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METHODOLOGY FOR THE DERIVATION OF SCARCITY VALUES OF INPUTS
AND OUTPUTS FOR THE VENEZUELAN ECONOMY

A Dissertation

Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

Nelson E. Rodriguez-Soto

December 1977

1347043

ACKNOWLEDGMENTS

Sincere appreciation is extended to Dr. Merton Badenhop, my major professor, for his counsel during my graduate program, and for his encouragement, patience, and invaluable advice and guidance in the development and completion of this study. Special appreciation is given to Dr. Charles L. Cleland, Dr. Joe Martin, Dr. Nelson Robinson, and Dr. Keith Phillips for their suggestions and constructive criticism of this manuscript.

Thanks are also expressed to Dr. T. J. Whatley, Past Head of the Department of Agricultural Economics and Rural Sociology, who made it possible for me to attend graduate school.

Gratitude is also extended to the author's parents for their support throughout the graduate program.

Without question the deepest appreciation is extended to the author's wife and children. Without their support, encouragement and sacrifice completing graduate studies would have been impossible. Gracias mis tesoros.

ABSTRACT

The primary objective of this research was to develop a set of economic and social accounting prices of inputs and outputs for the Venezuelan economy.

The parameters derived allowed putting the benefits and costs which might be encountered in a project in terms of the present value of uncommitted government income measured in foreign exchange. The parameters were designed to reflect the different final values of project inputs and outputs which depended upon whether the benefit: (1) was measured in terms of market prices or in terms of efficiency prices; (2) was perceived today or in the future; (3) was saved or consumed; (4) accrued to the rich or to the poor; and (5) was received by the private or the public sector.

The estimates of the national parameters rested on the assumption that the distortions found in the several markets of the economy (foreign exchange, savings, labor, fiscal) causing divergence between market prices and marginal social cost or marginal social utilities will continue to exist in the future.

Simple procedures to estimate tradable and nontradable goods conversion factor to change domestic market prices into border prices were developed. The following conversion factors were calculated: (1) the standard conversion factor (α); (2) the conversion factor for consumption goods (β_c); (3) the conversion factor for capital goods

(β_k); (4) the conversion factors for intermediate goods (β_I); and (5) the conversion factor for a nontradable, electricity.

Two different approaches were used to derive the shadow exchange rate in the country. The findings indicated an overevaluation of the official exchange rate varying between 7 and 16 percent, depending upon the external trade policies to be adopted in the future.

From the review of the different interest rates and capital yields considered most relevant in the country, it was concluded that the average private cost of capital in the economy ranged from 5.9 percent to 25.0 percent. Three different rates to discount benefits were estimated: the consumption rate of interest (CRI) of .065, which is the proper discount rate to use if consumption is the numeraire, and two accounting rates of interest, which should be used to derive the fall in the value of public income. The two accounting rates derived were the economic accounting rate of interest (the marginal productivity of public capital) and the social accounting rate of interest (SARI or ARI). The marginal productivity of capital in the public sector of .0976 was obtained by deriving the weighted average efficiency rate of return of fourteen of the most representative projects of the public investment program. The social accounting rate of interest was estimated by three different approaches and its value was found to vary between .075 and .081.

Also developed were the set of values required to introduce distributional considerations in project appraisal. The notion behind the distributional weight's estimates was to adjust the net benefits accruing to different individuals in accordance with a social welfare

maximization criteria, that is, lowering the valuation of benefits accruing to higher income groups and raising the valuation of benefits to the lower income groups. Estimates of the distribution weight attached to particular levels of consumption were derived (d_i). Two different approaches were used to derive the weight which reflected the value of public income relative to the value of additional consumption at the average level of consumption (V). The estimated value of V which equaled 1.25 implied that a unit of public income (savings) in 1977 was worth 1.25 units of current consumption accruing to consumers at the average income level.

Finally, consideration was given to the methodology for the derivation of the economic and social wage ratio for skilled, semiskilled, and unskilled labor in Venezuela taking into account the sector which ultimately supplies labor to fill new job openings.

The parameters derived are the first attempt to develop a set of consistent values to be used in the appraisal of projects in Venezuela. They are aimed to allow the measurement of the economic and social conveniences of selecting investment projects which reflect the government's preference. The methodology simply provides a consistent rationale for integrating equity and efficiency in project evaluation.

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CHAPTER I

INTRODUCTION

In Venezuela, as in most developing countries, the government plays an important role in guiding the country's growth. This is done by direct participation in productive activities, by monitoring the size and composition of its investment program, by setting up adequate controls on private investment, and by the use of taxes and other fiscal tools. Concomitant with this role, the government has the responsibility of pursuing national policies, programs, and projects that are in the national interest. Scarce resources should be allocated to activities which contribute most toward reaching the country's fundamental goals, those concerned with increased growth, employment, income and productivity. Pursuit of one of these goals may involve the sacrifice of others. Thus, it is advisable that a choice of investment projects be made based on an evaluation of the projects and with an understanding of how they contribute to the national goals. It follows, therefore, that the government needs to develop a consistent methodology for comparing and evaluating projects and their alternatives in terms of their contribution to national objectives.

In spite of this need the national entities responsible for carrying out the country's public investment program do not have the methodology or the knowledge, such as an appropriate set of prices (shadow prices as opposed to market prices for labor, foreign exchange, rate of discount) which might be used to evaluate the economic

impact of the projects they promote and execute. Distributional considerations, whose weights should be used together with economic prices, in the past have been essentially ignored in project appraisal.

I. OBJECTIVE

The primary objective of this research was to develop a set of economic and social accounting prices of inputs and outputs for the Venezuelan economy. To this end, considerable adaptation, with some practical modifications of the existing methodologies, was undertaken. It is hoped that the results of this study will help the government agencies in the evaluation of their investment decisions based on economic (efficiency) and social (distribution) prices, usually called "shadow prices."

