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**Private Consumption and Saving: the Cases
of Mexico and Chile**

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Abstract

This paper examines the behavior of private consumption in Mexico and Chile. Understanding private consumption behavior in developing countries is receiving increasing attention at a time many of them are required to substitute national saving for external saving. For both countries dealt with in this study, changes in the real rate of interest appeared to have a sizable negative effect on private consumption. Private consumption also appeared to be (positively) influenced by real net capital inflows. An empirical approximation to permanent income also appears relevant for both countries, in particular for Mexico, where the sum of the 2-year income elasticities was very close to 1.0. Finally, government consumption did not appear as a relevant variable in either country.

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Summary

The paper examines the behavior of private consumption and saving in two Latin American countries, Mexico and Chile. Problems of external indebtedness and the consequent need for enhanced domestic saving have made this a subject of substantial importance for these countries. Previous studies on consumption behavior in Latin America, have, however, used variables that are only proxies for the relevant determinants of consumption behavior. The present study devotes considerable effort to constructing relatively long series of variables that are more appropriate for examining the behavior of private consumption. In particular, in defining private and public sectors, the Central Bank is consolidated with the rest of the government, and the real disposable income of the private sector includes the real returns on its financial assets received from the government sector.

From the empirical analysis several important conclusions can be derived.

First, private consumption appears to be determined by real disposable income (including perceived sustainable capital inflows) and the relative cost of present consumption i.e., the expected real interest rate. In Chile, it also appears to be influenced by the expectations of devaluation.

Second, once the real disposable income, net capital inflows and the variables measuring the relative cost of present consumption are included in the regression, government consumption has no additional explanatory value. Thus, private sector behavior does not appear to offset changes in government saving.

Third, the empirical approximation to permanent income was found to be relevant for both countries, especially for Mexico, for which the sum of the current and 1-period lagged income elasticities was very close to 1.0.

Fourth, the expected real rate of interest seems to have a positive effect on private saving. In both countries, an increase of 1 point in the real interest rate appears to reduce consumption between 0.1 and 0.2 percent, which implies a more sizable effect on private saving, because saving represents a small fraction of consumption.

Finally, it appears that private consumption is influenced by the level of foreign saving as measured by the net real capital inflows. This may occur through their influence upon the relative prices of non-tradables, particularly upon the prices of factors of production in the country compared to international levels.

I. Introduction

This paper examines the behavior of private consumption and saving in two Latin American countries, Mexico and Chile. The analysis covers the period from the early 1960s to the mid-1980s.

Understanding private consumption behavior has received increased attention at a time when many developing countries have needed to carry out substantial economic adjustments. The abrupt reduction, since 1982, in the availability of external financing has required these countries to substitute national saving for external saving. For Latin American countries, this need for adjustment has been especially severe because of the increased reliance on foreign financing during the second half of the 1970s and early 1980s.

While adjustment of the Latin American economies entailed substantial resources to finance reallocation of production from the non-tradables to the tradables sector, and to compensate for reduced foreign financing, these economies have not always succeeded in generating the required saving. The combination of increased capital outflows for debt servicing, reduced level of imports and changes in relative prices has resulted in low levels of national income and insufficient rates of national saving.

In response to the above adverse developments, economists now tend to agree that adjustment and economic growth must be simultaneously promoted. To this end, the emerging approach stresses the need for a "quality" adjustment, involving increases in exports, in saving and in economic efficiency, all of which would allow high quality investment projects to be initiated and maintained. 1/

Under this approach, even when monetary models are utilized for designing financial programs, it is unrealistic to assume that real income is exogenous. In turn, the introduction of growth objectives in these programs implies stressing the role of saving, investment and the supply of external financing.

The increased role of saving in program design requires policy-makers to estimate at least approximate relationships between private saving and different economic policies. The main questions concerning these relationships are the following:

1/ IMF "Growth-Oriented Adjustment. Themes from the World Bank-IMF Symposium", SM/87/269. Also see Corbo V., M. Goldstein and M. Khan (editors) (1987), pp.7-8.

(a) What is the relationship between private saving and public saving? If they are independent, fiscal policy and other related policies would be able to effect a permanent increase in the overall saving rate of the economy. If they are not independent, however--in particular, if government consumption is a close substitute for private consumption--the behavior of private savers will tend at least in part to offset the effects of such policies.

(b) What is the relationship between private saving and foreign saving? If they are independent, the net use of foreign saving will be reflected in higher investment and, therefore, in an increase in productive capacity. If they are not independent, however, foreign saving will result in lower private saving and higher consumption. Since foreign saving, in this case, does not increase productive capacity, the economy will have to pay for the higher present consumption with lower consumption in the future.

(c) What is the relationship between private saving and policy variables such as interest rates? The authorities will be able to use these policies to promote an increase in private saving only if changes in (real) interest rates and in related variables have unambiguous and predictable effects.

The above critical questions are addressed in this paper. This paper contains findings on the behavior of private consumption in Mexico and Chile. It is hoped that these findings shed light on the optimal design of financial programs directed to achieve adjustment and growth.

It should be pointed out that there are relatively few published studies on consumption and saving behavior in Latin America. Most of these studies have examined a sample of several countries but, when examining private consumption behavior, they have used variables that are only proxies for the relevant variables. For example, gross national product has been used instead of private disposable income, and foreign interest rates instead of domestic after-tax rates. By contrast, considerable effort was made in this study to construct relatively long series of more appropriate variables for examining the behavior of private consumption. In particular, in defining private and public sectors, the Central Bank is consolidated with the rest of the government, and the real disposable income of the private sector includes the real returns on its financial assets.

The paper is organized as follows. Section II sets out the analytical framework. Section III briefly reviews the main economic policy developments in Mexico and Chile that may have influenced the evolution of private consumption and savings. These two sections form the basis for the choice of the empirical model, which is presented in Section IV. This section also presents the results of the empirical analysis and the main conclusions. Two appendices dealing with inflationary expectations and data sources complete the paper.

II. The Analytical Framework

In setting the analytical framework, a view must be taken on a number of different questions.

(1) The first such question concerns the distinction between consumption expenditure, which include expenditure on durable goods, and "pure" consumption, which includes only the services from--and not the expenditure on--durable goods. In most Latin American countries--including the two countries considered--only information on consumer expenditure is directly available. Still, even if more detailed information were available, consumption expenditure, rather than "pure" consumption, would remain the appropriate dependent variable for the two following reasons:

a) The definition of saving based on consumption expenditure corresponds to the definition of saving used in financial programming, that is, resources available for acquiring investment goods. Thus, although changes in consumption expenditure do not only reflect changes in "pure" consumption but also changes in the allocation of saving strictly defined, to the extent that economic agents allocate this strictly-defined saving to consumer durables, they are no longer available for investment.

b) The broader definition of consumer expenditure avoids the difficult empirical problems of defining what goods should be regarded as durables and non-durables, and of measuring the yearly value of services provided by the durable goods.

(2) A second question concerns the proper definition of the income variable. Empirical studies on consumption behavior in developing countries, especially in Latin America, have focused on the relation between consumption and actual income. ^{2/} However, both theoretical considerations and the evidence of considerable empirical research in the U.S. have concluded that private consumption behavior is determined by individuals' permanent income. ^{3/} In this sense, permanent income can be defined both

^{2/} See for instance the survey of empirical studies in Mikesell and Zinser (1974).

^{3/} Recent studies for the U.S. have combined the permanent income theory with the life cycle theory. The combined theory assumes that the individual will select the consumption path so as to maximize lifetime utility subject to his intertemporal budget constraint and to the variables affecting the relative price (cost) of present consumption relative to future consumption. See, for instance Hall (1978), Sargent (1978), Blinder (1981) and Flavin (1981). However, the combined theory assumes that the individual only cares for consumption during his life time horizon. This assumption seems too restrictive for Latin American countries, where relying on the extended family, instead of on individual resources exclusively, appears to be the norm.

as the constant level of real income that has the same present value as total wealth, that is, the actual sources of funds or, alternatively, as the amount of consumption that could be sustained forever.

Until the 1970s, the standard way of estimating the permanent income hypothesis empirically had been through the use of distributed lags. For instance, if Y_t^P denotes the permanent level of some definition of disposable income, and Y_{t-i} indicates the actual levels of the same definition of disposable income in the previous $t-i$ period ($i=0, 1, 2, \dots, n$), permanent income was expressed by a function as follows:

$$Y_t^P = a_0 Y_t + a_1 Y_{t-1} + \dots + a_n Y_{t-n} + e_t \quad (1)$$

where e_t is a random (white noise) term.

However, beginning in the 1970s, literature on the rational expectations approach stressed that the permanent income model is a forward-looking theory of consumption behavior, and thus should not be based on a backward-looking equation. Nevertheless, other economists have recently argued that given the uncertainty regarding future income, the best forecast of future income may be based on present and recent income levels; thus, a backward-looking equation may be consistent with rational expectations.

For instance, Blinder has argued that the time-series model of equation (1) may correspond to the stochastic process generating income. In this case, the relevant empirical model of consumption will be backward-looking, since (rational) expectations in period t will be based on the actual and past information implied by (1). 4/

In addition, Flavin has argued that because the path of future income is uncertain, the individual's expectations about future income are revised as new information becomes available. 5/ This behavior implies that fluctuations in current income will be correlated with fluctuations in permanent income. In particular, she based her model in the notion that, "in forming their expectations of future income, national economic agents will exploit the fact that income is a stochastic process which exhibits a high degree of serial correlation. Based on the observation that the current realization of income is greater than anticipated, agents will revise their expectations of future income, and therefore their permanent income, upward". 6/

The studies just referred to indicate that using current and lagged income to estimate consumption behavior, as is done in this paper, may be

4/ A. S. Blinder (1981), p.31.

5/ M. A. Flavin (1981), p. 974.

6/ Ibid, p. 986.

consistent with rational expectations. However, because of the specific objective of the paper, and the much greater variation of real income in developing countries than in industrial countries--which greatly reduces the usefulness of time series analyses in the former group--no special effort was devoted to test rationality of consumer behavior.

(3) The empirical approximation of permanent income used in this paper is based on the concept of real disposable income. If real private consumption is determined by real permanent disposable income, a tax increase would tend to reduce real permanent disposable income and also private consumption and private saving. However, because private saving is a small fraction of private income, the tax increase may raise government saving a great deal more than it reduces private saving. Thus, government saving and aggregate saving may grow at the expense of private consumption. This view corresponds to the traditional view that stresses the role of fiscal policy as a tool for promoting aggregate saving and economic growth. 7/

Recent theory has cast some doubts on the independence of private saving (consumption) and government saving (consumption). In particular, it has been argued that government consumption expenditures may substitute for private consumption expenditures. Therefore, when the government reduces its expenditures on consumption to increase its saving, this increase in saving will be (in part or totally) offset by a reduction of private saving because of higher private consumption. In this view, the behavior of total saving (total consumption) may be more stable than the behavior of private saving (private consumption).

(4) Following Barro 8/, the definition of aggregate private real disposable income in this study includes the real returns on financial assets received by the private sector. To distinguish the private sector from the public sector, the Central Bank is consolidated with the rest of the government, while the private financial sector is consolidated with non-financial private enterprises and individuals. Excluding intrasectoral transactions, the only real returns on financial assets received by the private sector are the real cost implicit in holding base money (outside money), measured by the product of the monetary base in real terms (B) and the inflation rate (p), and the real return on government bonds, measured by the product of the real value of these bonds (B^g) and the real rate of interest paid on them ($R-p$).

