loanable funds and, in turn, physical capital. Finally, the rate of economic growth depends on the rate of increase in physical capital. Evidently lower interest rates promote economic growth.

The preceding argument sounds plausible, but it neglects the supply of loanable funds. Consider the following three cases:

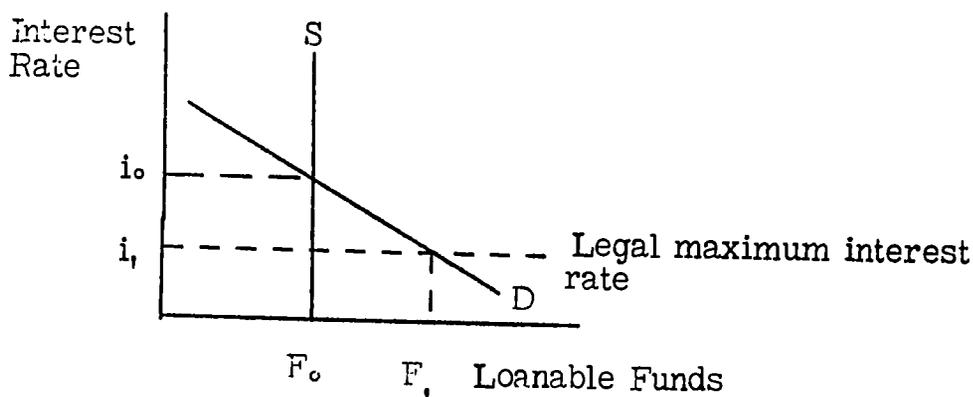


In all three cases, the free market rate is i_0 and the legal ceiling rate is i_1 . Given a negatively sloping demand for loanable funds, the supply of loanable funds determines the effect of a legal maximum rate on the flow of loanable funds and capital formation. The flow is decreased, unchanged, and increased from F_0 to F_1 for cases A through C, respectively.

It is not clear whether the loanable funds supply curve in Bolivia is like case A, B or C. The supply of loanable funds is equal to the change in the money supply less the change in money hoarded plus current saving. Changes in the money supply depend mainly on factors other than the interest rate. Money hoarded varies inversely with the interest rate simply because the interest rate is the opportunity cost of hoarding money. Economists are not in agreement about the relationship between saving and the interest rate. Some argue that interest is a reward for saving or postponing consumption, and the higher the reward the more households will save. Others argue that people save to meet planned future expenditures such as buying a house, sending a child to school, retirement, etc. At higher interest rates, a given fund can be accumulated in a fixed period of time with smaller annual levels of saving. Therefore, the argument runs, saving is inversely related to the interest rate. Given these separate forces, the total

supply of funds could be positively related, independent, or negatively related to the interest rate. My own guess is that the supply curve is either positively sloped or perhaps vertical and in either case, a ceiling interest rate will not increase the flow of loanable funds and the rate of capital formation.

However regardless of the effect on capital formation, a ceiling interest rate may lead to sub-optimal allocation of loanable funds. Suppose there is one lending institution with an inelastic supply of loanable funds.



In a free market demand just equals supply at interest rate i_0 . Only those projects for which the borrower is willing to pay i_0 or more would be financed. Now suppose the legal maximum interest rate is i_1 . At this rate $F_1 - F_0$ additional loanable funds are demanded, but the supply remains fixed at F_0 . Therefore excess demand is $F_1 - F_0$. When, as in this case, the interest rate is not permitted to clear the market, other allocative mechanisms such as loan costs, risk, friendship, required deposits, likelihood of future banks business, etc., emerge to "solve" the disequilibrium. Unfortunately, some of the loanable funds may go to borrowers whose projects did not promise a sufficient rate of return to meet the free market rate of i_0 . Given the assumptions, this necessarily means that an equal quantity of loanable funds will not go to borrowers who would have paid i_0 or more. That is, some of the most promising loans will not be made. Consequently, misallocation of loanable funds is quite possible, even likely, if the interest rate is legally suppressed as it is in Bolivia below the free market rate. 8/

Whether or not there is excess demand, the ceiling interest rate will tend to guide banks toward safe loans and away from risky loans even when the risky loan is economically preferable in the sense that it has the higher expected rate of return. A simple example, admittedly extreme, illustrates the paradox. Suppose that the probability

is 1.0 that project A will yield a 20% return. The probability that project B will earn 100% return is .9. But there is also a .1 chance that project B will earn 0% and in this case, the borrower will have to default on the loan. The expected rates of return are 20% for A and 90% for B; B is decidedly preferable in spite of the very small chance it may be unprofitable. But the bank does not reason thusly. The bank can receive the full maximum interest rate if it lends for project A but it has only a .9 chance of receiving the maximum interest rate if it decides to finance project B. Confronted with such an alternative, a profit-maximizing bank will lend for A rather than B even though B has a much higher expected rate of return. Without a ceiling interest rate entrepreneurs behind riskier projects such as B could compete with safer projects like A by offering to pay a higher interest rate to compensate the bank for the risk differential.