The general principles and application of the existing methodologies of benefit cost have recently received special attention by the United Nations Industrial Development Organization (UNIDO), the Organization for Economic Cooperation and Development (OECD), the World Bank and the Inter American Development Bank. Several economists (Harberger, Little and Mirrlees, Schydrowsky, Bruno, and Marglin) have also contributed major works to this effort. These works, however, do not relate to any specific country analysis. The development of a social benefit cost methodology to a particular country should reflect the main features of the respective economy. In fact, it has to take into account the particular policies of the country, the distortions and interaction between the major factor and product markets and the nature of the resource being allocated.

An outstanding aspect of the benefit cost analysis is that project evaluation is often taking place in economies where markets are not in competitive equilibrium and/or when externalities in production or consumption are present. To the extent that perfect competition does not hold in the economy, market prices will not indicate the social costs and benefits of using and producing different inputs and outputs; that is, market prices will no longer equate and equal the marginal social cost (MSC) and marginal social value (MSV) of the relevant commodities, and in consequence, their use in project appraisal will lead to mistaken project choices. If the disequilibria in the different markets of the economy (labor, savings, foreign exchange, etc.) are expected to persist during the lifetime of the project, then it is necessary to derive the set of prices (second best shadow prices) which will reflect the real situation which will eventuate rather than to use the prices (first best shadow prices) that would result if the economy were in competitive equilibrium. Their use will only be justified if the economy is expected to reach the optimum state by the time the project is implemented.

II. THE SHADOW PRICES REQUIRED

In Venezuela, the distortions which cause divergence between market prices and marginal social costs or marginal social utilities have existed for considerable time and there is no reason to believe that they will cease to exist in the near future. In the labor market for example, institutional controls have existed for some time and they will continue to exist in the future. In the foreign exchange market, the

restrictions on trade have existed for a long time and they are expected to increase in the near future. In the capital market, interest rate ceiling as well as credit rationing have been traditional distortions which are expected to change very slowly over time.

The existence of these distortions implies that investment projects will be executed in an environment in which market prices do not reflect the true scarcity measure. Hence there is the need to derive shadow prices for the Venezuelan economy which reflect the marginal social cost and marginal social utilities of the inputs and outputs under the distorted conditions which exist and are expected to exist in the future. Thus the first characteristic required of the shadow prices is that they must be determined under these distorted conditions (second best prices).

Most of the distortions which cause divergence between market prices and marginal social costs or marginal social utilities arise from existing government policies. As those policies change, so will the distortions; the shadow prices must change too. Hence, a second characteristic of the shadow prices required is that they must change over time as to reflect, among other things, policy changes. That is, instead of thinking of having a single shadow price for each resource or factor, there will be a time profile of shadow prices.

Finally, since the economy consists of several interrelated markets, the derivation of the shadow prices should not proceed on an independent market by market basis. Rather, they should be estimated taking into account the interaction of the various distortions across markets as one point in time and over the time horizon. Thus a third characteristic

required of shadow prices is that they be general disequilibrium shadow prices.

III. THE STATE OF THE ARTS IN SHADOW PRICING

A practical way of classifying the existing literature in this field is by dividing it into those works on "first best shadow prices," that is, those that measure the market prices which would exist in an economy if it were in perfectly competitive equilibrium, and works concerning "second best shadow pricing," i.e., those which take the market imperfections as they exist and derive marginal social cost and marginal social utility on that basis.

In the area of first best prices, the main orientation to be distinguished is the programming alternative. The shadow prices arising from this work represent the dual in a programming model. There are several examples of application of this procedure, particularly in the use of linear programming. The main difficulty with applying this procedure is the lack of suitable disaggregated and sufficient data, as well as the limitations imposed by the assumptions of the model, i.e. linearity, and by the technological coefficients used.

The work on second best shadow prices can be grouped into three categories. The first of these includes the studies which values traded goods at border prices and develops a special methodology for shadow pricing nontraded goods and primary factors. Within this group is the

Little-Mirrlees work (LM).¹ Some economists, noticing that a number of arguments and principles advanced in the LM work seem quite similar to those associated with first best welfare economics, have concluded wrongly that the LM methodology has ignored the problems of the second best and classify it as a first best shadow price approach.

Another approach to second best shadow price analysis corresponds to a partial equilibrium or disequilibrium (each market unrelated to the others). It starts from the existing prices in the market and develops transformations which measure the relevant marginal social costs or marginal social benefits. Into this group falls the work by Harberger, the UNIDO methodology (Marglin, Dasgupta, Sen), by Feldstein, Eckstein, and others. A major limitation of these works is that they ignore the interrelation among the major factor and product markets.

It is now generally agreed that properly applied these second best partial shadow prices methodologies, particularly the LM and the UNIDO approach, give the same accept-reject decisions. In fact, both analyses highlight the issues to be faced in order to make the rational economic decisions or at least to point out the economic and social consequences of a given course of action.

Another group of scholars have attempted to derive second best shadow prices within a general disequilibrium situation, taking into account not only the distortions in the various markets but also considering their interactions. One approach has consisted in

¹I. M. D. Little and J. A. Mirrlees, Project Appraisal and Planning for Developing Countries, Heinemann Educational Books (London: Morrison and Gibb, Ltd., 1974).

generating general disequilibrium prices through the use of a equilibrium model with specified distortions. Another approach has been to start from market prices, as in the partial disequilibrium approach, and construct a set of simultaneous equations for the transformation to shadow prices (e.g. Schydrowsky).