Let real net product be denoted by $Y-dK$, where Y is real income net of international transfers and factor payments and dK is the depreciation, and real taxes paid by the private sector (net of real transfers of

7/ This theory assumes the Ricardian Equivalence Theorem away or, equivalently, that the tax increase is seen by economic agents as implicating a permanent change in the present value of aggregate real taxes.

8/ R. J. Barro (1984), p.168.

subsidies received by the private sector) by T. Real disposable income of the private sector (RDI) can then be expressed as follows:

$$RDI = Y - dK - T + (R-p) B^g - p B \quad (2)$$

In turn, real private saving may be defined either as the difference between real disposable income and real private consumption (C), or as the sum of changes in the monetary base (outside money) in real terms (ΔB), in the real amount of government bonds (ΔB^g), in private net foreign assets in real terms (ΔFp), and in real private investment (ΔKp). Thus,

$$\begin{aligned} \text{Real private saving} &= Y - dK - T + (R - p) B^g - p B - C \\ &= \Delta B + \Delta B^g + \Delta Fp + \Delta Kp \end{aligned} \quad (3)$$

(5) There is still disagreement regarding consumption responses to changes in the real rate of interest. While it is clear that a rise in the real rate of interest makes current consumption more expensive with respect to future consumption and thus will tend to reduce current consumption (the substitution effect), the traditional view (at least since Marshall) has argued for an income effect that tends to push consumption in the other direction, making the overall response of consumption ambiguous.

The rationale for the income effect is that, at the individual level, an increase in the real interest rate reduces the amount of savings required to attain a given desired level of future income. Nevertheless, recent theory has concluded that, at the aggregate level, the substitution effect will largely dominate the income effect. For instance, Bailey has argued that an increase in the real interest rate cannot be reflected in a simultaneous increase in income for all householders since it is not true that all householders could go on consuming the same total quantity of current goods and yet have more goods at some future time only because of increased earnings of their savings. This is especially true because the rise in the real interest rate does not automatically increase real resources, factor productivity, or total wealth. Thus, apart from distributional considerations, each household will typically find the possibility of carrying out its old consumption plans unaffected by the change in the real interest rate but, because of the substitution effect, now has an inducement to reduce its current consumption. In other words, for constant real resources, the interest elasticity of saving is positive, not ambiguous. ^{9/}

Barro has reached the same conclusion through a different line of reasoning. In his model, the aggregate stocks of private bonds and of

^{9/} M. Bailey (1971), pp.106-108.

inside money are always zero, which implies that the average household is neither typically a lender nor typically a borrower. Thus, neglecting distributional considerations, the wealth effect from a change in the interest rate is nil. ^{10/} Since our analytical framework also consolidates the private issuers and holders of bonds (excluding the Government and the foreign sector), it is also true that the wealth effect of a change in the interest rate will cause a redistribution of income which will largely cancel out for the aggregate private sector. Therefore, the important effect of a change in the real rate of interest will be the substitution effect. ^{11/}

(6) In developing countries with fragmented or distorted markets, the supply of private saving may directly depend on the demand for it. This would be the case when private saving occur in the form of retained earnings by enterprises. Then the level of private saving would depend on the investment opportunities open to the enterprises. Financial savings may also depend on investment decisions. For instance, individuals or enterprises may accumulate deposits in order to make a sizable payment for a physical asset.

Despite this direct relation between saving and investment, saving (at least financial saving) will still be affected by the real interest rate. For instance, negative real rates of interest would represent a tax on saver-investors that would decrease both saving and investment. ^{12/}

(7) Finally, several empirical studies on developing countries, including Latin American countries, have suggested that the net inflow of foreign capital may substitute for private domestic savings instead of adding to them. ^{13/} In terms of our analytical framework, this would be the case if the private sector begins to consider real net capital inflows as a "permanent" addition to its real permanent income. That is, if the private sector behaves as if the domestic economy had captured an additional "permanent" flow of resources. (In this sense, "permanent," should be interpreted as non-reversible in the medium-term). Mikesell and Zinser have pointed out what seems to be a persuasive example of this kind

^{10/} R. Barro (1981), p.96.

^{11/} However, if the increase in domestic real interest rates reflects a similar increase in international real rates, because this increase also raises net factor payments, the aggregate income effect might be negative and thus it will reinforce the substitution effect.

^{12/} Of course, to the extent that investment would be financed by credit, the other side of the tax would be the corresponding subsidy to borrowers that have access to cheap credit. L. Mohlo (1985), p.25. However, negative real interest rates will cause saving and therefore investment to be lower than otherwise, for two reasons: one the effect of the tax on saving; the other, the fact that sub-optimal investment allocation will result in lower income and, therefore, in lower saving.

^{13/} For instance, L. Landau (1969), H. Chenery and P. Eckstein (1970), and N. Leff and K. Sato (1975).

of behavior in the case of Israel during the 1950s, when because of sizable capital inflows domestic saving was negative. ^{14/}

Given the large capital inflows received by Mexico and Chile during the second half of the 1970s and early 1980s, it is possible that these capital inflows have been at least partly reflected in higher private consumption.

III. Consumption, Saving and Economic Policy in Mexico and Chile

This section describes the evolution of private consumption and saving and their relation with the main economic policies in Mexico and Chile, from the early 1960s to the mid 1980s. This institutional discussion, together with the analytical framework described in the previous section, form the basis for the choice of the model in section IV.

1. Consumption, saving and economic policy in Mexico

For most of the period, excepting the years 1982-85, the Mexican economy experienced high and relatively constant economic growth; annual average growth in real GDP was 6.8 percent in 1961-81, 7 percent in 1961-70 and 6.6 percent in 1971-81. Inflation was relatively low, below 5 percent in the 1960s and early 1970s, and fluctuating between 13 and 30 percent over the 1973-81 period. A positive real interest rate was maintained, except for several years in the mid-1970s when inflation was accelerating. There were practically no restrictions on international capital movements. In the 1960-81 period, one of the important goals of economic policy was to maintain the (peso/U.S. dollar) exchange rate fixed. The rate was fixed from 1954 to 1976 (at 12.5). After the devaluation of 1976-77, the exchange rate was again nearly constant from 1977 (22.7) to 1980 (22.9).

However, the fixed exchange rate was not the only policy goal of the Mexican authorities. Other policy goals were reflected in a rapid acceleration of public sector expenditures. These expenditures grew from a relatively constant level of 20 percent of GDP during the 1960s to 33 percent in 1975. ^{15/} This increase was financed by increased taxes, monetary expansion, and foreign financing, mainly from private banks.

The need to finance increasing public sector expenditures reduced real disposable income (RDI), relative to real gross national product net of international transfers (RGNP). For instance, defining real disposable income (RDI1) as the net sum of the net national product plus international transfers less taxes paid by the private sector--net of all transfers received by the private sector--plus the real returns received by the

^{14/} R. F. Mikesell and J. E. Zinser (1974), p.39.

^{15/} See Appendix B for the source of data on public expenditure and income.

private sector from holding government financial liabilities, the ratio $RDI1/RGNP$ was reduced from about 84 percent at the end of the 1960s to 79 percent in 1981. Alternatively, defining real disposable income ($RDI2$) as the net sum of the net national product plus international transfers less direct and indirect taxes--net of subsidies--plus the real return from holding government financial liabilities ^{16/}, the ratio $RDI2/RGNP$ was reduced from about 86 percent at the end of the 1960s to 81 in 1981 (Chart 1).

At the same time, while real private consumption (RPC) had been a very stable fraction of real disposable income from 1960 to 1981 (Chart 2), real private consumption fell continuously in terms of $RGNP$ ^{17/} because of the decline in the relative level of real disposable income.

In many respects, the period 1982-85 differed markedly from the previous one. In contrast to the high and constant economic growth of the past, real GDP in 1985 was practically the same as that of 1981, and in per capita terms it was 9 percent lower (following declines of 3 percentage points in 1982 and 6 percentage points in 1983). Real wages, in particular, suffered the brunt of the adjustment. Real industrial wages and real minimum wages fell by more than 30 percent from 1981 to 1985, compared to annual increases of 4 percent during 1960-81. In addition, the inflation rate accelerated: the price level increased by a factor of more than 5 between 1982 and 1985. The acceleration in inflation was accompanied by negative real interest rates in all these years, with the exception of 1985.

Regarding income and saving of the private sector, real disposable income as a percentage of $RGNP$ fell sharply, from about 80 percent in 1981 to about 67 percent in 1983, because public sector real expenditures did not fall in line with the fall in real domestic product. The ensuing adjustment in public sector expenditure and the recovery in the economy reversed that trend in 1984-85, and in the latter year real disposable income in terms of $RGNP$ rose to about 77 percent, almost recovering its 1981 level. These sharp increments in the ratio of real disposable income to $RGNP$ in 1982-85 contrast with the smooth declining trend observed from 1963 to 1981.

The sharp fall in real disposable income in 1982-83 was not accompanied by a similar fall in real private consumption and the saving rate became negative for the first time in 1983. However, the economic recovery and the adjustment policies in 1984-85 brought about a fall in the ratio of real private consumption to real disposable income, to about 90 percent in 1985, only slightly above its 1981 level. As it was the case in the $RDI/RGNP$ ratio, the sharp movement in the consumption rate in

^{16/} The only difference between the two alternative definitions is that taxes in $RDI1$ are net of all transfers from the government to the private sector, while in $RDI2$ they are only net of subsidies. A detailed explanation of the two empirical definitions of real disposable income for the case of Mexico appear in Appendix B. Their annual values appear in Table 3, in Appendix B.

^{17/} The annual values of the ratios of private consumption to both RDI and $RGNP$ appear in Table 3, in Appendix B.

1982-85 sharply contrast with the relative constancy in this ratio from the 1960s to 1981.

2. Consumption, saving and economic policy in Chile

The economic experience of Chile differed from that of Mexico. This is particularly true during the 1963-81 period, when the Chilean economy experienced a much higher inflation, lower income growth and many more distortions in relative prices than the Mexican economy did.

Prior to that period, the Chilean authorities had maintained a fixed exchange rate, despite the fact that in the 4 years from 1959 to 1962, prices increased by a factor of about 2, money supply (M1) increased by a factor of about 3 and the monetary base increased by a factor of about 5. The resulting overvalued currency and the need for increased restrictions on international transactions had brought about huge changes in relative prices as well as great uncertainty about future changes. These effects stimulated consumption at the expense of saving, and in 1962 real private consumption was nearly equal to real disposable income (RDI). ^{18/}

In 1962-63 the Chilean authorities depreciated the nominal exchange rate more than 50 percent and began a flexible exchange rate policy, which they continued until 1970. The nominal exchange rate depreciated by 732 percent (in local currency terms) from 1962 to 1970, and the real exchange rate depreciated by 56 percent (it depreciated 52 percent in 1962-63 and it remained fairly constant in 1964-70). The consumption rate (RPC/RDI) fell from about 100 percent in 1963 to 85 percent in 1970 (Chart 3).

The flexible exchange rate and the continuous devaluations of the currency were required to compensate for the relatively high annual inflation rate, which in all these years was persistently above 25 percent. Nevertheless, the maximum annual rate of interest was below 25 percent by law. ^{19/} Thus, this period showed persistently negative real interest rates.