Appropriate Mission policy is two-pronged. First the Mission should lobby for an increase in the maximum interest rate or better, outright repeal of the maximum interest provision. If the legal rate can be neither raised nor eliminated, the supply of funds must also be controlled to avoid excess demand and the resulting misallocation of credit. Therefore it should also be Mission policy to increase the flow of loanable funds through grants, loans, and indirect influence including technical assistance and leverage deployment so that the free market rate will coincide with the legal maximum interest rate.

SPECIALIZED LENDING BANKS

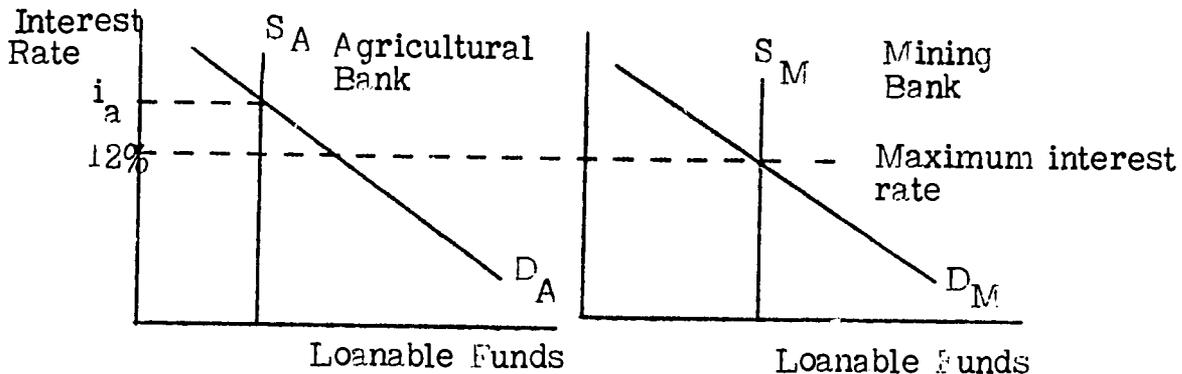
Of course, Bolivia has several rather than one lending institutions. A number of these institutions are legally permitted to extend credit only for specific purposes. In this category are the Mining Bank, Agricultural Bank, Industrial Bank, and the savings and loan institutions. There are at least two potential advantages to fragmenting the market in this way. First, through specialization, lending institutions are more likely to develop the skill needed to discern sound loans from unsound ones. Second, a group of specialized financial institutions facilitates the subsidization of one or more sectors, relative to the others mainly through control of the flow of foreign assistance capital offered at subsidized rates.

Regulation of these specialized banks is not limited to the type of borrower they may service. Two additional kinds of regulation combined with market fragmentation raise the possibility of loanable funds misallocation. First, all loans made by these institutions earn a legal maximum (and an effective minimum) of 12% plus various service charges. Second, these institutions are permitted to acquire loanable funds mainly through non-market channels. Sources of loanable funds are mainly development loans to the lending institutions, repayments of outstanding loans, and to an increasing extent the central bank rediscount fund. It is true that the savings and loan institutions acquire funds through deposits, but most of

these deposits are to meet loan eligibility conditions. Also, the Industrial Bank sells corporate stock although it has not had much success to date.

These three conditions--market fragmentation, legal maximum interest rates, and loanable funds supplies which are largely not responsive to market conditions--make it quite possible that loanable funds misallocation occurs.

Consider the following hypothetical case.



All borrowers, miners or farmers, are charged the legal maximum interest rate of 12%. Therefore, there is no incentive for the Mining Bank to supply funds to the Agricultural Bank even though some farmers would be willing to pay i_a for loanable funds which is higher than the 12% interest miners will pay. Nor can demand shifts be depended on to eliminate the loanable funds misallocation; farmers whose credit demands are unfulfilled at the ceiling interest rate of 12% are not legally eligible for credit at the Mining Bank where the competition for loanable funds is less keen. The result is that some farmers willing to pay i_a , considerably more than 12%, cannot obtain financing while simultaneously, there are no unfinanced mining projects which would have paid over 12%.

In the past development loans and grants extended directly to the specialized banks were the main avenues through which the Mission attempted to avoid loanable funds misallocations of the type discussed above. That is, capital inputs were directed toward sectors which appeared to have the largest volume of most promising unfinanced projects. Now to an increasing extent, Mission support of the loanable funds market is being conducted through expansion of central bank rediscount fund. The obvious advantage of the present policy is that Mission support operating through the rediscount fund can respond much more quickly and fully to changing market conditions than it could have through the bureaucratic stages implicit in specific loans and grants. While this is an improvement it is hardly a panacea. Given the legal constraints, the rediscount fund must be large enough to meet all excess demand at 12% or the Banco Central will simply be placed in the difficult position of guessing which bank

has potential borrowers who would pay the highest interest rate if a free market existed. The Banco Central could be spared the trials of selection if law permitted it to lend rediscount funds to the bank bidding the highest rate. This modification would also permit the rediscount fund to grow more rapidly and therefore, support a larger volume of loan demand. But the possibility of excess demand for bank, as distinct from Banco Central, loanable funds would remain. To avoid loanable funds misallocation through this avenue, Mission policy should be to push for elimination of the interest rate ceiling and expansion of the supply of loanable funds.