Analyses included in this last category are still very experimental although they present all the features required of shadow prices estimates. The work advanced by Schydrowsky, for example, which is one of the most practical and promising within this group, proposes a specific formula for each of the major shadow prices (such as foreign exchange, labor, time, investment); but it still requires considerable revision before it can be confidently applied to real world data.

It is not the aim of this dissertation to develop new methodologies or additional theory to measure second best shadow prices. Its main concern is to analyze the factors and adjustment mechanisms affecting each of the country's major markets, in order to derive the transformations from markets to shadow prices that are appropriate for the specific situation of Venezuela. To this end, it takes as given the theory already developed, particularly the LM approach, with some of the modifications introduced by Squire, and van der Tak,² and proceeds to provide practical estimates of economic and social accounting prices needed to appraise investment decisions in Venezuela.

²Lyn Squire and H. G. van der Tak, Economic Analysis of Projects (Baltimore: The Johns Hopkins University Press, 1975).

IV. ORGANIZATION OF THE WORK

This work consists of two main parts. The first provides a broad review on the nature of shadow prices. Chapter II deals with the welfare economic basis of project appraisal. Several approaches for evaluating changes in economic welfare resulting from investment projects are discussed. Chapter III is concerned with the implications of project evaluation in economies in general disequilibrium. The disequilibria in the various product and factor markets that characterize the Venezuelan economy as well as the kind of shadow prices needed are examined in some detail. Also a review is presented of the methodology which is considered most appropriate for estimating shadow prices in Venezuela, in the light of the nature of the markets' distortions and on data availability.

The second part deals with the specific analysis of the numerical estimation of the second best partial disequilibrium shadow prices of foreign exchange, labor, and capital, so as to reflect a wide range of economic conditions and value judgments concerning basic policy objectives pertaining to growth and distribution.

Chapters IV, V and VII deal with the general principles for deriving shadow prices of foreign exchange capital and labor respectively as suggested by the UNIDO Guidelines, the OECD Manual, Schydrowsky, Harberger, and others. Chapter VI discusses the integration of efficiency and equity in project appraisal.

CHAPTER II

GENERAL WELFARE CRITERIA FOR PROJECT APPRAISAL

The purpose of this chapter is to present some general considerations about the relationship between the theory of welfare economics and the meaning of project evaluation. It has long been recognized in the literature that the objectives against which investment projects are to be evaluated is the maximization of the welfare of the average consumer. Hence, project appraisals and the theory of resources allocation can be understood and have some meaning only by reference to propositions at the center of welfare economics. This is a body of theory which attempts to answer whether one set of economic arrangements is better or worse than another. It is based sometimes on utility considerations, but most often, refers to a number of ethical propositions which appear to command a widespread assent in society even though they are not written into some sort of virtual constitution or code. If welfare economics is to be grounded on utility considerations, then every effect on the individual's utility is to count even though it has been frequently maintained that it is impossible to make interpersonal comparisons of utility. However, if welfare economics is to be raised from ethical propositions, only the economic effects of the activities or policies sanctioned by the so called constitution or code have to be included or taken into consideration.

I. WELFARE ECONOMICS PROPOSITIONS

If one opts for the ethical base it appears that only two propositions form the basis of a large part of theoretical welfare economics: (1) Pareto improvement, and (2) a distributional improvement.¹

A Pareto improvement takes place if an economic rearrangement makes at least one person better off and no one worse off, while a distributional improvement takes place if there is a near unanimous agreement that the distribution coming from an economic rearrangement fulfills the aspirations which form part of the virtual constitution or code established (written or unwritten).

Unfortunately, not all economic problems can be solved with reference to a Pareto and distributional improvement. There are some economic decisions which will raise other issues such as that of the incompatibility of some national economic objectives (or their relative weight) or that of selecting the most convenient path by which the economy can reach its goals. For each of these problems there are a number of choices which are all accepted as good ones and none of which can be selected as superior with reference to the Paretian postulates.

A major problem in judging the convenience of accepting an economic rearrangement with reference only to the Paretian postulate is that complete redistribution of gains and losses following a change is rarely feasible. Hence, to measure the net effect of the economic change undertaken it will be necessary to add the gains by one individual to

¹E. G. Mishan, Cost Benefit Analysis an Introduction (New York: Praeger Publishing Inc., 1971), pp. 307-320.

the losses by another. This can be done only if there exists a social welfare function which shows the relative weights which society attaches to the utility of different individuals.

A traditional approach followed to derive such a welfare function has been by relating welfare (W) to the utilities of individuals (U_1) as in (2-1)

$$W = W (U_1, U_2 \dots U_n) \quad (2-1)$$

and

$$\frac{\partial W}{\partial U_1}, \frac{\partial W}{\partial U_2}, \dots, \frac{\partial W}{\partial U_n} > 0$$

where the individual utilities depend on the consumption of all goods

$$U_i = f_i (C_{i1}, C_{i2}, \dots, C_{in}) \quad (2-2)$$

C_{in} is the consumption of goods n by individual i

and

$$W = (C_1 \dots C_n)$$

where C_i is the value of consumption of individual i .

Since neither utility levels nor the welfare function are directly observable, there are considerable problems in trying to apply this approach; nevertheless, several attempts have been made to derive estimates of the implicit welfare function.