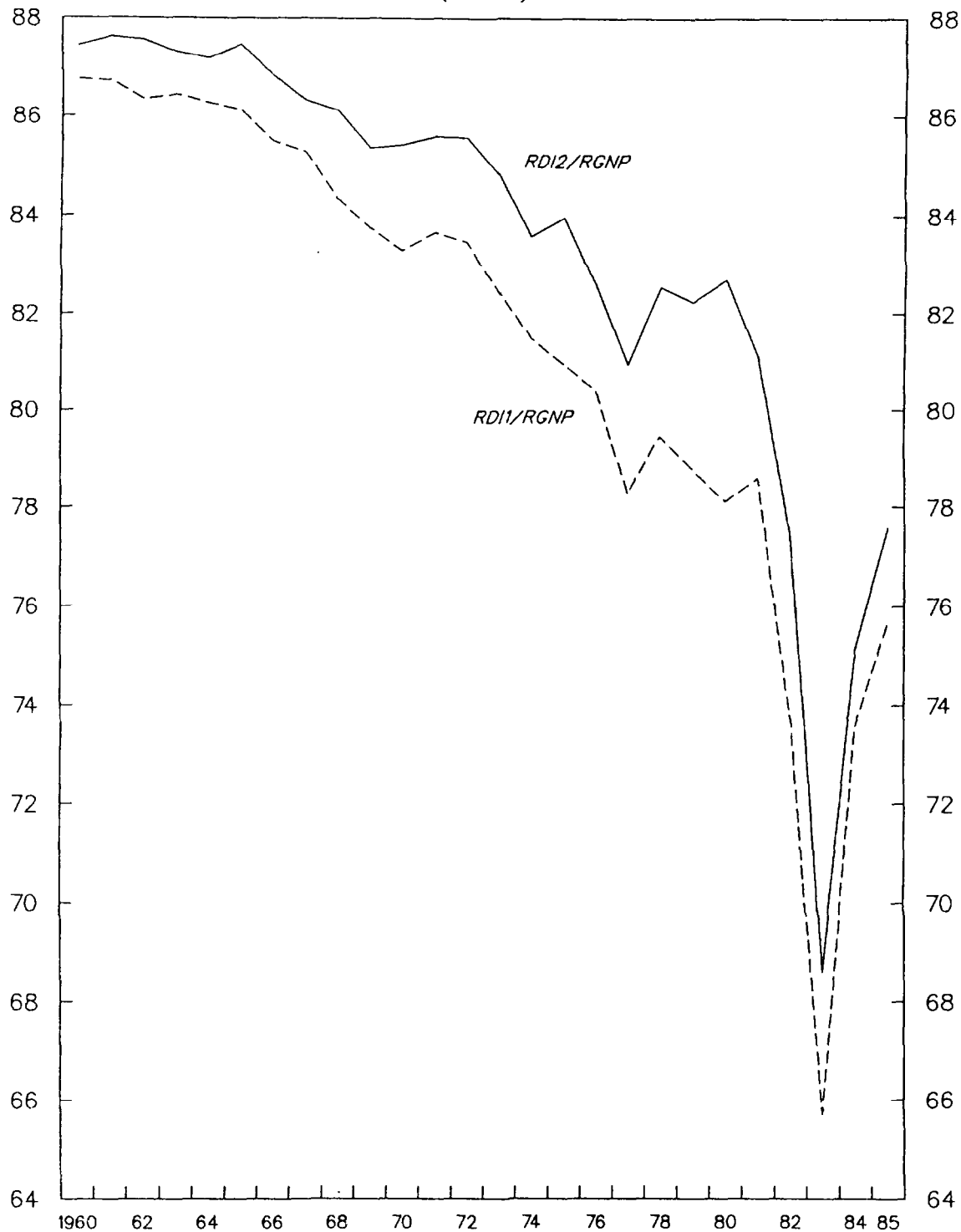
In the 1963-70 period, the authorities also implemented economic policies that reduced the relative size of the public sector and, therefore, resulted in a continuous increase of real disposable income in terms of RGDP, from about 82 percent in 1963 to about 92 percent in 1970 (Chart 4).

During the 1970-73 period, the authorities changed the economic policy stance, sharply accelerating the growth of government expenditures,

^{18/} In contrast to the case of Mexico, only one definition of real disposable income was used in the case of Chile; it corresponds to the RDI1 definition for Mexico. The relevant Chilean data appears in Table 4 in Appendix B.

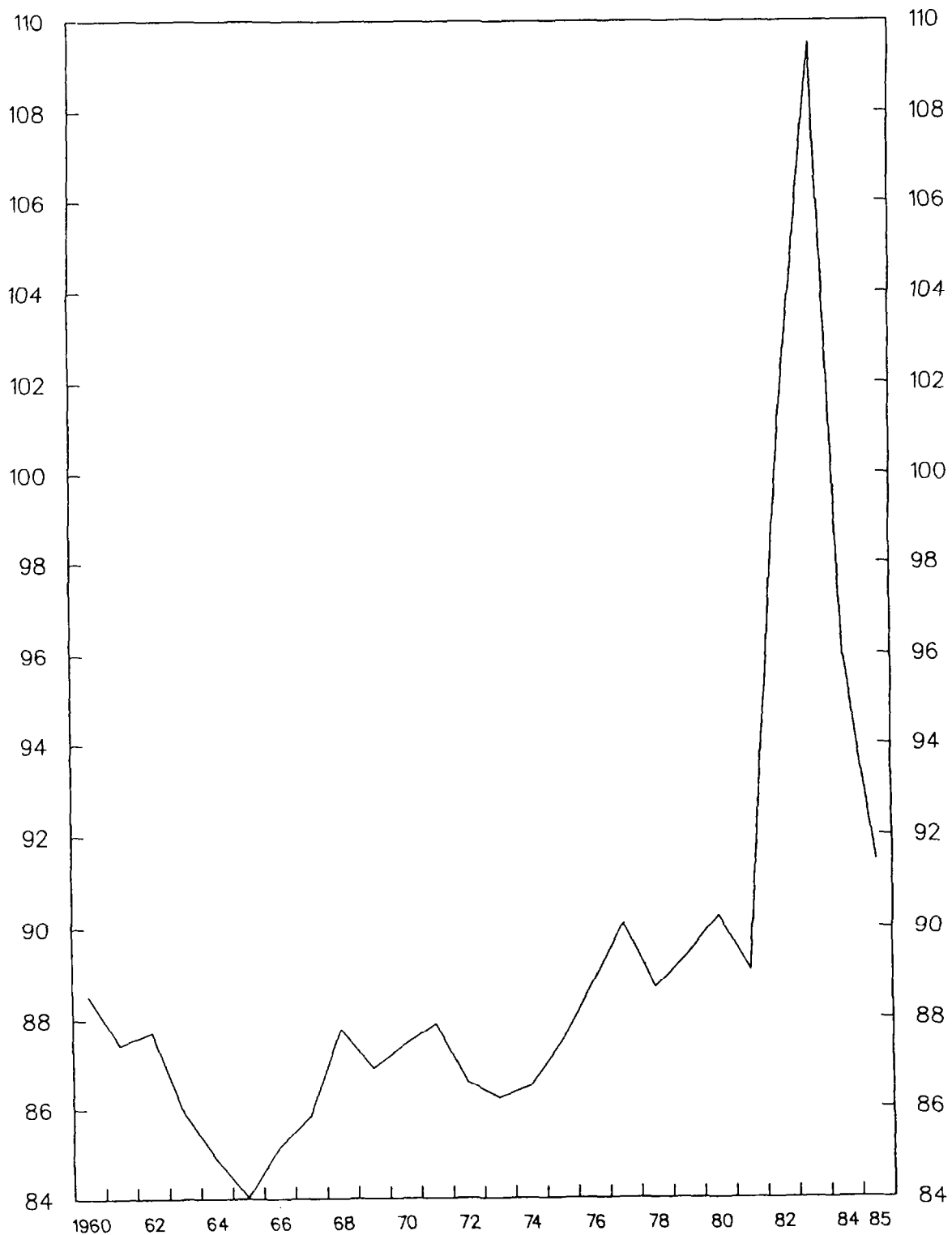
^{19/} Banco Central de Chile, Boletín Mensual.

CHART 1
MEXICO
RATIOS OF TWO ALTERNATIVE DEFINITIONS OF REAL DISPOSABLE
REAL DISPOSABLE INCOME (RDI) TO REAL GROSS NATIONAL
PRODUCT (RGNP), 1960-85



Notes: RD11 corresponds to the sum of the net national product plus net international transfers less taxes paid by the private sector (net of transfers received) plus the return on government financial liabilities. RD12 corresponds to the above definition, substituting "subsidies" for transfers received by the private sector. RGNP includes net international transfers. See Table 3 Appendix B.

CHART 2
MEXICO
REAL PRIVATE CONSUMPTION AS PERCENTAGE OF
REAL DISPOSABLE INCOME, 1960-85

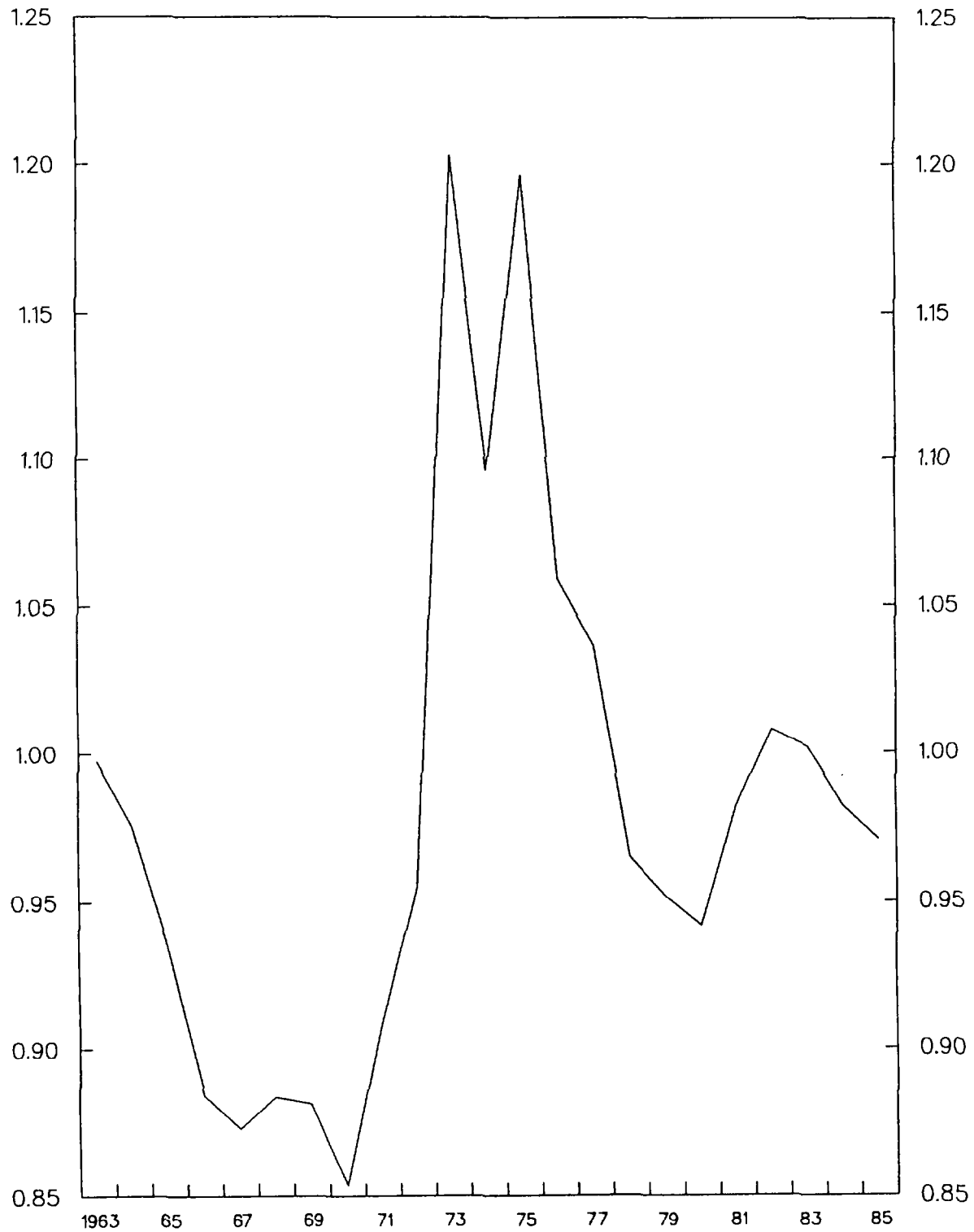


Notes: The graphic depicts the values using the empirical definition RD11. Similar results were obtained with the definition RD12. See Table 3 in Appendix B.