SUBSIDIZED INTEREST RATES

Commercial Banks, as distinct from the specialized banks discussed above, can extend credit at up to 18% plus service charges for commercial purposes. However, borrowers legally eligible for 12% money from the Industrial Bank, Agricultural Bank, and Mining Bank cannot be charged more than 12% by the commercial banks. In effect, the lower interest rate ceiling applies to stages of the production process prior to commerce.^{10/} The purpose of this interest rate differential is to stimulate economic development through the subsidization and therefore expansion of certain productive activities relative to the remaining productive activities and consumption. In this regard three questions can be raised:

1. Is the economic return for Bolivian society higher in the subsidized sector (i. e. in production stages prior to commerce) than in the commercial sector ?
2. Are the larger future output levels induced by subsidizing plant and equipment expenditures "worth" the required sacrifice in current consumption ?
3. What are the possible effects of this production stage interest rate differential ?

"Yes" answers to (1) and (2) are implied by the interest rate differential plan. Assuming for now that these answers are correct, consider the third question. Given available information and the state of the science, no unqualified answer can be given to this question. However, it is possible to show not unreasonable circumstances under which the actual effects are just the opposite of the intended effects in the sense that some unfinanced mining or manufacturing projects may exist which could earn a higher return than any unfinanced commercial projects.

Consider the following cases:

1. Commercial banks have loanable funds equal to or less than demand by commercial firms at interest rate 18%. Risk and loan

costs equal, a commercial bank would obviously prefer earning 18% to 12% on its extended credit. In this case all commercial bank loans will go to the commercial sector. ^{11/} Yet it is quite possible that the Industrial Bank, for instance, has not financed all industrial projects which could pay over 18%. Even though there is residual industrial demand promising very high returns, commercial banks will be acting rationally by ignoring these potential borrowers who can legally pay no more than 12% to service potential borrowers who can pay the higher 18% interest rate.

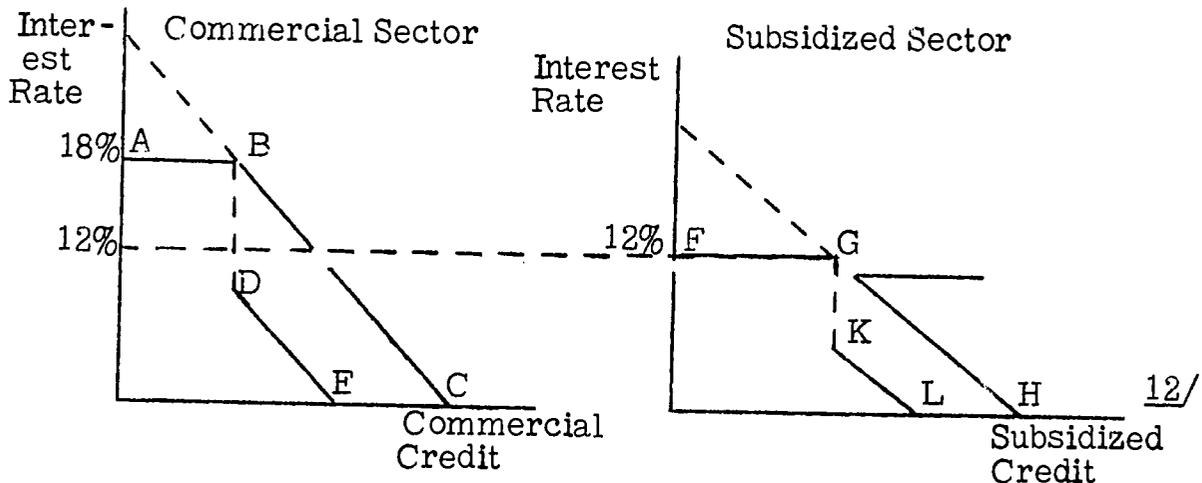
2. Commercial banks have loanable funds in excess of commercial sector demand at 18%. The profit-maximizing commercial bank allocates loanable funds to the commercial sector and to the interest rate subsidy sector such that the last unit of credit in each sector increases bank total revenue by the same amount.

a. Marginal revenue equals the interest rate.

In the Bolivian credit market there is a relatively small number of banks so it is not reasonable to assume that marginal revenue equals the interest rate because every bank's demand curve for loanable funds is horizontal. However, banks may be able to make loans simultaneously to similar borrowers at different interest rates. And in this case, marginal revenue and the interest rate are equal even though the demand curve is negatively sloping. When these conditions prevail, the bank will finance all commercial sector demand down to 12% interest before it finances any projects subject to the 12% interest rate ceiling. And again, it is entirely possible that highly profitable projects are effectively excluded precisely because they are eligible for an interest rate subsidy.

b. Marginal revenue is less than the interest rate.

In this contest, this assumption means that the commercial bank must charge all similar borrowers the same interest rate. From the bank's view, the commercial sector demand for credit is ABC, and the subsidized sector demand for credit is FGH.



The commercial bank will make its first loans entirely in the commercial sector where marginal revenue is earned at 18% on loans up to AB. But beyond AB, the commercial bank can only lend to commercial firms at less than 18%. For the case illustrated above, marginal revenue falls sharply from 18% to below 12% along DE. At this point, the bank begins to make production loans which earn marginal revenue at a constant rate of 12% up to FG. In this range, the "advantage" seems to swing to the subsidized sector; unfinanced projects in the commercial sector could pay up to 18% and, given sufficient loanable funds, all projects in the subsidized sector earning over 12% receive financing.