Fisher in 1892 and Pigou in 1910 were the first to put forward the proposition that the ordinal measurability of marginal utility depends on the independence of wants. Later on in 1932 and 1957, Frish utilized the concept of elasticity of the marginal utility of consumption in deriving

direct and cross demand elasticities. Fellner in 1967 also estimated the elasticity of the marginal utility of income from consumption data.²

Following the Fisher-Frish approach, Fellner's measure, among others, of the private elasticity of marginal utility of consumption (income) assumes that all individuals have the same isoelastic utility function and that the individual utility function is separable into at least two additive terms representing groups of commodities (X).

$$U = U_1 (X_1) + U_2 (X_2) \dots \quad (2-4)$$

This permits interpreting observable marginal rates of substitution as ratios of marginal utilities, on the assumption that if the quantity of one good is held constant and that of another is varied, then the marginal utility of the first of these goods remains unchanged.³

Deriving the first order condition of utility maximization, as in (2-5), one can determine the increase in income necessary to induce the consumer to buy the same quantity of X_1 at a higher price.

$$\frac{\partial U}{\partial X_1} / P_1 = \frac{\partial U}{\partial X_2} / P_2 = \dots \frac{\partial U}{\partial X_i} / P_i = \lambda \quad (2-5)$$

$\partial U / \partial X_1$ is the same for the identical level of consumption

where P = prices and λ = marginal utility of income.

²Bela Balassa, "The Income Distributional Parameter in Project Appraisal," The World Bank: Development Research Center, Discussion Paper No. 14, pp. 5,6. (Unpublished)

³William Fellner, "Operational Utility: The Theoretical Background and a Measurement" in Ten Economic Studies in the Tradition of Irving Fisher, ed. by W. J. Fellner (New York: John Wiley & Sons, 1967), p. 46.

Fellner suggests that, "for the small income range in which we observe X to be constant, the ratio of i^{th} commodity's income elasticity (η_y) to its compensated own price elasticity (ϵ_i) will provide an estimate of the elasticity of the marginal utility of income."⁴

The several attempts made to measure the private marginal utility of consumption rest on heroic assumption and the results obtained so far can be easily objected by considering that the marginal utility of all goods rises with overall consumption. Even more, although it is reasonable to think that an individual is the best judge of his own welfare, society as a whole may not be willing to measure the net effect of an economic change proposed (or accept a Pareto improvement) by reference to individual utility alone.

In fact, maximization of social gains cannot be achieved by reference to a social welfare function derived from utility of individuals which only addresses to maximizing purely economic gains as measured by the consumers. Society as a whole has some noneconomic objectives that cannot be assessed by individual preferences and whose effect on national welfare should, in the view of the author, be adequately weighed and taken into account in the opportunity of deciding whether an economic arrangement (investment decision) should take place. The question is how can one meaningfully measure whether a given economic rearrangement contributes to maximize social welfare, without consideration of individual preferences?

⁴Balassa, p. 7.

One way of answering this question is by looking at the government's role in the economic decision-making process. It is frequently observed that it is the government of the country which claims to represent the nearly unanimous acceptance of a number of ethical premises and value judgments of society. In fact, in most, if not all, of the nations of the world with some form of representative government the decisions on national economic policy (level of employment, income redistribution, growth) depend upon or are left to the political decision making machinery. In this, it is implicitly accepted that the government has the role of (1) articulating the value judgment of society which is very often expressed, through the national political strategy of economic development; and (2) translating implicit judgment into explicit weights on objectives such as weights on consumption over time, and the shadow prices of labor and foreign exchange.⁵

Unfortunately, one cannot usually infer the weights of the different economic objectives of the country from the national economic plans since most of them, as is the case in Venezuela, are simple enunciative documents which do not delineate an optimal pattern of economic development and sometimes are not even internally consistent. The complexities of the economic and institutional setting, together with the lack of statistics and consistent economic models make it sufficiently difficult to generate simple feasible plans, so the issue of optimality is out of the question.

⁵This does not exclude the possibility of notorious attempts by some politicians to influence some economic decisions with the aim only of obtaining money or votes or just the will of the political party.

Of course, it does not mean that national planning is not any more relevant to project formulators and evaluators. On the contrary, the success in adequately measuring economic (social) profitability does continue to depend on the extent to which the "national parameters"⁶ reflect national priorities; otherwise, project evaluation become meaningless. In this sense, a well-formulated plan can serve to forecast future economic development even though one could not impute optimality to that forecast. In fact, some of the weights could be legitimately inferred from the plan only if it is consistent while others cannot (shadow prices of investment, the social rate of discount).

II. EMPIRICAL DERIVATION OF WELFARE FUNCTIONS

One way of deriving a welfare function from government's preferences or pronouncements (or from government actions with regard to projects) consists, as suggested by Sen, Dasgupta and Marglin in the UNIDO Guidelines, in deducing policymakers' preferences or tradeoffs between conflicting objectives through their pattern of successive decisions, assuming consistent choices. In fact, the Guidelines proposes to treat those national parameters that are simply quantifications of value

⁶United Nations Industrial Development Organization—Guidelines for Project Evaluation (New York: United Nations, 1972) (hereafter referred to as UNIDO Guidelines), pp. 2, 139. One can distinguish two categories of "national parameters": weights and shadow prices. The term weight is reserved for those national parameters which reflect political value judgments and shadow prices (of labor, investment, foreign exchange) which depend on the technological possibilities facing an economy, the objectives of the government and the variety of instrument of policy that the government possesses and does in fact apply.

judgments (weights) as unknowns of the planning problems. Eventually, a consistent pattern of weighting would emerge from a large number of choices made by policymakers. That is, policymakers would indicate, by their choices, the relative importance of the several national parameters which reflect political value judgment (income redistribution, the relative emphasis to be placed on regional consumption of economic growth "vis-a-vis" employment generation).

A serious limitation to the proposition that a welfare function can be derived from government's actions or pronouncements is that it assumes rationality and consistency in the political decisions. Yet, governments are constantly exposed to pressures from several interest groups; decisions on projects are often taken by different ministries or presidents of government agencies or state companies who also change rather frequently.