- 10c -

CHART 3
CHILE

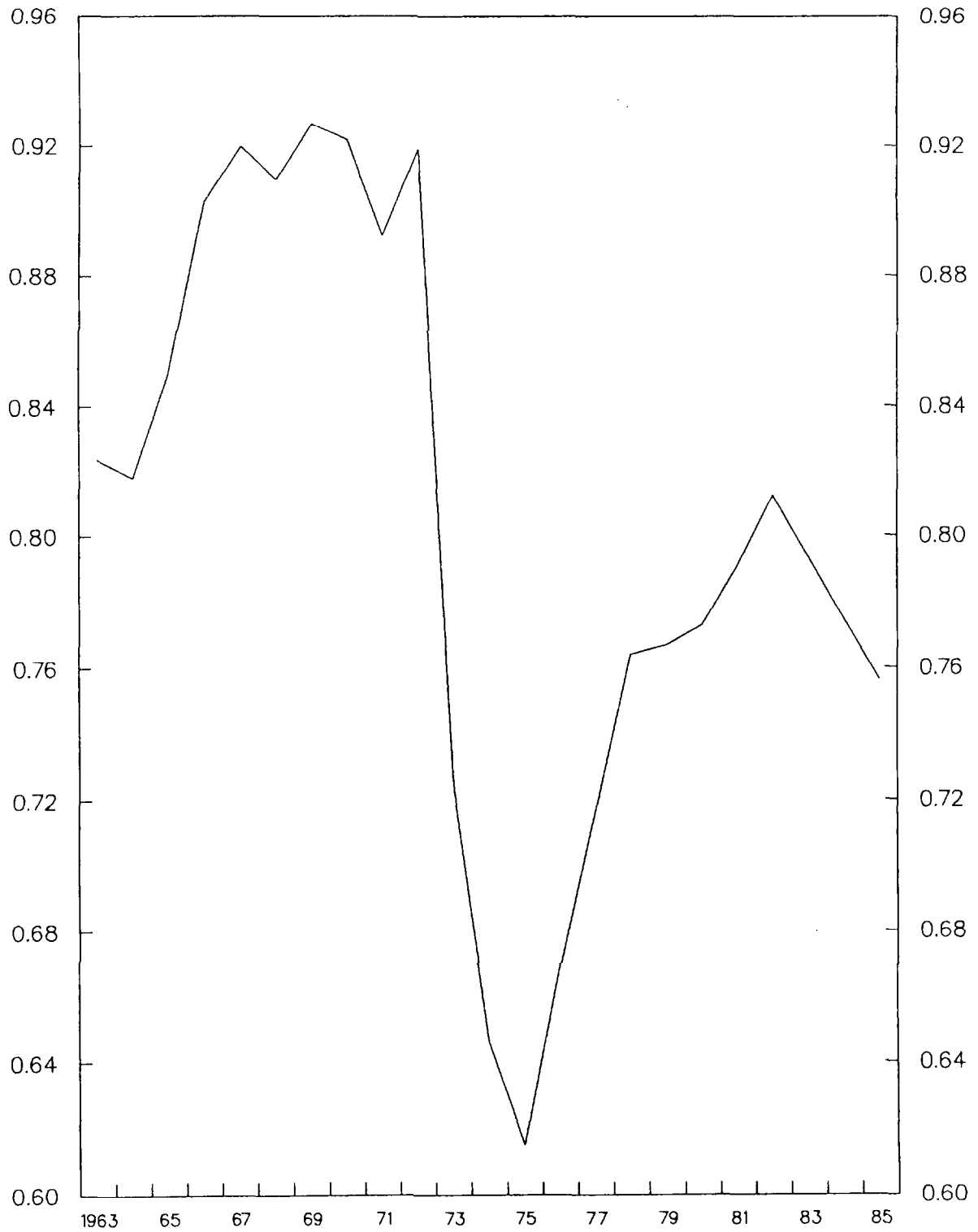
REAL PRIVATE CONSUMPTION AS PERCENTAGE OF
REAL DISPOSABLE INCOME, 1963-85



- 10d -

CHART 4
CHILE

REAL DISPOSABLE INCOME AS PERCENTAGE OF
REAL GROSS NATIONAL PRODUCT, 1963-85



including a program of nationalization of private enterprises. These expenditures were mainly financed by monetary expansion and by increased taxes and other domestic sources of revenue. The accelerated expansion in public expenditures brought about a reversal in the ratio of real disposable income to RGNP from about 92 percent in 1970 to about 72 percent in 1973. At the same time, in an attempt to control inflation, the authorities let the real exchange rate appreciate and fixed the prices of many commodities, which brought about black markets, huge changes in relative prices, and many more restrictions on international transactions. These policies greatly stimulated consumption at the expense of saving. The rate of saving (as a proportion of real disposable income), which was 14 percent in 1970, fell very rapidly and became negative in 1972 and 1973.

At the end of 1973, Chilean economic policy changed once again and a gradual liberalization process was introduced. The authorities first liberalized domestic prices and, partly as a result of this measure, the annual inflation rate rose from 80 percent in 1972 to 430 percent in 1973 and 692 percent in 1974. These policies, in particular the acceleration of the inflation rate, reduced real disposable income sharply, from about 72 percent of RGNP to 64 percent in 1974 and 61 percent in 1975. Although consumption fell in terms of RGNP from 87 percent in 1973 to 74 percent in 1975, it sharply rose in terms of RDI, and the rate of saving became strongly negative.

In 1975, the authorities liberalized interest rates. At that time, the authorities began a gradual process of reducing inflation and increasing the relative importance of the private sector in the economy. As part of this process, several enterprises were returned to the private sector and government expenditures decelerated during the following years. The authorities also implemented programs to eliminate non-tariff barriers, and to achieve a gradual reduction and unification of tariffs. At the conclusion of this program, in 1979, only motor vehicles (and parts thereof for which substitutes were produced locally) were subject to tariffs higher than 10 percent.

These policies resulted in a rapid rate of economic growth, 7.5 percent per year on average from 1976-79, and on a rapid fall in the inflation rate from 340 percent in 1975 to 40 percent in 1978. This liberalization process was reflected in sharp increases in both the RDI/RGNP ratio, to about 76 percent in 1978, and in the saving rate (RPC/RDI), which became positive in 1978.

However, the authorities felt that inflation was not falling as quickly as desired, and to accelerate its decline they reduced the annual rate of depreciation of the peso (to only 21 percent in 1978) and, in mid-1979, they fixed the nominal exchange rate at 39 pesos per U.S. dollar. However, partly because of the continuation of a wage policy that indexed wages to price increases of the previous year, the inflation rate remained high: 33 percent in 1979, 35 percent in 1980 and 20 percent in 1981.

The combination of high inflation and fixed nominal exchange rate implied a sizable appreciation of the peso in real terms. The appreciation of the currency brought about increases in imports and the

trade deficit and, eventually, it increased expectations of a future devaluation. ^{20/} It is likely that devaluation expectations increased the demand for imports still further, becoming an additional factor for its extraordinary increase, especially imports of consumer durables, which rose more than 4 times from 1978 to 1981 in dollar terms. Uncertainty about changes in relative prices and the relative low prices for imports stimulated consumption, despite very high rates of interest, ^{21/} which were reinforced by devaluation expectations, and the private saving rate fell again, becoming negative in 1981. On the other hand, the liberalization policies and the control of public expenditures increased the RDI/RGNP ratio, from 70 percent in 1978 to 81 percent in 1982.

In 1982, when the availability of foreign capital was sharply reduced, the authorities were pressed to devalue and to begin an adjustment process. As in the case of Mexico, the adjustment initially coincided with a sharp reduction of real GDP, which in per capita terms fell by 15.5 percent in 1982. Despite some recovery of growth in 1984-85, which averaged 4 percent per year, real GDP in 1985 was still 7 percent below its level of 1981 (13 percent below in per capita terms).

The adjustment was also reflected in a sharp reduction of real disposable income relative to real gross national income, which fell from 81 percent in 1982 to 75 percent in 1985, and in a 79 percent depreciation of the peso/dollar exchange rate from mid- 1982 to the end of 1985. In the Chilean case, however, monetary and fiscal policies were much more restrictive than in the Mexican case, and the annual inflation rate did not rise with the strong depreciation of the exchange rate, but remained at about 20 percent from 1982 to 1985.

The reduction in real disposable income in 1982-83 was accompanied by an increase in consumption at the expense of saving, as was also the case in Mexico. However, in 1984 and 1985, private saving remained very low in the case of Chile, instead of recovering strongly as in the case of Mexico.

IV. Empirical Analysis

This section discusses the model specifications and the results obtained for Mexico and Chile. The section ends with a brief review of the main conclusions and policy implications.

^{20/} The appreciation of the real exchange rate was also possible because of sizable capital inflows.

^{21/} The annual real rate in short term deposits reached about 28 percent in 1981.

1. The model

In Section II, it was concluded that private consumption depends on permanent income and on variables influencing the cost of present consumption relative to future consumption. It was also mentioned that, although permanent income is a forward-looking concept, private economic agents may use recent past information to form their expectations about future income. In addition, private economic agents may take advantage of the high degree of serial correlation exhibited by income, when they review their expectations as new information becomes available. That is, if current income is higher than anticipated, economic agents will revise upward their expectations of future income.

In this paper, a very simple model of permanent income is used, namely, it is assumed to be based on the levels of real disposable income corresponding to the current period and to the previous period. The influence of the latter on present consumption is expected to be positive, because agents may use the recent past to form their expectations of future income, and the influence of the current period on present consumption is also expected to be positive, because agents may recognize the high degree of serial correlation of income when reviewing their expectations of future income.

The earlier review of economic development showed a clear difference in economic conditions--in particular in the availability of capital flows and in the evolution of the two ratios, RDI/RGNP and RPC/RDI--during the years 1982-85, as compared with the years 1960-81. ^{22/} To allow for this difference of economic conditions, a dummy variable \bar{D} (which takes the value 1 in the years 1960-81 and the value 0 for the years 1982-85) was introduced, multiplying the corresponding real disposable income variables. A positive sign for the coefficient of this variable would imply a higher income elasticity of consumption in the former period than in a more recent period and vice-versa for a negative sign of the coefficient.