In this case as well, the volume of loanable funds determines whether the instrument has its intended effect. Of course, even if the supply of loanable funds is sufficiently large so that funds do flow to the subsidized sector, the desirability of subsidizing some productive activities relative to the rest of the production sector and the consumption sector should be carefully considered.

Is the economic return for Bolivian society higher in the subsidized sector (i. e. in production stages prior to commerce) than in the commercial sector? Consider an economic system which manufactures goods, but does not arrange for their distribution. Recognizing the bottleneck some manufacturers will open distribution outlets. Resources will continue to flow from manufacturing into distribution as more entrepreneurs become aware of the relatively lucrative returns available to a distributor. In a free market system a balance between manufacturing and distribution will soon be reached in which no entrepreneur can expect to earn a higher return on his invested capital by switching from manufacturing to distribution or vice-versa. At this point society is getting the optimal performance from the total capital input in manufacturing and distribution.

The Bolivian interest rate subsidy almost surely prohibits to Bolivia from getting the optimal performance from the total capital input in manufacturing and distribution. As we have seen the actual effect of the subsidy is uncertain. But it would be purely accidental if the last projects to receive financing in the subsidized and unsubsidized sectors promised to earn the same return per unit of invested capital. Unless this highly unlikely result occurs, loanable funds and additive to the stock of capital are not optimally allocated. 13/

The Mission should begin what will be a long campaign to convince GOB to eliminate the interest rate differential system as it presently operates. Certainly there are projects and programs that deserve economic assistance from both GOB and foreign donors, but the interest rate subsidy is far too blunt an instrument to sort out the deserving from the under serving projects. And, as we have seen, it leads to sub-optimal allocation of loanable funds and fixed capital.

Are the large future output levels induced by subsidizing plant and equipment expenditures "worth" the required sacrifice in current consumption? The interest rate a producer is willing to pay is based on the return he expects which in turn reflects the value society places on his economic activity. The ceiling rates are such that consumers will pay 18% and producers will pay 12% at the margin. Evidently the social return to financing the consumer exceeds the social return to financing the producer. On this basis, the answer is that it is not worth it to subsidize the production sector relative to the consumption sector. But the preceding argument is incomplete in light of foreign assistance to Bolivia. The presence of significant foreign capital grants, particularly from the U. S., means that objectives of non-Bolivians must also be considered in the allocation of loanable funds--at least the foreign assistance share of loanable funds. It is entirely reasonable from the donor point of view that its share of loanable funds be earmarked for projects which will promote Bolivian economic growth and hasten the day when Bolivia can realize continued progress without continued assistance.

However it does not follow that an interest rate subsidy to the production sector relative to the consumption sector is the best way to stimulate capital formation and economic growth. As we have seen above the results of such a policy may be quite different from the objectives; banks quite logically prefer to service borrowers who are legally permitted to pay the highest interest rates. A better way to channel funds away from consumers is to restrict the supply of funds available for this purpose. Present regulations regarding the rediscount fund tend to have the desired effect in that this fund is closed to banks which plan to use the proceeds for consumer loans.

To increase the rate of capital formation and to improve the allocation of capital, Mission policy regarding the loanable funds market should be as follows:

- 1) The two interest rate ceilings should be eliminated. This will automatically eliminate the interest rate subsidy which is now available for some productive activities.
- 2) Banks should be able to borrow from the rediscount fund in order to make loans to all productive sectors including the commercial sector, but the fund should not be used to finance consumer loans.
- 3) The system of specialized banks should be retained, but competition for loanable funds among these banks should be ensured by allowing the rediscount rate to vary such that there is never an excess demand for rediscount funds. In this case, funds will tend to flow automatically to the specialized bank and corresponding production sector where the expected rate of return on fixed

capital is the highest. Moreover, the fund itself will tend to grow more rapidly if the interest rate is a market rather than a subsidized rate.

With these changes, the kinds of loanable funds misallocation discussed throughout this section would be eliminated. The only remaining "misallocation" would favour the production sector relative to the consumption sector. And, as I have argued above, this is not misallocation when we give some weight to the objectives of USAID and other donors as well as Bolivian residents. Under these circumstances the sound way for the Mission to encourage Bolivian capital formation and economic growth would be to supplement its ad hoc grants for highly deserving projects with direct inputs into the Banco Central rediscount fund.

HOUSING AND OTHER FIXED CAPITAL

The economic distinction between a house and other capital such as roads, factories and producers' durable equipment is not so vast as it may seem on the surface. It is tempting to argue that a house does not increase future potential output whereas producers' durable equipment does. This is nonsense. In fact, a house provides consumer services throughout its lifetime in much the same way as a machine may produce either consumer goods or services or perhaps even other producers' durable equipment which ultimately satisfies consumers.