Just the simple decentralization of decision making and changes in power positions over time throws enough doubt upon the usefulness of the UNIDO approach to derive welfare weights from historical decisions taken in regard to investment projects. Furthermore, it is frequently argued that the use of some weights such as income distribution provides an excuse for not applying the existing or possible fiscal policies.

According to some economists the measurement of improvements in economic welfare should avoid the problem of comparing individual utilities, which can be meaningfully done by simply defining the increase in real income brought about by an economic rearrangement, independently

⁷UNIDO Guidelines, pp. 135-153.

of the income distribution effects. The idea behind this proposition is that if many changes are carried out on the basis of increasing real income the effects can be expected to be randomly distributed, so that in the end, if a large number of economic changes are carried out all individuals will ultimately benefit.

The problem with the approach of defining real income independently of income distribution is that the values attributed to changes in availabilities of different goods itself depends on the distribution of income so what might be considered an increase in real income on a given criterion, with a certain income distribution pattern, might not be considered so with another.

Some authors however have combined the Kaldor-Hicks criterion of increases in real income with some general income distributional considerations. Little, for example, argues that provided the broad judgment can be made the income distribution is no worse following a change, the Kaldor-Hicks suggestion provides a satisfactory criterion. This criterion, however, tells nothing about the case where income distribution is considered to have worsened.⁸

A very strong position against considering income distributional effects in measuring economic welfare is taken by Harberger who proposes that only three basic postulates should be accepted as a conventional framework for applied welfare economics. The postulates are:

⁸I. M. D. Little, A Critique of Welfare Economics (London: Oxford University Press, 1957), pp. 92-95.

- a. The competitive demand price for a given unit measures the value of that unit to the demander.
- b. The competitive supply price for a given unit measures the value of that unit to the supplier.
- c. When evaluating the net benefit or costs of a given action (project, program or policy), the costs and benefits accruing to each member of the relevant group (e.g. a nation) should normally be added without regard to the individual(s) to whom they accrue.⁹

Harberger further argues that the effects on income distribution must be presented separately from efficiency and other policy goals and that the economist is not professionally qualified to make judgments on income distribution.

Implicit in Harberger's postulates is the assumption that at the time a given economic arrangement takes place the existing pattern of income distribution is optimal or that any change toward the optimal income distribution would not result in any significant alteration in the value to be attached to different goods.

III. GROWTH AND DISTRIBUTION

Independently of the approach taken to measure improvements in economic welfare, one fundamental question to be raised is whether egalitarian measures do improve the wealth of a nation and if the actions taken to reduce income inequalities necessarily improve the lot of the poor in the long run.

Belassa reports that in countries such as Argentina and Uruguay in Latin America, and Sri Lanka and India in Asia, which adopted egalitarian

⁹Arnold Harberger and others, Benefit Cost Analysis an Aldine Annual (Chicago: Markham Publishing Company, 1971), p. 3.

policies, have experienced low rates of economic growth and very slow improvements in the living conditions of the poor, while countries like Hong-Kong, Korea, and Taiwan with policies oriented toward rapid economic growth have brought substantial increases in the income level of the poor.¹⁰

Of course, the question is not whether growth is more important than distribution but rather how to deal with distributional considerations in project appraisal once the government has decided to do so through investments.

A country may have alternative policy instruments that can improve income distribution and which are less costly in terms of loss of output than project choice, but usually the government cannot use these tools as a means of income redistribution. In Venezuela, for example, as it is the case in most of the developing countries, although there are several fiscal measures and other means that could be used to achieve income distribution, the government is unable (or even unwilling), for a variety of political and social reasons, to employ them. Thus the burden of achieving income redistribution should, in the author's opinion, fall on public investment, and in consequence the study of this subject should be an important part of the estimates and methodological considerations to which this work addresses.

The country has several other objectives different from income redistribution such as a more efficient agricultural sector and full employment, but which in the end are only means to attain more fundamental

¹⁰Balassa, p. 20.

objectives that usually relate to the distribution of consumption both over time and at the present. Thus, in the remainder of this work these two aspects of consumption—that is, its intertemporal and interpersonal distribution—as seen by the government—will form the basis of the welfare function to be employed. This approach will allow focusing on the crucial tradeoff between growth (the transformation of present consumption into future consumption) and the redistribution of present consumption (the transfer of consumption from the rich to the poor).

CHAPTER III

THE NATURE AND IMPLICATIONS OF THE PRODUCTS AND FACTOR MARKETS DISEQUILIBRIA IN THE VENEZUELAN ECONOMY

In an economy with a perfect market for all goods, with no uncertainty about future tastes and technology, market prices correctly measure the willingness to pay of all consumers (producers) for marginal changes in the availability of goods. Thus the allocation of resources on the basis of market prices of all goods and factors would result in Pareto optimality for a given income distribution.¹ However, to the extent that perfect competition does not hold, which is the usual situation—and certainly it is the case in the Venezuelan economy due to the existence of tariffs and taxes, subsidies, externalities, and institutional and legal constraints—market prices will no longer equate and equal the marginal social cost (MSC) of producing and the marginal social value (MSV) of using the relevant goods and factors. Under these circumstances, market prices may equal the MSV or MSC of the relevant commodities or may not equal either, depending on the nature of the distortion causing the market disequilibria. Consequently, the use of these prices to value the stream of benefits and costs characteristic of

¹Pareto optimality requires that for a given distribution of income: (1) the marginal rates of transformation in production of different commodities are equal to their marginal rates of substitution in consumption, (2) the marginal rates of substitution between any pair of factors are the same in all industries in which they are used, and (3) the marginal rates of substitution of any pair of commodities is the same for all the individuals consuming both goods.

any economic rearrangements, proposed or underway (e.g., an investment project) will lead to mistaken project choices. This will be true independently of the welfare criterion to be used.