The historical review also revealed that the two countries made a constant and persistent use of foreign savings in the 1970s and early 1980s. To the extent that agents regarded this stream of foreign savings (or part of it) as "permanent", they would have considered it complementary to their permanent income. Therefore, the model includes the real value of net capital inflows (the capital account excluding reserves and direct investment), denoted END , as another explanatory variable that is expected to have an effect on private consumption similar to that of the "permanent" income.

The main variable that determines the price of present consumption relative to future consumption is the real rate of interest. For the

^{22/} This difference was less marked for Chile than for Mexico, given the sharp changes in the income and consumption ratios of the former country during the 1970s.

empirical analysis, two alternative definitions of "the" real interest rate were considered. The first definition, denoted by r , corresponds to the annual after-tax nominal interest rate paid on short-term deposits adjusted by the current inflation rate. Thus, this definition assumes that inflationary expectations were equal to actual inflation. The alternative definition, denoted by $r(E)$, assumes that agents do not make perfect forecasts, but that they know "the model" that determines the inflation rate in the economy. This model and its empirical results for the cases of Mexico and Chile appear in Appendix A. The "predicted" empirical values resulting from applications of this model to Chile and Mexico were used as a proxy for the expected inflation rate. The variable $r(E)$ thus corresponds to the real expected interest rate, that is, the same nominal rate of interest as used in r , but adjusted by "predicted" expectations of inflation instead of the current inflation rate.

An alternative version of the model was used to test whether private consumption is directly influenced by government consumption, which would imply that total consumption (or total saving) is a more stable variable than private consumption (or private saving). In this alternative model, the real value of government consumption was added as an independent variable.

To avoid spurious correlation due to population increase, the variables, excluding the real interest rate, are specified in per capita terms. Thus, denoting real private consumption per capita by PC , the alternative approximations to real disposable income per capita by Y , the stream of real net capital inflows per capita by $PEND$, real government consumption per capita by GC , the real interest variables by ri , the natural log of the variables ^{23/} by L and the dummy variable by D , the alternative specifications of the model can be represented as follows:

$$(1) \quad LPC_t = a + b_1 Y_t + b_2 Y_{t-1} + b_3 D \cdot LY_t + b_4 D \cdot LY_{t-1} \\ + c \, PEND_t + d \, (ri)_t + e_t$$

$$(2) \quad LPC_t = a + b_1 Y_t + b_2 Y_{t-1} + b_3 D \cdot LY_t + b_4 D \cdot LY_{t-1} \\ + c \, PEND_t + d \, (ri)_t + f \, LGL_t + e_t$$

where e_t is the random disturbance term. The expected signs of the coefficients are $b_1, b_2, c > 0$, and $d, f < 0$.

^{23/} Natural logs were used whenever possible. It was not possible to use the logs of the real net capital inflows per capita, $PEND$, or of the real interest rates, r and $r(E)$, because at least one of the empirical values of these series was negative.

2. Empirical results for private consumption in Mexico

Table 1 presents the estimated regressions for the natural log of real private consumption per capita in Mexico. In general, the results are similar for both definitions of real disposable income, although the results with the definition (RDI1), which includes all taxes net of all transfers from the government to the private sector, are slightly better than the results with the definition (RDI2), which includes all taxes net of "subsidies".

The original regressions (3 to 7 and 10 to 14) indicate the presence of autocorrelation. However, using the Cochrane-Orcutt correction for first-order autocorrelation (regressions 1, 2, 8 and 9) the autocorrelation is considerably reduced, without a substantial change in either the value of the significant coefficients or their level of significance.

Regarding the coefficients of the explanatory variables, several observations can be made. First, the coefficients (elasticities), of real private consumption per capita with respect to the actual and lagged real disposable income per capita are significant and, in most cases, their sum is close to 1.0. This implies that a given increase in income is almost fully reflected in a similar increase in private consumption after two years. The only regressions where the sum of the coefficients is well below 1.0 (between 0.75 and 0.8) are those regressions (5, 7, 12 and 14) that include the log of real government consumption per capita among the explanatory variables.

Second, the coefficient of the product of the dummy variable and the actual level of real disposable income per capita is negative and significant in all regressions. This result implies that the income elasticity of private consumption was higher in the more recent period (1982-85) than in the previous period (1960-81), independently of any effect from changes in capital flows and in the real rate of interest, which are the other independent variables in the regression. This result is somewhat surprising, given that wages suffered the brunt of the adjustment after the debt crisis and, that income is widely believed to have become more concentrated in the more recent period.

There is no readily apparent explanation for this result except, perhaps, that the sharp changes in the availability of external funds, in the 1982-85 period, combined with the economic policies of the country--including the resort to inflationary financing, and the nationalization of the banking system--have resulted in a strong variability of the real exchange rate and in more uncertainty with respect to future profitability of private investment and of private saving. In any case, this result also implies an additional difficulty for the economic adjustment of the country.

Table 1. Mexico: Estimated Regressions for Per Capita Consumption in Real Terms

(Period of Analysis = 1960-1985)

Reg.	Const.	LY	LY(-1)	D.LY	PEND	r	rE	LGC	D.LY(-1)	SEE	\bar{R}^2	DW
<u>I. Using the alternative definition of real disposable income = RD11</u>												
(1)	.620 (1.40)	.614 (11.20)	.307 (6.07)	-.013 (-4.75)	.00011 (1.91)		-.0022 (-4.58)			.013	.994	1.61 <u>1/</u>
(2)	.662 (1.54)	.687 (10.98)	.229 (4.08)	-.014 (-4.58)	.00011 (1.76)	-.0019 (-4.04)				.014	.993	1.72 <u>1/</u>
(3)	.672 (2.42)	.673 (10.48)	.244 (3.62)	-.015 (-5.90)	.00012 (1.97)	-.0015 (-3.04)				.016	.992	1.10
(4)	.665 (2.47)	.606 (9.97)	.311 (5.05)	-.015 (-6.10)	.00012 (2.14)		-.0017 (-3.30)			.016	.993	1.03
(5)	.110 (1.66)	.531 (4.36)	.292 (4.33)	-.013 (-3.66)	.00012 (2.10)		-.0012 (-1.62)	.057 (0.52)		.016	.993	.87
(6)	.640 (2.32)	.591 (8.85)	.329 (4.72)	-.014 (-4.48)	.00013 (2.19)		-.0014 (-2.23)		-.0017 (-0.60)	.016	.993	.96
(7)	.997 (1.36)	.536 (4.27)	.308 (3.76)	-.013 (-3.36)	.00013 (2.09)		-.0011 (-1.45)	.046 (0.53)	-.0011 (-0.36)	.016	.992	.87
<u>II. Using the first definition of real disposable income = RDJ2</u>												
(8)	.370 (0.65)	.603 (10.12)	.351 (6.33)	-.014 (-4.47)	.00012 (2.01)		-.0025 (-4.66)			.015	.993	1.59 <u>1/</u>
(9)	.432 (0.79)	.685 (10.21)	.261 (4.83)	-.014 (-4.34)	.00012 (1.84)	-.0022 (-4.36)				.015	.992	1.68 <u>1/</u>
(10)	.406 (1.25)	.675 (9.76)	.276 (3.87)	-.017 (-5.80)	.00015 (2.26)	-.0018 (-3.27)				.018	.990	.90
(11)	.407 (1.28)	.599 (8.94)	.352 (5.28)	-.017 (-6.03)	.00016 (2.50)		-.0020 (-3.42)			.018	.991	.93
(12)	.126 (1.64)	.461 (3.51)	.310 (4.17)	-.013 (-3.17)	.00015 (2.40)		-.0012 (-1.32)	.104 (1.22)		.018	.991	.72
(13)	.390 (1.19)	.585 (7.69)	.369 (4.68)	-.016 (-4.41)	.00017 (2.48)		-.0018 (-2.43)		-.0014 (-0.41)	.018	.990	.86
(14)	.124 (1.49)	.461 (3.42)	.313 (3.37)	-.013 (2.94)	.00015 (2.27)		-.0011 (-1.23)	.103 (1.11)	-.0017 (-0.50)	.018	.990	.73

Notes: Below the value of the coefficient appears the t- value in parenthesis. L denotes natural log and (-1) one-period lag; Y denotes real disposable income; D is a dummy variable for the 1960-84 period; PEND denotes real capital inflow; r is the actual real interest rate and rE is the expected real rate, both measured as percentages; GC denotes real government consumption per capita.

1/ Includes correction for first-order autocorrelation.

Third, the coefficients of the variable denoting the net real capital inflow per capita have the expected sign and are significant in all regressions (at the 5 percent level, one-tail test). Thus, it seems that economic agents in Mexico expected that the (positive) capital inflow during the 1970s and early 1980s would continue in the near future. Similarly, economic agents also seemed to expect that the persistent net capital outflow during the years 1982-85 would continue in the following years.

To be sure, the value of the coefficient (about .00012) is very small. In judging the relevance of this coefficient, however, it should be remembered that it represents a semi-elasticity. Therefore, the percentage change in the dependent variable equals the product of the value of this semi-elasticity and the change in the independent variable. For instance, given that in the case of Mexico the annual average increase in real net capital inflow per capita was about 81 pesos (at prices of 1960) from 1977 to 1981, the percentage annual increase in real private consumption per capita brought about by the increase in the capital inflow was about 1 percent ($= .00012 \times 81$) per year, which implies a cumulative increase in consumption per capita of almost 4 percent in these 4 years. The corresponding value of the elasticity is equal to the product of this semi-elasticity and the average value in the independent variable. In Mexico, this estimated elasticity varies between 0.015 and 0.022, that is, between 1.5 percent and 2.2 percent.

The coefficients of the real interest rate also have the expected sign and are significant in most regressions, except in those regressions in which the log of government consumption per capita is an additional explanatory variable.

The values and significance of the coefficients for both variables representing real interest rates are similar, although the results are slightly better for the expected real interest rate than for the actual interest rate. These coefficients also denote semi-elasticities. Therefore, their values imply that an increase of 1 (percentage) point in the real interest rate tends to decrease real per capita private consumption by about .002, or 0.2 percent.

Once again, this value may appear to be very small. Nevertheless, a shift in the real interest rate from minus 15 percent to 5 percent (as occurred in 1985) would imply a decrease in private consumption of 4 percent. Since private saving is a small fraction of private consumption, say, about 10 percent (Chart 2 and Table 3 in Appendix B), the above change in the real interest rate will by itself increase private saving by about 40 percent.

Finally, the inclusion of the other variables--for instance, the log of real government consumption per capita and the product of the dummy variable (which takes the value 1 in the years 1960-81 and the value 0 in 1982-85) and the log of the lagged real disposable income per capita--does not seem to add significantly to the explanation of private consumption. Furthermore, the inclusion of the product of the dummy variable times the lagged real disposable income appears as an irrelevant variable, in the sense that it does not affect either the values or the significance of the

other coefficients (compare regression 4 with 6 and 11 with 13). The inclusion of the log of real government consumption per capita, however, reduces the significance of all other coefficients, although the coefficient of this variable is insignificant and even appears with the wrong sign. The latter results suggest that once we take into account the effect on private consumption of changes in the main explanatory variables--real disposable income (which in itself reflects changes in taxes and in inflationary financing), real net capital inflows and the real interest rates--changes in government consumption by itself have no effect on consumption (or on saving) by the private sector.