As I see it, there are two important distinctions with regard to Bolivian development between housing and most other fixed capital such as machinery. First, the requirements for acquisition are very different. Housing can be produced domestically, and therefore require saving, but little if any foreign exchange. Machinery is quite another matter. At present virtually no physical capital except construction including roads and factories as well as housing is produced within Bolivia's border. Consequently, foreign exchange as well as saving is required for acquisition of machinery. The Chenery-Eckstein analysis is relevant in this regard. Recall that the critical development gap in Bolivia is the savings gap rather than the trade gap. That is, a foreign capital input large enough to fill the savings gap will automatically fill the trade gap. If foreign assistance is sufficient to close the savings gap, Bolivia will have ample foreign exchange with which to purchase machinery from abroad.

The second important difference between housing and other fixed capital concerns the use of domestic resources after the capital is formed. It is agreed that both houses and machines generate a stream of output in the future. However, a house without any complementary imports simply yields a direct service in the form of shelter. Non-housing capital, on the other hand, increases the productivity of labor, particularly in a capital-scarce country like Bolivia. This may be a major reason why housing in Bolivia is

deficient; capital combining with other relatively plentiful inputs is so very productive that the opportunity cost of residential construction is quite high.

There is an interesting corollary to the pair of distinctions between housing and machinery. A house uses labor inputs during the construction phase, but none after construction when it yields services. On the contrary, machinery, since it is not produced in Bolivia, has no effect on the domestic labor market during the manufacturing phase. But after the machine is in place, it has a clear effect on domestic employment and/or labor productivity. In theory, then, houses should be built when the economy is recessed. During such a time, some domestic labor will be idle, and the marginal productivity of capital, for example machinery, will be temporarily low insofar as the present stock of capital is less than fully utilized. So domestic resources for residential construction are available and the opportunity cost to such construction is, at least for the moment, relatively low. On the other hand, when the domestic economy is booming, the labor force is fully employed, and the existing stock of plant and equipment is operating at near-capacity levels, it would be preferable to ease the pressure on domestic resources by reducing housing construction which frees part of the labor force and expanding the stock of other fixed capital through expenditures of foreign exchange. At such a time, the opportunity cost of residential construction is relatively high.

Using Eckstein's estimates of the marginal propensity to save (.22) and the marginal capital-output ratio (4.69), it is possible to formulate some rather wild guesses about the opportunity cost of residential construction in terms of the growth rate of output excluding the services from the new houses. If no resources are devote to residential construction, the annual growth rate of potential output is $.047 \left(\frac{.22}{4.69} \right)$. In fact, from 1958 through 1964 residential construction was about 5% of total fixed capital formation. Residential construction activity at the 1958-64 pace would lower the annual growth rate of GNP other than housing services to about $.045 (= .95 \times .047)$. In essence, the reason is that for every additional house, the economy has fewer machines for the production of goods and services. In 1965 and 1966, according to preliminary estimates, residential construction jumped to about 10% of total fixed capital formation. Residential construction at this level would reduce the annual growth rate of GNP not counting housing services to about $.042 (= .9 \times .047)$. That is, the opportunity cost of increasing residential construction from 5% to 10% of total fixed capital formation is $.3\% (= 4.5\% - 4.2\%)$ annual growth in GNP less housing services.

The preceding analysis shows only the sacrifice of other things--the opportunity cost--to housing construction. It should not be inferred that the growth rate of GNP necessarily declines with increases in residential construction; housing services are and should be counted as part of GNP. No estimate of the effect of residential construction

on economic growth is attempted because of the difficulty of estimating a capital-output ratio for housing services.

As calculated above, the opportunity cost of housing construction assumes that the capital-output ratio and the marginal propensity to save remain constant. But it can be argued that current saving is functionally related to residential construction activity. New housing, particularly large developments such as the Hogares Bolivianos Calacoto project, probably offer a positive incentive for current saving as households seek to adjust their "asset portfolios" to the changing conditions. Certainly as families occupy the new houses, the demonstration effect will begin to operate especially on friends and relatives, but also on the community at large. Moreover, the development of the savings and loan industry and its modus operandi has probably caused a net increase in total current saving especially for residential construction. Insofar as housing generates saving which would not otherwise materialize, the opportunity cost of residential construction as expressed above is reduced. For example, the opportunity cost of increasing residential construction from 5% to 10% of total fixed capital is reduced to zero if the marginal propensity to save can be increased from .22 to .232 ($\frac{.22}{.95 \times 4.69} = .90 \times \frac{.232}{4.69}$)

CONCLUSIONS

A. Capital Formation.

1. Bolivia's historic marginal propensity to save of about .13 is not large enough to yield saving levels projected in Bolivia's Ten Year Plan for 1962-1971.
2. Given the rather low projected levels of domestic saving, a satisfactory rate of GNP growth in Bolivia will require significant net inputs of foreign capital.
3. At the present time, the necessary foreign capital input in Bolivia could be reduced with an increase in the marginal propensity to save or an increase in the productivity of capital, but not with changes in the import and export rates.
4. To raise the Bolivian GNP growth rate by one percent requires an estimated annual increase in foreign capital of almost \$30 million.
5. A Bolivian GNP growth rate of over 4.9% requires increasing annual foreign capital inputs over time. Under 4.9% the required flow of foreign capital is annually reduced.
6. For a constant foreign capital input, a one percentage point change in Bolivia's marginal propensity to save increases her GNP growth rate by about one-fourth of a percentage point.