The problem then consists in adjusting the market prices to obtain the relevant "prices" which are needed in investment appraisals and which will truly measure the real marginal utilities and marginal costs of outputs and inputs in the economy. These "prices," to be determined, are usually called shadow prices or "economic" (efficiency) and "social" (distribution) prices, or "accounting" prices.

The use of the prices that would result were the economy in competitive equilibrium have been recommended in project evaluation by several economists. These prices, however, called "first best shadow prices," measure the marginal utilities and marginal costs of inputs and outputs only if the economy has reached equilibrium by the time the proposed investment is implemented. If market disequilibria persist during the lifetime of a project (the next ten to twenty years at least), which is the main assumption behind this work, these first best shadow prices measure neither marginal utilities nor marginal costs of goods and factors. Instead, it becomes necessary to derive "second best shadow prices" which would measure the marginal social cost and marginal social utilities of the inputs and outputs under the distorted conditions which in fact will exist in the future (second best conditions). Of course, these second best shadow prices are not constant; they will change over time as a result of shifts in the disequilibria and interplay of the various markets of the economy.

The shadow prices which depend on future conditions, particularly on future policies, are hard to define and to estimate.² As was mentioned before, as the government policy changes, so will the distortions of the markets and the relative scarcities of inputs and outputs in the economy. On the other hand, the systematic use of shadow prices for investment would gradually change the economic conditions on which the policy operates, thereby affecting the variables which determine the shadow prices in the future.

Although the author recognizes that shadow prices vary over time the changes in government policies and the characteristics of the Venezuelan political system make it difficult to estimate the time profiles of the necessary shadow prices. Consequently, this work does not dedicate efforts to this matter.

I. MARKET IMPERFECTIONS

The distortions causing divergence between market prices and marginal social costs or marginal social utilities, have existed in the Venezuelan economy for a long time and they are expected to continue to exist in the future. A very important distortion is created by the presence of taxes and tariffs. A tariff creates a gap between the marginal social benefit of an increase of the consumption of the good subject to the tariff and the marginal social cost of the increase in

²The desirability of using shadow prices that vary over time was suggested many years ago by Harberger however, the existing second best general disequilibrium methodology does not spell out the factors determining them.

exports resulting from the imports of the good (or the reduction in the imports of another tariff-free good).

Market distortions can also be brought about because of the small number and/or type of organization of buyers and sellers in the market. A typical case is the presence of monopolies and/or the situation where production is confined to a very small number of large domestic firms. In these cases, the marginal social cost of an increase in production is less than the marginal social benefits. Another important imperfection in developing countries is caused as a result of the organization of sellers. This is a peculiar characteristic of the labor market in which the wages in the organized sector may be several times higher than in the unorganized sector.

Externalities and institutional and legal constraints are also important causes of market distortions. Externalities arise when in the production process some inputs and/or outputs are treated as free goods when in fact there is a social cost attached to them. Legal and institutional constraints such as minimum wage legislation and interest ceilings also create serious distortions between the scarcity prices and market prices.

In the following chapters the question of how to account for these market imperfections, as they occur in Venezuela, will be considered in detail.

II. THE GENERAL DISEQUILIBRIUM

In this section an attempt is made to present some aspects of the form of the disequilibria in some of the markets of the Venezuelan economy.³

Disequilibrium in the Market for Foreign Exchange

In this market the supply of foreign exchange is mainly generated from two sources: (1) by the interaction of a supply curve of exports and an officially established exchange rate, and (2) by the interaction of a supply curve of private capital market inflow and the official exchange rate. At the official exchange rate, the quantity of foreign exchange demanded would exceed the availability of foreign exchange. However, through demand and tariff policies demand for imports has been drastically reduced, thus equaling the total supply of foreign exchange.⁴ Under these circumstances, a competitive equilibrium price is not attainable and as long as a tariff exists a differential is maintained between the price of foreign exchange received by exporters and other suppliers and the price paid by importers.

³The approach used to analyze the disequilibria of the markets examined is based on the methodological considerations suggested by Daniel Schydrowsky in a speech given to technicians of the Inter American Development Bank in Washington, D.C., in May 1972. His speech dealt with the evaluation of projects in economies in general disequilibrium, as fulfillment of a research work supported by the Inter American Development Bank.

⁴Previous to 1974, the structure of tariffs in the country was the result of historical and isolated attempts to raise revenue rather than to influence internal production. During the last three years, however, a more serious attempt to influence imports and hence internal production through tariffs has been taken by the government.

In the foreseeable future, a free trade policy is not likely to be implemented in the country. Perhaps the tariff structure will become more uniform. The official exchange rate may be adjusted from time to time among other things to offset domestic inflation. In fact, for several years the "bolivar" (national currency) has been fixed to the dollar without margins, while most currencies of the world have margins of about 2 percent above and below parity with the dollar. The consequence of this policy is that today the bolivar is floating indirectly on the foreign exchange markets of the world for reasons that are completely unconnected with Venezuela's economic realities. The fall in the dollar value in the mid-1977 in terms of other currencies however, has necessitated new solutions, especially a possibility either to link the bolivar to the European "currency group" or else to create for the country a new currency basket composed of the weighted average of the country's trade partners' currencies in which the weight is restricted to the import structure and not to the entire trade pattern.

Whether Venezuela will change its exchange rate policy or continue with the one it has been pursuing for the last several decades prior to this study is something for which there is not any clear indication at the time.

Disequilibrium in the Labor Market

In this section only a general and brief indication of the disequilibrium in the Venezuelan labor market will be presented. A more detailed consideration of this theme will be undertaken in Chapter VII.