3. Empirical results for private consumption in Chile

The model for the empirical analysis was modified somewhat to take account of structural differences between the Chilean economy and the Mexican economy. While Mexico did not modify the openness of its market to international trade or capital transactions, Chile, which had been a very closed economy until the mid-1970s, practically eliminated its trade and non-trade barriers during the second half of the 1970s but, in contrast to the openness of capital transactions in Mexico, only began to liberalize its capital transactions at the end of that decade.

These structural differences in the openness to trade and capital transactions might have determined the reactions and adjustment of agents to economic policy. For instance, when economic agents in Mexico faced currency overvaluation and increasing expectations of devaluation, they seemed to have transferred savings from the domestic to the international market (capital flight), which in turn forced a devaluation of the currency. ^{24/}

In Chile, in contrast, economic agents, when faced with the same situation, may have shifted some savings internationally but, on the whole, seemed to have tried to gradually shift savings from the domestic financial sector to real estate or to durable consumption goods. ^{25/} In particular, imports of durable consumption goods would have made it possible for agents to profit from the disequilibrium of relative prices. This adjustment of savings may explain the extraordinary increase in the imports of durable consumption goods in Chile from 1978 to 1981.

^{24/} Several empirical studies support this conclusion. For instance, J. Cuddington (1987) found that overvaluation of the exchange rate was an important cause of capital flight in Mexico. In addition, H. Blanco and P. Garver (1983) developed an empirical model in which the overvaluation of the Mexican peso and the devaluation expectations, at the same point, triggered accelerated capital outflows, that forced the devaluation of the currency.

^{25/} Differing from the case of Mexico, there is no evidence of sizeable capital flight from Chile during the second half of the 1970s and beginning of the 1980s.

Therefore, while in the case of Mexico, the interest rate may have been the only factor influencing the cost of present consumption relative to future consumption, in Chile, the relative cost of consumption expenditures may have also been influenced by the expectations of devaluation, determined by the disequilibrium in the prices of nontradables relative to the prices of tradables. To take account of this difference in adjustment, an alternative specification of the model was used in which private consumption was also positively related to an empirical estimation of the expectations of devaluation, denoted EXDV. In the construction of this variable, a constant equilibrium exchange rate US dollar/peso was assumed for the whole 1964-85 period. This led to an estimation of the degree of overvaluation or subvaluation (denoted OVL) of the Chilean peso. Then, the expectations of devaluation were derived directly from OVL by making this variable equal to zero in those years with strong subvaluation of the Chilean peso (Chart 5). ^{26/}

Table 2 presents the estimated regressions for the natural log of private consumption per capita in Chile. In general, the results for Chile are similar although slightly less satisfactory than those for Mexico. For instance, while the standard error estimates were below 2 percent and the values of the \bar{R}^2 were above .99 in the regressions for Mexico, in Chile the standard error estimates were between 2.5 percent and 3.6 percent and the values of the \bar{R}^2 were all below 0.95. These differences are understandable given the high distortions in relative prices of products and factors and the extraordinary changes in economic policies in Chile during most of the period of analysis.

In reviewing the Chilean results, several observations can be made. First, as in the case of Mexico, the empirical approximation to permanent income is relatively satisfactory, although the sum of the coefficients (elasticities) of private consumption with respect to current and one-period lagged real disposable income is only about 0.55.

Second, in contrast with the case of Mexico, the income elasticity of private consumption does not appear to have increased during the 1982-85 period. The coefficient of the product of the dummy variable and the actual real disposable income per capita is not significantly different from zero, and its inclusion did not affect the values of the other coefficients or the overall regression results.

Third, the coefficient for the variable denoting the net real capital inflow per capita has the expected sign and is significantly different from zero in most regressions. The estimated value for this semi-elasticity varies between .00001 and .00002. Given the average annual value of the real capital inflow per capita, the implied values for the

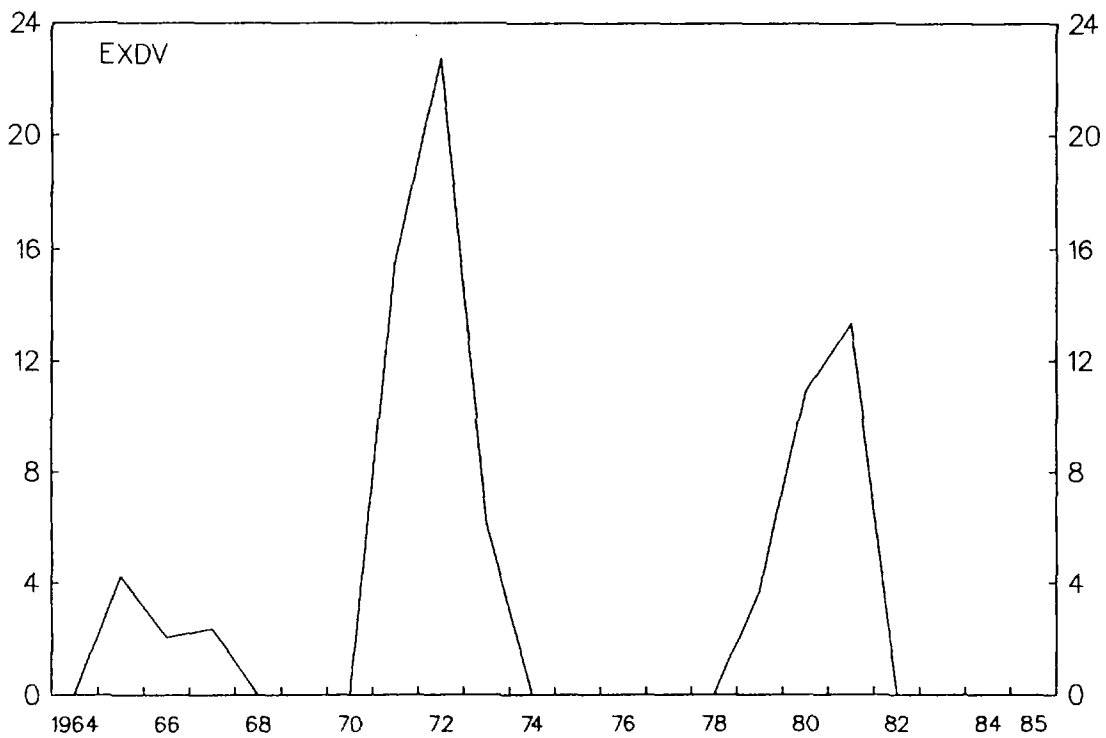
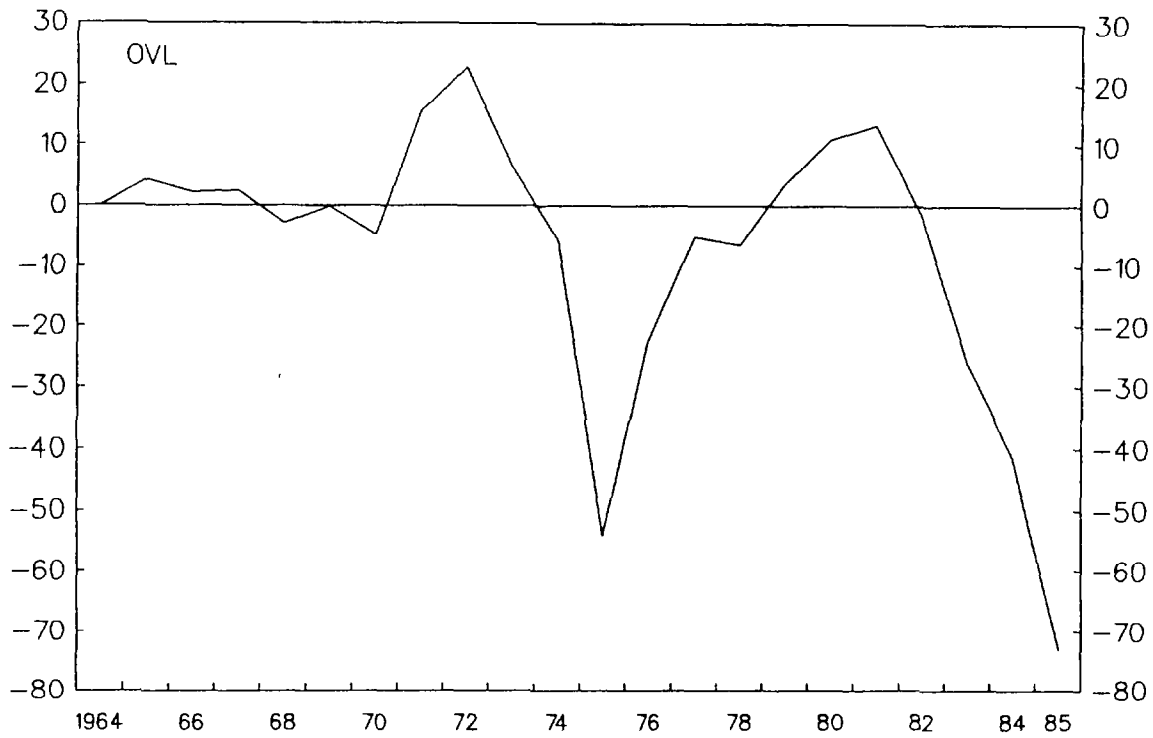
^{26/} For a more detailed explanation of the way the two variables EXDV and OVL were constructed, see Appendix B.

Table 2. Chile: Estimated Regressions for Private Consumption
(Period of Analysis 1964-1985)

Reg.	Const.	LY	LY(-1)	D.LY	PEND	r	rE	EXDV	LGC	S.E.E.	\bar{R}^2	DW
(1)	3.71 (7.69)	.335 (4.21)	.288 (3.67)		.000019 (2.82)	-.0009 (-2.43)				.036	.904	1.59
(2)	3.58 (7.28)	.373 (4.18)	.263 (3.08)		.000017 (2.50)		-.001 (-2.29)			.036	.901	1.59
(3)	4.44 (10.44)	.300 (4.37)	.250 (3.97)		.000011 (2.03)		-.0007 (-2.22)	.454 (3.89)		.027	.946	2.34
(4)	4.52 (10.82)	.272 (4.40)	.270 (4.61)		.000013 (2.29)	-.0006 (-2.27)		.446 (3.82)		.027	.947	2.26
(5)	3.79 (4.72)	.294 (4.52)	.268 (4.59)		.00001 (1.67)	-.0006 (-1.96)		.397 (3.18)	.065 (1.07)	.026	.949	2.45
(6)	4.51 (10.44)	.282 (3.84)	.262 (3.84)	-.0006 (-0.27)	.000012 (2.21)	-.0007 (-1.89)		.449 (3.71)		.027	.943	2.28
(7)	3.80 (4.56)	.299 (3.97)	.264 (3.87)	-.0003 (-0.13)	.00001 (1.57)	-.0006 (-1.54)		.399 (3.06)	.064 (1.00)	.027	.944	2.42

Notes: Below the values of the coefficients appear the t- values in parenthesis. L denotes natural log and (-1) denotes lagged one period. Y denotes real disposable income per capita; D is a dummy variable for the 1964-81 period; PEND denotes real capital inflow per capita; r is the actual real interest rate and r(E) is the expected real interest rate, both measured as percentages; EXDV denotes the expectations of inflation and GC denotes real government consumption per capita.

CHART 5
CHILE
ESTIMATED VALUES FOR OVL AND EXDV IN PERCENTAGE,
1964-85



Notes: OVL corresponds to the difference in percentage between the actual and the "equilibrium" exchange rates. EXDV corresponds to the product of OVL and a dummy variable with zeros for those years in which the corresponding value in OVL was negative. See Table 3 in Appendix B.

elasticity are between .015 and .03, that is between 1.5 percent and 3 percent. These values are very close to the estimated values for this elasticity in the case of Mexico.