7. For a constant foreign capital input, a unitary decrease in Bolivia's marginal capital-output ratio increases her GNP growth rate by about 1.1 percentage point
8. For a constant Bolivia GNP growth rate, an increase in the marginal propensity to save of .01 reduces the annual foreign capital needed to sustain the growth rate by \$7.0 million.
9. For a constant Bolivian GNP growth rate, a reduction in the marginal capital-output ratio of .1 reduces the annual foreign capital needed to sustain the growth rate by \$3.3 million.

B. CAPITAL ALLOCATION

1. Legal maximum interest rates in Bolivia probably decrease rather than increase the rate of capital formation.
2. Legal maximum interest rates tend to allocate capital away from risky projects even when such projects are highly profitable.
3. Legal maximum interest rates lead to allocation of loanable funds on non-economic basis. Under these conditions, the projects promising the highest rates of return may go unfinanced.
4. Combined with other characteristics of the Bolivian loanable funds market, specialized lending banks and the accompanying fragmented loanable funds market make it possible that highly profitable projects in one productive sector may remain unfinanced while less productive projects in other sectors receive financing.
5. The effects of subsidy interest rates for some productive activities are uncertain. However, it is possible to show not unreasonable circumstances under which the actual effects are just the opposite of the intended effects in the sense that some unfinanced projects in the subsidy sector exist which could earn a higher return than any unfinanced projects which are not subsidized.
6. The two interest rate ceilings should be eliminated. This will automatically eliminate the interest rate subsidy which is now available for some productive activities.
7. Banks should be able to borrow from the rediscount fund in order to make loans to all productive sectors including the commercial sector, but the fund should not be used to finance consumer loans.
8. The system of specialized banks should be retained, but competition for loanable funds among these banks should be ensured by allowing the rediscount rate to vary such that there is never an excess demand for rediscount funds. In this case, funds will tend to flow automatically to the specialized bank and corresponding pro-

duction sector where the expected rate of return on fixed capital is the highest. Moreover, the fund itself will tend to grow more rapidly if the interest rate is a market rate rather than a subsidized rate.

9. The Banco Central rediscount fund should be expanded.
10. Residential construction in Bolivia should be promoted when the economy is depressed. Emphasis should be on the acquisition of other types of capital when the economy is operating at a near capacity level.
11. When the economy is operating at full capacity, the opportunity cost of increasing residential construction from 5% to 10% of total fixed capital formation is .3% annual growth in GNP not counting the additional housing services. This opportunity cost is reduced to zero if the marginal propensity to save is increased from .22 to .232.

A N N E X "A": DOMESTIC SAVING

This Annex on the determinants of total and sector domestic saving in Bolivia is based on a more thorough study by Rolando Sanz Guerrero of USAID/Bolivia entitled The Role of Domestic Savings in the Economic Development of Bolivia.

The purpose of this annex is to show that projected saving flows in the current GOB Ten Year Plan cannot be realized without major structural changes in the economy or much larger increases in national output than projected in the Plan.

The technique of multiple linear regression is used to "explain" household saving (HS), enterprise saving (ES), and net taxes (Tn). Given projected government current expenditures and projected values for the explanatory variables, future levels of HS, ES, and government saving (GS) can be estimated. It turns out that the annual sum of these saving components falls short of projected saving levels in the Ten Year Plan.

Observations for the multiple regression analysis are from 1953 through 1965. Economic data from earlier years describe the different pre-revolutionary economy and are therefore less useful in estimating parameters to be used in predicting how certain economic variables will behave in the future.

(1) Household saving (HS) is assumed to be a linear function of real disposable personal income (DY) and the annual percentage change in the consumer price index (P). The regression results are:

$$HS = -21.2 + .0967 DY - .0691 P$$

$$(14.4) \quad (.0421) \quad (.0263)$$

$$R^2 = 0.69 \quad \underline{14/}$$

(2) Enterprise saving (ES) is assumed to be a linear function of real gross domestic product (GDP), the annual percentage change in the consumer price index (P), and imports of capital goods (MK). The regression results are:

$$ES = -9.97 + .0895 GDP + .0731 P + .351 MK$$

$$(20.6) \quad (.0654) \quad (.0274) \quad (.200)$$

$$R^2 = 0.67$$

(3) Net taxes (Tn) are assumed to vary linearly with real gross domestic product (GDP) and the annual percentage change in the consumer price index (P). The regression results are:

Annex "A"

- 2 -

$$T_n = 4.67 + .0689 \text{ GDP} - .0120 \text{ P}$$

(16.6) (.0410) (.0287)

$$R^2 = 0.24$$

In a number of macroeconomic models an estimate is needed of the marginal propensity to save GDP or GNP. With this purpose in mind the following regression equation is included in this annex. It is not used in the analysis which immediately follows:

$$TS = -13.1 + .134 \text{ GDP}$$

(14.9) (.0388)

$$R^2 = 0.47$$

Using the first three regression equations and Ten Year Plan values for DY, GDP, MK, and G, predictions of HS, ES, GS and their sum or total saving (TS) can be calculated for the period 1962-1971. 15/

Moreover, for the first four years of the Plan (1962-1965) another set of total saving estimates can be calculated by using the regression equations and the actual values of the independent variables. Finally, for the first four years of the Plan actual total saving can be compared with the three sets of estimates of total saving.