The Venezuelan labor market consists of several submarkets (public workers, oil workers, industrial workers, rural workers) governed by different institutional arrangements regarding wages, cost of labor, skills, and mobility. Regardless of these submarkets one can easily distinguish a "protected" sector of the labor market in which the wages are kept above the supply market price through minimum wage legislation, industry hiring policy, and union-management contracts. In this sector overmanning is a salient feature since much of the labor force is employed in unproductive work. There is also an urban free market—the "nonprotected sector"—in which wages are not (or are only partially) affected by minimum wage legislation; besides, much of the labor income comes from self employment, e.g., street vending (buhoneros). In this market there is some open unemployment. Finally, there is a traditional rural sector in which there are several forms of remunerating the workers depending on whether they are part-time or full-time workers or simply receive some customary wages (e.g., a fixed share of the crop).

When a new job is created in the protected sector, workers are drawn in from the free urban sector (and from the traditional rural sector, particularly if industrial agriculture is the demander). Moreover, emigration takes place from the rural to the free urban center; however, this does not assure that the equilibrium between income foregone and expected income will be achieved.

The existing disequilibrium in the labor market brought about by government regulations and union contracts are disappearing as a result of the rapid economic growth brought about as a result of the significant increase in oil prices and revenues. This has contributed to an increased

overall demand and high growth in other sectors of the economy. Thus in most of the regions of the country there has been a gradual shift to the right of the demand curve for skilled labor up to the point that the institutional and legal binds no longer keep the wage above the market clearing price. This is particularly true in the Guayana region, in the central industrialized centers of Valencia and Maracay, and in Caracas, as well as many other regions and areas directly affected by the 1976-1980 government investment plan.

Disequilibria in the Market for Savings

The detailed analysis of this topic will be developed in Chapter V. In this section, a brief consideration on the nature of the disequilibria in the savings market will be presented.

Venezuela does not have a single market to which all savings accrue and from which all investments flow and in which the quantities supplied and demanded are equated by a market interest rate. Instead, the market is segmented both on the demand and on the supply side. At the low end of the supply side are the group of savers who have no other alternative than accumulating cash and who get a negative rate of interest as the price level is rising. At the other end of the yield spectrum is the group of savers who are able to channel their savings toward their own enterprises and whose return depends on the profitability of their own submarket (their business).

Between these two groups are a variety of financial submarkets comprising bank savings deposits, time deposits, time deposits certificates, insurance policies, and mortgage bonds. These yield a

variety of rates of return, all of them higher than the return obtained by savers holding money, but all of them lower than the return attainable by savers who invest in their own business.

Savers investing in self-owned enterprises have access to all the other ways of saving while savers in other categories do not have the option to move up the ladder. Thus, at any time it is possible for any saver to use other financial instruments to save and obtain a return lower than that attained in his own submarket, but it is much more difficult to move upward to a higher yielding market.

The savings demand is also fragmented. On the one hand are the government investments which actually exceed government savings. On the other are the private investors who have a net demand of financial resources arising from the residual demand after their own savings have been invested.

At the prevailing rates in the market paid to savers who have no business, there is an excess demand for savings. In a competitive situation this average rate must go up until equilibrium is reached; otherwise borrowing must be limited. Under the existing structure in the country, however, both the borrowing rates and the lending rates of the financial system are subject to maxima imposed by the Central Bank authorities. These rate ceilings are set independent of any social benefit criterion and consequently, since the interest rate cannot rise to clear the market, borrowing has to be limited in some submarkets to some investors through various mechanisms.

If this market were in equilibrium (not fragmented) the interest rate received by savers would be the same on all savings (except for

risk and liquidity considerations) and it would reflect the time preference of consumer-savers and the productivity of capital. Under the existing distorted condition (disequilibria) the interest rate does not reflect these concepts since the lack of equilibrium means that the marginal rate of transformation of consumption in one period into consumption in another period will not be equal to the marginal rate of substitution of consumption through time (as seen by the consumers).⁵

In the near future no major government policy changes are expected to curve the existing disequilibrium in the savings market. Perhaps the market segmentation may be reduced somewhat and capital inflows will increase but the disequilibrium is expected to persist. Thus, it is necessary to define for the country some indicative measure of its productivity of capital and the time preference of the consumers.

Other Disequilibria

Another important disequilibrium is that with regard to government revenue and expenditure. The level of taxation in the country excluding petroleum is very low. Indeed, the tax burden excluding petroleum, measured as the ratio of nonpetroleum taxes to nonpetroleum GNP, is at present about 7.7 percent, which is a very low coefficient by any standard. In fact, it is lower than in most Latin American countries.

⁵Otto Eckstein, "Investment Criteria for Economic Development and the Theory of Intertemporal Welfare Economies," Quarterly Journal of Economics, 71(Feb. 1957); M. S. Feldstein, "The Social Time Preference Discount Rate in Cost Benefit Analysis," Economic Journal, 74(June 1964); Stephen Marglin, "The Social Rate of Discount and the Optimal Rate of Investment," Quarterly Journal of Economics, 77(Feb. 1963); and Stephen Marglin, "The Opportunity Cost of Public Investment," Quarterly Journal of Economics, 77(May 1963).

For several decades oil revenues have been the main source for financing Venezuela's public expenditures with the result that the marginal consumption equivalent gained from government expenditures seems to be greater than the marginal consumption given up due to tax revenue.

This disequilibrium in the fiscal sector is expected to continue for several years and it will narrow in accordance with the revenue and expenditure elasticities of the fiscal system. In the middle run (1980) it is expected that the petroleum revenues would be inadequate to finance fully the public investment program. Hence, a tax reform is essential in view of Venezuela's future economic prospects and objectives. Of course, the gap may widen or narrow depending not only on the elasticity of revenues but also on how the new tax effort is absorbed (for investment or current expenditures).