Fourth, the coefficients of both real interest variables are significant in most regressions, except, as in the case of Mexico, in those regressions in which the log of government consumption per capita is an additional explanatory variable. The values of these coefficients (semi-elasticities) are between -.0006 and -.0011, which implies that an increase in the real interest rate of 1 (percentage) point tends to decrease real private consumption by between .06 and .1 percent. ^{27/} Again, the percentage effect on saving is magnified because real private saving is very small (about 3 percent on average) of real private consumption (Chart 3 and Table 3 in Appendix B).

Fifth, the inclusion of the expectations of devaluation (EXDV) variable greatly improves the overall regression results. In addition, the estimated coefficients have the expected sign and are significant in all regressions. This results strongly suggest that private consumption in Chile has been influenced by the expectations of devaluation.

Sixth, as in the case of Mexico, there was no evidence that government consumption per capita influences private consumption. The coefficient of the GC variable has the wrong sign, and its inclusion does not improve the overall regression results.

4. Conclusions and policy implications

Several important conclusions can be derived from the empirical analysis. First, private consumption in both countries appears to be determined by a function of real disposable income (including perceived sustainable net capital inflows) and the relative cost of present consumption, which in turn is determined by the real interest rate, and in Chile, this relative cost appears also to be influenced by the expectations of devaluation.

Second, the empirical approximation to permanent income, based on the current and lagged one-period levels of real disposable income, was found to be relevant for both countries. The values of the two income elasticities were found to be significantly different from zero and, in the case of Mexico, their sum was very close to one. In the case of Chile, this empirical approximation to permanent income was somewhat less satisfactory, since the sum of the point estimates of the two elasticities was only about 0.55.

^{27/} The value of this semi-elasticity is somewhat lower than the value of elasticity of real private consumption per capita with respect to the real interest rate for Chile reported by McDonald (1983): -0.153 for the short term and -0.232 for the long term. The analysis period covered the period 1961-1975.

A policy implication derives from the fact that real disposable income, as it was defined, included taxes, transfers and the real returns from financial assets--including the inflation tax--all of which are policy-determined variables. Thus, it appears that any change in these policy-determined variables may affect both real disposable income and private consumption and, therefore, may also affect overall saving in the economy.

Third, the results for Mexico imply an increase in the elasticity of real private consumption with respect to current real disposable income during 1982-85, compared with the period 1960-81. This increase is independent of the shift in net capital inflows and of changes in the real interest rate. This result is somewhat surprising in view of the apparent tendency for income to become more concentrated in the more recent period. I have no ready explanation of this phenomenon.

Fourth, once real disposable income, net capital inflows and the variables measuring the relative cost of present consumption are included in the regression, the inclusion of the government consumption variable appears as an irrelevant variable. Then the fact that private consumption and government consumption appear as mutually independent suggests that private sector behavior in the two countries does not offset the effect on real private consumption of changes in the policy-determined variables mentioned above.

Fifth, it appears as if private consumption is influenced by the level of foreign saving, measured by the net real capital inflows. The main reason for this influence may be that capital flows tend to influence perceived permanent income, perhaps through their influence upon the relative price of non-tradables, particularly upon the prices of factors in the country relative to international levels.

A policy implication of the above result is straightforward. If an economy tries to rely heavily on foreign savings, these savings will tend (at least partially) to be reflected in higher consumption, and not only in higher investment. The economy will then have to pay for present consumption with lower consumption in the future.

Finally, the real rate of interest seems to have a positive effect on private saving in both countries. An increase in the real interest rate reduces private consumption by about .2 percent, in the case of Mexico, and by about .1 percent in the case of Chile. Since saving is a small fraction of private consumption (around 15 percent in Mexico and less than 5 percent in Chile), the effect of 1 (percentage) point in the real interest rate will have a more sizable effect in real private saving (about 1.1 percent in Mexico and 1.9 percent in Chile).

The policy implication of this result is also straightforward. By manipulating the real interest rate, the authorities should be able to influence private savings permanently. In other words, positive real interest rates may not only be important for influencing financial savings (and economic efficiency in the economy) but they also seem to have a direct influence on the level of private saving in the economy.

APPENDIX A

Inflation Expectations: The Model and its Empirical Results

The model of inflation expectations, which was assumed to be the base for public behavior, is a short-run or disequilibrium model. This model recognizes that, while overall inflation depends on changes in the prices of both tradable goods and nontradable goods, the forces that affect the former differ from the forces that affect the latter in the short and medium run. ^{28/} Therefore, in the short and medium run, there may be disequilibrium of relative prices between tradables and nontradable goods. ^{29/}

The domestic prices of tradable goods are assumed to be determined by inflation in the rest of the world and by the exchange rate. Thus, if we denote the external inflation by p^* and the change in the exchange rate by e , the inflation rate in tradable goods is $[(1+p^*)(1+e) - 1]$, which will be denoted as w .

The domestic prices of nontradable goods depend on the excess demand of the economy. Given that annual changes in aggregate supply are relatively small to changes in domestic demand and relatively constant, the expansion of domestic demand is used as a proxy for the excess demand of the economy. In turn, the expansion of domestic demand may be approximated by the expansion in the money supply. However, because of the relatively high transaction and information costs in developing countries, which are reflected in a slow adjustment of the money market, the relevant changes in the money supply may not be the contemporary changes but those of past periods. Thus, if we represent the changes in the money supply in current and past periods by m_{-i} ($i=0,1,\dots$), the determinants of the overall inflation, p , can be represented by the following function:

$$p_t = a_0 + a_1 w_t + a_2 m_t + a_3 m_{t-1} + \dots$$

The results from the application of the model to the cases of Mexico and Chile, appear in Table 6 (below):

^{28/} This model is a simplification of a more complete model that uses excess demand for money instead of the money supply. See, for instance, Blejer (1977) and Gómez-Oliver (1978).

^{29/} In the long run, the equilibrium of relative prices is ensured by changes in the net exports (of goods, services and assets) of the country, which will in turn change the domestic money supply or the exchange rate. However, these long-run reactions were not explicitly considered in the model.

Table 6. Estimated Coefficients of the Variables that Determine the Inflation Rate 1/

Country	Cons	w_t	m_{-1}	m_{-0}	R^2	D.W
Mexico	-.065 (-2.58)	.388 (8.09)	.858 (6.78)		.925	1.98
Chile	-.068 (-0.51)	.683 (12.00)	.326 (2.45)		.963	3.13
Mexico	-.064 (-2.43)	.374 (7.00)	.641 (2.14)	.215 (0.74)	.921	1.95
Chile	-.068 (-0.51)	.663 (8.34)	.276 (1.60)	.097 (0.43)	.960	3.26

1/ The annual inflation rate in the GDP deflator. The periods of analysis are 1960-1985 for Mexico and 1965-1985 for Chile. Below the value of the coefficient appears t-value, in parenthesis.

The results for both countries suggest that, while contemporary changes in the money supply have no influence on the annual inflation rate, changes in the other 2 variables, the money supply of previous periods and the external inflation, have marked influence on the domestic inflation rate. The R^2 values are relatively high, in particular when we recall that the dependent variable is a rate of change in percent.

Given the assumption that public behavior would be as if their inflation expectations were based on the best model available, the "predicted" values from the first two regressions were assumed to measure the public's inflationary expectations. Accordingly, these predicted values were used to adjust the nominal interest rate to obtain the (expected) real interest rate.

APPENDIX B

Description and Sources of the Data

a) Real disposable income

The empirical approximation to real disposable income, denoted RDII, was defined as follows:

$$(1) \text{ RDII} = \text{GDP} - \text{NFT} - \text{D} - (\text{TX} - \text{TRA}) - p \cdot B + r \cdot B^g$$

In this equation:

GDP represents gross domestic product at constant prices. The base year was 1960 for Mexico and 1977 for Chile. The source of the series was the Central Bank of each country. 30/

NFT represents the real factor payments net of international transfers received. The sources for the nominal (U.S. dollar) values were the balance of payments statistics computed by the Central Bank of each country. To obtain the nominal peso values, the dollar values were multiplied by the average (peso/U.S. dollar) exchange rate, in the case of Mexico, and by the implicit (peso/U.S. dollar) exchange rate, computed by the Central Bank, in the case of Chile. 31/ Then the nominal peso values were deflated with the implicit GDP deflator of each country.

D represents the real value of the consumption of capital. The nominal values, which were computed by both Central Banks, were deflated using the implicit deflator of the capital formation, also computed by the Central Bank of each country.

TX-TRA represents the real value of total taxes (direct plus indirect) paid by the private sector less transfers (other than interest payments) received by the private sector from the Government. In the case of Chile, the nominal values of taxes paid in dollar terms, 32/ were first converted in Chilean pesos, using the implicit exchange rate, and then these values were deflated by the implicit GDP deflator. In the case of

30/ The publications of the Central Bank that have most of the relevant data were, from the Banco de Mexico, Indicadores Económicos, and Informes Anuales and, from the Banco Central de Chile, Cuentas Nacionales de Chile 1960-1983 and Boletín Mensual. The Central Banks were also the source of the data on real (private and government) consumption.

31/ As reported in H. Büchi (1985).

32/ As reported in H. Büchi (1985).

Mexico, the nominal values of taxes and transfers 33/ were also deflated by the implicit GDP deflator.

p.B represents the product of the annual inflation rate (measured by the GDP deflator) and the monetary base at the end of the year. This product represents the real cost derived from holding base money (outside money). The source of the series on the monetary base was "International Financial Statistics" (IFS) in the case of Chile. In the case of Mexico the source was the Central Bank from 1958 to 1977, and IFS from 1978 to 1985.

r.B^B represents the product of the real interest rate paid on government bonds (including Central Bank bonds) and the stock of these bonds held by the private sector. In the case of Mexico, the real interest rate was computed as the difference between the implicit nominal rate paid on government securities 34/ (treasury bills and petrobonds) and the inflation rate measured by the implicit GDP deflator. In the case of Chile, the bonds are indexed and therefore the real rate was explicitly considered. 35/

Because of the changes in financial instruments (and in financial policy), the series on nominal interest rates for each country are a combination of two truncated series. In the case of Mexico, term deposits were very limited until 1974 and bonds issued by banks (and redeemable on demand) were the most dynamic and important financial instrument. Accordingly, the after-tax rate paid on "pagarés no millonarios" ("bonds of less than 1 million pesos") represents the first part (from 1960 to 1974) of the interest rate series. In 1974, the banks began offering term deposits that paid a higher rate than the bonds and the pagarés did (the later were abandoned in 1977). Then, the second part of the series (from 1974-1985) was the after-tax three-month time-deposit rate. The source of the data was the Central Bank.

In the case of Chile, the period 1963-1974 corresponds to a period of financial repression, where all interest rates were negative in real

33/ The sources of the nominal values were the official publication, Estadísticas Hacendaria del Sector Público, which covers the years 1965 and after, and Griffiths (1972), for the years 1960-64. Total taxes less transfers are net of intergovernment operations involving public and departmental enterprises; however, they differ from taxes less subsidies (as recorded in the national accounts) because of differences in timing (the former are recorded on a cash basis) and in coverage (for instance, in the case of Mexico, the former do not include revenues--quotas--and payments--transfers--of the Housing Fund--INFONAVIT).