Total Savings in Bolivia : 1962 - 1971

(1)	(2)	(3)	(4)	(5)
<u>Year</u>	<u>Estimated TS</u> (Using Plan values for independent va- riables)	<u>Plan TS</u>	<u>Estimated TS</u> (Using actual va- lues for independ- ent variables)	<u>Actual TS</u>
1962	42.6	33	35.0	34
1963	48.4	49	45.8	41
1964	54.0	66	49.7	47
1965	59.9	85	48.4	49
1966	67.9	107		
1967	73.5	122		
1968	77.8	138		
1969	81.7	156		
1970	86.7	176		
1971	91.9	198		

From the table it is readily apparent that Plan TS (column 3) is not consistent with estimated TS based on the regression results and Plan projections for the independent variables (column 2). In reality the Plan projections for the independent variables have also been too optimistic during 1962 through 1965 so the estimated TS (column 4) is less than estimated TS (column 2).

A N N E X "B" : External Debt and Economic Progress

In recent years economists as well as donors and recipients of development loans have expressed concern over the increasing external debt and the accompanying service expenditures of less developed countries. This situation will almost surely grow worse in the future. The Economics Branch of USAID/B estimates that GOB's external debt will increase from US\$301.3 millions in 1968 to US\$628.4 millions in 1980 and debt service will increase from US\$17.8 millions to US\$38.6 million over the same interval. Moreover, it is expected that "... the annual level of net capital inflow (disbursements minus debt service), is reduced by about two thirds, from 31.2 million in 1968 to 10.5 million by 1980 the projected ratio of debt service to exports increases from 11.4% in 1968 to 13.9% in 1980 (and) the ratio of debt service to projected GDP increases from 2.4% in 1968 to 2.8% in 1980" 16/

While these trends are disconcerting, it is possible that increases in external debt are on balance advantageous. Increases in external debt are occurring and affecting the Bolivian economy on a reasonably continuous basis. These more or less regular injections tend to interfere with a clear guess as to the effects of debt increases. To skirt this problem, the method of analysis here will be to trace the probable impact of a one-shot increase in external debt. 17/

Assumptions

1. There is an excess supply of sufficiently skilled labor such that the output-capital ratio is constant.
2. Demand for national output just equals supply.
3. The increase in the external debt is U.S. \$10 million. The grace period is 10 years during which time the interest rate is 2%. The principal and the interest on the unpaid balance are paid in 20 annual installments of equal dollar magnitude. During this post-grace period the interest rate is 2 1/2%.
4. Physical capital depreciates at an annual rate of 10%.
5. All domestic saving becomes outputs - producing capital with a one year lag.
6. The increments to output, positive and negative, are discontinued at a rate of 15%.
7. The marginal propensity to save GNP is .15.
8. The incremental output-capital ratio for domestic saving is .333.
9. The incremental output-capital ratio for capital acquired with the loan is .333.

Conclusions

1. Annual increments to GDP are positive for the first twenty-six years following the loan and negative at least through the fiftieth year. Total GDP for the first fifty years after the loan will be \$32.0 million more than it would have been without the loan.
2. Annual increments to GNP change over time in the same general way as the increments to GDP except that GNP increments are less than GDP increments from the second through the thirty-first year when interest and amortization payments occur. Total GNP for the first fifty years after the loan will be \$17.3 million more than it would have been without the loan.
3. The difference between total GDP and GNP for the first fifty years after the loan will be \$14.6 million. This is the total interest and amortization payments associated with the \$10 million loan.
4. The present value of the GNP increments for the first fifty years after the loan will be \$13.0 million. This is the net benefit to Bolivia from accepting the loan.
5. Even though the loan has a positive present value of \$13.0 million, the debt service-GDP ratio will increase over its present level from the very first year in which the interest is due until the loan is completely paid off. Reconciling legitimate institutional concern over a rising debt service -GDP ratio in Bolivia with the theoretical judgment that external loans appear to have very high economic value to Bolivia is not likely to be easy for the policymakers. Obviously there are unacceptable values for the debt service-GDP ratio (i.e. over one). But perhaps we should not pay quite so much attention to what are presently regarded as maximum ratios, at least when other circumstances of the loan suggest that repayment can be made without causing undue hardship .
6. To repay the loan GOB must be able to acquire the foreign exchange for interest and amortization payments. This, in turn, depends on the output increments due to the loan, GOB's ability to capture a share of the output increments in the form of tax revenues, and the effect of the loan on Bolivia's imports and/or exports. In general, these considerations mean USAID and GOB should prefer loans which are used for fixed capital leading to imports substitutions or exports expansion. Finally, GOB fiscal reform is important not only to assume debt repayment but also to increase gross saving and capital formation in Bolivia.

Notes to: "Capital Formation and Capital Allocation"

- 1/ Remembering the disastrous effects of hyperinflation the 1950's the IMF, the Mission and GOB agree that sustainable growth in Bolivia requires stable prices or at least a controlled rate of inflation. Throughout this decade the annual rate of increase in prices has been in the neighborhood of 5%, a commendable record. No one knows for sure whether or not short-run growth has been sacrificed to price stability, but most observers believe that prospects for foreign and domestic investment in Bolivia are improved by the responsible monetary performance of the 1960's).
- 2/ In Bolivia at the present time, only the construction industry captures any significant share of domestic demand for plant and equipment. Virtually all of the remaining demand is fulfilled by firms operating outside of Bolivia.
- 3/ As footnoted previously, virtually no physical capital with the exception of construction is produced within Bolivia's borders. Incidentally, some of Bolivia's construction occurs outside the market economy as campesinos combine excess labor with local building materials to produce dwelling and agricultural storage units. Other than construction, physical capital in Bolivia is obtained with foreign exchange earned through exports--approximately 80% of which are minerals--and through foreign sector investments, loans and grants.)
- 4/ e.g. according to Cuentas Nacionales, household saving as a percentage of disposable income was 1.2, 7.1 and 2.4 for 1963, 1964 and 1965 respectively.
- 5/ Chenery, Toward a More Effective Alliance for Progress, A.I.D. Discussion Paper N° 13, Office of Program Coordination-A.I.D. March, 1967.
- 6/ We ignore the trade gap here insofar as it is not presently constraining the Bolivian economy.
- 7/ GOB and the Mission should give ad hoc treatment to projects which obviously have important external effects.
- 8/ Some readers may wonder whether there really is an excess demand for loanable funds in Bolivia at the legal maximum interest rate. This is a legitimate question, but no answer to it can justify the maximum interest rate law. Either it is an ineffective law because there is no excess demand and therefore interest rates are not held down by it, or it is potentially harmful because there is excess demand and the maximum rate may result in flows of loanable funds to sub-optimal projects.
- 9/ In this case, there may be farmers who would pay even more than i_a . See the preceding discussion of the potential effect of excess demand caused by a legal maximum interest rate.

- 10/ In addition to commercial loans, the 12% maximum rate does not apply to consumer credit.
- 11/ The Superintendent of Banks "requires" that commercial banks hold subsidy sector paper equal to X percent of outstanding credit. However, the requirement is not enforced and commercial banks do not extend any significant amount of credit to firms eligible for the interest rate subsidy.
- 12/ The demand curves have horizontal segments because interest rates above 18% and 12% cannot be charged in the commercial and subsidized markets, respectively.
- 13/ Recall that economic externalities were ruled out by assumptions in the introductory remarks of this section of the paper.
- 14/ For this and subsequent regression equations HS, DY, ES, GDP, and MK are in millions of U. S. dollars. P is expressed in per cent. Standard errors of the regression coefficients are in parenthesis.
- 15/ It is assumed that consumer prices will increase at an annual rate of 5% for the period covered by the Ten Year Plan.
- 16/ Memo on Debt Service Analysis, 1968, pp 2, 3.
- 17/ This can be thought of as in excess of anticipated increases in debt.

EFFECTS OF THE LOAN

Year	<u>Δ GDP</u>	<u>Δ Debt Service</u>	<u>Δ GNP</u>	<u>P. V. of Δ GNP</u>
1	3.330	.0	3.330	2.896
2	3.097	.2	2.897	2.195
3	2.865	.2	2.665	1.753
4	2.646	.2	2.446	1.398
5	2.437	.2	2.237	1.113
6	2.238	.2	2.038	.882
7	2.050	.2	1.850	.696
8	1.871	.2	1.671	.546
9	1.701	.2	1.501	.426
10	1.539	.2	1.339	.331
11	1.385	.2	1.185	.254
12	1.429	.631	.798	.149
13	1.426	.631	.795	.129
14	1.399	.631	.768	.108
15	1.352	.631	.721	.088
16	1.286	.631	.655	.070
17	1.204	.631	.573	.053
18	1.107	.631	.476	.038
19	.997	.631	.366	.026
20	.875	.631	.244	.015
21	.744	.631	.113	.006
22	.603	.631	-.028	-.001
23	.475	.631	-.156	-.006
24	.352	.631	-.279	-.010
25	.232	.631	-.399	-.012
26	.114	.631	-.517	-.014
27	-.005	.631	-.636	-.015
28	-.126	.631	-.757	-.015
29	-.250	.631	-.881	-.015
30	-.380	.631	-1.011	-.015
31	-.515	.631	-1.146	-.015
32	-.447	-	-.447	-.005
33	-.364	-	-.364	-.004
34	-.298	-	-.298	-.002
35	-.248	-	-.248	-.002
36	-.213	-	-.213	-.001
37	-.191	-	-.191	-.001
38	-.182	-	-.182	-.001
39	-.185	-	-.185	-.001
40	-.201	-	-.201	-.001
41	-.229	-	-.229	-.001
42	-.269	-	-.269	-.001
43	-.300	-	-.300	-.001
44	-.321	-	-.321	-.001
45	-.335	-	-.335	-.001
46	-.343	-	-.343	-.000
47	-.347	-	-.347	-.000
48	-.349	-	-.349	-.000
49	-.349	-	-.349	-.000
50	-.350	-	-.350	-.000
	$\Sigma = 31.957$	$\Sigma = 14.620$	$\Sigma = 17.337$	$\Sigma = 13.031$