34/ The implicit rate was computed as the ratio of yearly interest flow on government securities to the stock of government securities held by the private sector at the end of the year. The source of both series was the Central Bank.

35/ The real rate used was 5 percent, which represents the more common rate.

terms. For this subperiod, the maximum lending rate was used as a proxy for the interest rate paid. For the subperiod 1975-85, the interest rate series was the interest rate paid on short term deposits. The source of the data was also the Central Bank.

The alternative definition of real disposable income, RDI2, used in the case of Mexico, was defined as follows:

$$(2) \quad RDI2 = GDP - NFT - D - DT - NIT - p B + r B^g$$

where:

DT represents real direct taxes paid by the private sector, which corresponds to their nominal values deflated by the implicit deflator and NIT represents the real value of indirect taxes net of subsidies, which also corresponds to their nominal values deflated by the implicit GDP deflator. The sources for the former were those indicated before for the total taxes, while the source for the latter was the Central Bank.

b) Capital flows and other variables

i) RPC and GC, which represent the per capita values of real private consumption and government consumption, respectively, were estimated as the corresponding real values reported by the Central Banks of both countries divided by the population reported by IFS.

ii) PEND, which represents the per capita real value of the net capital inflow was estimated as follows. First, the dollar amounts of the capital flow (excluding changes in international reserves and direct investment) were multiplied by the average exchange rate, in the case of Mexico, and by the "implicit" exchange rate in the case of Chile, in order to obtain the values of the net capital inflow in domestic currency. These values were then deflated by the implicit GDP deflator and divided by the population to obtain the real per capital values of the net capital inflows.

iii) EXDV represents the expectations of devaluation based on the difference between the domestic prices of goods and services (measured by the implicit deflator) and the external prices of goods (measured by the producer price index in the U.S.). In their estimation, several steps were followed. First, the year 1964 was selected as the base year. Second, the ratios of the domestic and the external price indexes (both on a 1964 = 100 basis) were multiplied by the exchange rate peso/dollar of 1964 to obtain an estimate of an "equilibrium" exchange rate, in the sense that it kept the real exchange rate constant at the 1964 level. Third, the difference in percentage between the actual and the estimated "equilibrium" exchange rates was denoted OVL. Finally, EXDV corresponds the product of OVL and a dummy variable with zeros for those years in which the estimated "equilibrium" exchange rate was higher than the actual exchange rate. (Table 5 shows the estimated valued for OVL and EXDV).

Table 3. Mexico: Real Disposable Income and Some Relevant Ratios

	Real Disposable Income 1/ (In millions of 1960 pesos)		Ratios (in percent)					
	RDI1	RDI2	RDI1	RDI2	RPC	RPC	RPC	RPC
			RGNP	RGNP	RDI1	RDI2	RGNP	RGDP
1959	120,160	121,174	86.8	87.5				
1960	129,630	130,638	86.8	87.4	88.5	87.8	76.8	76.2
1961	129,630	137,357	86.7	87.6	87.4	86.5	75.8	75.3
1962	141,629	143,627	86.3	87.6	87.7	86.5	75.7	75.1
1963	153,071	154,609	86.4	87.3	85.9	85.0	74.2	73.6
1964	170,638	172,443	86.3	87.2	84.9	84.0	73.2	72.6
1965	181,355	184,166	86.1	87.5	84.0	82.7	72.4	71.8
1966	192,333	195,363	85.5	86.8	85.1	83.8	72.8	72.1
1967	203,736	206,236	85.3	86.3	85.8	84.8	73.2	72.5
1968	217,708	222,273	84.3	86.1	87.8	86.0	74.0	73.2
1969	229,671	234,086	83.8	85.4	86.9	85.3	72.8	71.9
1970	244,101	250,387	83.4	85.5	87.4	85.2	72.9	71.9
1971	255,468	261,384	83.7	85.7	87.9	85.9	73.6	72.7
1972	276,782	283,775	83.5	85.6	86.6	84.5	72.3	71.5
1973	296,381	304,984	82.5	84.9	86.2	83.8	71.1	70.3
1974	310,685	318,650	81.5	83.6	86.5	84.3	70.5	69.7
1975	324,738	336,772	81.0	84.0	87.5	84.4	70.9	69.8
1976	334,622	343,693	80.5	82.7	88.7	86.4	71.4	70.0
1977	336,396	347,818	78.4	81.1	90.1	87.1	70.6	69.0
1978	369,620	384,041	79.6	82.7	88.7	85.3	70.5	68.9
1979	399,191	416,745	78.9	82.4	89.4	85.6	70.5	68.8
1980	425,041	450,041	77.7	82.2	90.2	85.2	70.1	68.2
1981	462,419	476,938	78.7	81.2	89.0	86.3	70.1	67.9
1982	411,422	432,096	72.7	76.4	101.2	96.3	73.6	69.0
1983	351,743	367,244	66.0	68.9	109.5	104.9	72.2	67.4
1984	411,097	419,842	73.9	75.4	96.0	94.0	70.9	66.6
1985	440,527	451,721	76.0	78.0	91.5	89.2	69.5	66.2

1/ The precise composition of the two alternative definitions of Real Disposable Income, RDI1 and RDI2 and their sources appear in Appendix B.
 RGNP= Gross domestic product less net factor payments plus net transfers received, all in real terms.
 RPC= Private consumption in real terms.
 RGDP= Gross domestic product in real terms.

Table 4. Chile: Real Disposable Income (RDI)
Real Gross National Product (RGNP) and Some Relevant Ratios

	In millions of 1977 pesos		Ratios (in percent)		
	RDI ^{1/}	RGNP	$\frac{\text{RDI}}{\text{RGNP}}$	$\frac{\text{RPC}}{\text{RDI}}$	$\frac{\text{RPC}}{\text{RGNP}}$
1963	176527.399	214339	82.4	99.7	82.1
1964	179337.034	219291	81.8	99.6	79.8
1965	187011.200	220039	85.0	93.5	79.4
1966	219948.483	243648	90.3	88.4	79.8
1967	230355.831	250475	92.0	87.3	80.3
1968	236268.340	259767	91.0	88.4	80.4
1969	249354.500	269108	92.7	88.1	81.7
1970	256016.758	277741	92.2	85.3	78.7
1971	272279.237	305280	89.2	90.8	81.0
1972	278922.538	303584	91.9	95.5	87.7
1973	206880.262	285433	72.5	120.0	87.2
1974	185624.381	287290	64.6	109.6	70.8
1975	150598.294	244901	61.5	119.6	73.6
1976	170573.296	255175	66.8	105.9	70.8
1977	202156.508	282218	71.6	103.6	74.2
1978	233469.349	305587	76.4	96.5	73.7
1979	252075.699	328678	76.7	95.2	73.0
1980	272017.069	351952	77.3	94.1	72.8
1981	288809.934	365450	79.0	98.2	77.6
1982	247216.496	304386	81.2	100.8	81.9
1983	240247.950	302889	79.3	100.2	79.5
1984	248176.510	320395	77.5	97.1	73.4
1985	248219.263	328159	75.6	97.1	73.4

^{1/} The precise composition of the RDI variable appears in Appendix B.
RPC = Private consumption in real terms.

Table 5. Chile: Estimated Values of OVL and EXDV
(In percent)

	OVL	EXDV
1964	-0.00	0.00
1965	4.22	4.22
1966	2.07	2.07
1967	2.37	2.37
1968	-3.00	0.00
1969	-1.83	0.00
1970	-4.90	0.00
1971	15.63	15.63
1972	22.71	22.71
1973	6.08	6.08
1974	-5.75	0.00
1975	-54.12	0.00
1976	-22.27	0.00
1977	-5.14	0.00
1978	-6.43	0.00
1979	3.65	3.65
1980	10.89	10.89
1981	13.32	13.32
1982	-1.89	0.00
1983	-26.19	0.00
1984	-41.44	0.00
1985	-73.02	0.00

Notes: The definition of both variables and a description of the way they were computed appears in Appendix B.

References

- Bailey M., National Income and the Price Level, 2nd ed., McGraw-Hill, New York, 1971.
- Banco Central de Chile, Cuentas Nacionales de Chile, 1960-1983, Santiago, Chile, Diciembre 1984.
- Barro R. J., Macroeconomics, J. Wiley and Sons, New York, 1984.
- _____, Output Effects of Government Purchases, Journal of Political Economy, Vol. 89, No. 6, November 1981.
- Blanco H. and P. M. Garber, "Recurrent Devaluation and Speculative Attacks on the Mexican Peso." Unpublished paper, Rice University and The University of Rochester, December 1983.
- Blejer M. I., Dinero, Precios y la Balanza de Pagos: La Experiencia de Mexico 1950-1973, CEMLA, Mexico City, Mexico, 1977.
- Blinder A. S., "Temporary Income Taxes and Consumer Spending," Journal of Political Economy, Vol. 89, No. 1, January 1981.
- Büchi H., Exposición Sobre el Estado de la Hacienda Pública, Ministerio de Hacienda, Santiago, Chile, Diciembre 1985.
- Chenery, H. and P. Eckstein, "Development Alternatives for Latin America," Journal of Political Economy, Vol. 76, No. 4 (Supplement), July 1970.
- Corbo V, M. Goldstein and M. Khan (Editors), Growth-Oriented Adjustment Programs, International Monetary Fund and The World Bank, Washington, D.C., 1987.
- Cuddington, J. T., "Macroeconomic Determinant of Capital Flight: An Econometric Investigation", in Leonard D. and Williamson J. (Edit.), Capital Flight and Third World Debt, Institute for International Economics, Washington, D.C., 1987.
- Flavin, M.A., "The Adjustment of Consumption to Changing Expectations About Future Income," Journal of Political Economy, Vol. 89, No. 5, September 1981.
- Gómez-Oliver A., Dinero, Inflación y Comercio Exterior en México, CEMLA, Mexico City, Mexico, 1977.
- Griffiths B., Mexican Monetary Policy and Economic Development, Praeger, New York, 1971.
- Gylfason T., "Interest Rates, Inflation and the Aggregate Consumption Function," Review of Economics and Statistics, Vol. 63, No. 6, 1981.

- Hall R.E., "Stochastic Implications of the Life Cycle - Permanent Income Hypothesis: Theory and Evidence." Journal of Political Economy, Vol. 86, No. 6, November 1978.
- Landau L., "Differences in Saving Ratios Among Latin American Countries" in Chenery H. (Editor), Studies in Development Planning, Harvard University Press, Cambridge, Massachusetts, 1969.
- Lee J. K., "Exports and the Propensity to Save in LDC's," Economic Journal, June 1971.
- Leff N. H. and K. Sato, "A Simultaneous-Equation Model of Savings in Developing Countries," Journal of Political Economy, vol.83, no.6, November 1975.
- McDonald D., "The Determinants of Saving Behavior in Latin America," International Monetary Fund, Washington D.C., DM/83/26.
- Mikesell R. F. and Zinser J. E., La naturaleza de la función ahorro en los países en desarrollo. CEMLA. Mexico City, Mexico, 1974.
- Molho L. E., "Interest Rates, Saving and Investment in Developing Countries: A Re-examination of the McKinnon-Shaw Hypothesis," International Monetary Fund, Washington D.C., DM/85/63.
- Sargent T. J., "Rational Expectations, Econometric Exogeneity, and Consumption," Journal of Political Economy, vol.86, no.4, July 1978.
- Secretaría de Hacienda y Crédito Público, Estadísticas Hacendarias del Sector Público. Cifras Anuales 1965-1982, Mexico City, Mexico.