III. VALUATION AND SHADOW PRICES

Although several market distortions are found in the country, only those aspects related to the derivation of disequilibrium shadow price of foreign exchange, unskilled labor, and time and capital will be explicitly dealt with in this work. Attention will also be paid to the integration of efficiency and equity in project selection; that is, the distributional effects of investments. To this end, considerable extension and adaptation of the theory developed by Little and Mirrlees will need to be undertaken throughout the discussion. Other methods that may be feasible for estimating these shadow prices, particularly the UNIDO approach, will also be reviewed.

Shadow prices are defined here as the value of the contribution to reach the socioeconomic objectives of the country, brought about by any marginal change in the availability of goods and factors of production.

Just as the economy consists of a set of interrelated markets which must be analyzed in a general equilibrium framework, so also are accounting prices. Ideally, one should therefore apply general equilibrium analysis but it is doubted that a general equilibrium model sufficiently disaggregated for this purpose is likely to be produced in the foreseeable future. Hence, the development of the shadow price estimates in this work will correspond to a partial equilibrium or disequilibrium analysis and they relate to an economic environment in which distortions are expected to persist.

IV. AN INTRODUCTION TO THE METHOD USED

The Numeraire

The parameters to be developed in this work following the theory developed by Little and Mirrlees (LM) and reinterpreted by Squire and van der Tak⁶ are designed to put all of the values which will be encountered in a project evaluation in terms of a numeraire: present value of uncommitted government income measured in foreign exchange. Indeed, from a mathematical, technical and economic point of view it makes no difference what numeraire is chosen, provided one uses the appropriate discount rate. Some numeraires, however, are easier to understand and work with than others.

⁶Squire and van der Tak, pp. 145-151.

In the UNIDO Guidelines aggregate consumption is used as a numeraire.⁷ This choice, however, is open to serious objections since the consumption of different economic groups should be given different weights, which conflict with the principle that different units of the numeraire should be equally valuable. If consumption were to be used as the numeraire, it should be specified in terms of some average or some particular group of individuals.

Aggregate consumption is a slippery concept since it is very difficult to get a real number to represent a heterogeneous set of consumer goods. In the UNIDO Guidelines the authors propose to perform the aggregation in terms of the consumers' willingness to pay. That is, the term aggregate consumption is reserved in the Guidelines to measure the value of consumption as consumers see it and the corrections of consumers' personal evaluations according to the authors can be done through considerations of separate objectives or through corrections of the measure of aggregate consumption in itself.⁸

The LM uncommitted social income is expressed in terms of "border prices" (foreign exchange) which is converted into domestic currencies at the official exchange rate (OER).⁹

Since loans account for a large part of the public and private investment in the country, the use of the LM numeraire makes the

⁷UNIDO Guidelines, p. 39.

⁸Ibid., pp. 39-40.

⁹Any exchange rate will do as well, provided it will be used consistently for all conversions.

accounting rate of interest directly comparable with interest on loans payable in foreign currency and with the public lending program abroad. Another advantage of using "uncommitted government income," rather than consumption, is that it allows the expression of the net benefits of a project in terms of something in which decision-makers are constantly thinking about, i.e., savings.

The approach to be used to measure the scarcity value of inputs and outputs recognizes that the net benefits of a project might have different values depending on whether they are:

1. Measured in market prices or in efficiency prices;
2. Realized today or in the future;
3. Saved or consumed; and
4. Accrue to a specific group in the private sector or to the public sector.

Market Prices versus Shadow Prices

If the benefits or costs of a project are measured market prices, their value could be overstated or understated in comparison to its real economic price. Thus, they must be either revalued directly using border prices or be converted to border prices by multiplying them by individual conversion factors (β) or a standard conversion factor which allows expressing them in terms of the chosen numeraire. Conversion factors are discussed in detail in Chapter IV.

Present versus Future Benefits

Several discount rates can be used to obtain the equivalent present value of benefits which are realized sometime in the future. If the

benefits are expressed in terms of consumption, the consumption rate of interest (CRI) will be the relevant rate to discount the benefits to the present. If benefits are expressed in terms of units of public income the economic shadow rate of interest (ESRI) or the social shadow rate of interest (SSRI) are the most appropriate rates to use.

Savings versus Consumption

In general the net present value of consumption obtained by investing now and consuming later seems to be greater than the net present benefit that could be obtained by consuming immediately. This means that savings are in general more valuable than consumption; hence resources saved should be credited with a premium over those which are consumed at once. The public sector may invest in many fields—education, agriculture, health, industrial production. Even though some government funds might get committed to uses which are less valuable than others, the view is taken that projects cannot be distinguished from each other on this ground and that it is simpler to assume that all uses are equally valuable in prospect. One could then concentrate on a given investment project and consider how one could estimate the social value of funds devoted to that project.¹⁰

Private Consumption versus Government Income

Since the consumption equivalent of marginal tax revenue seems to be lower than the consumption equivalent of marginal government

¹⁰Little and Mirrlees, p. 246.

expenditure, there is the need to distinguish whether consumption benefits are in the hands of the private sector or in the hands of the government.

It is not expected that the government will tax the private sector up to the point of reaching the optimal taxation level. On the contrary the gap may widen or narrow at various rates. Therefore, there is a need to add a premium on income in the hands of the government. The approach taken in this study (Chapter VI) will be to discount private consumption benefits by dividing these by the social value of the public income (V)—the private consumption equivalent of a unit of government income, rather than multiplying government income by a given weight as to credited with a premium.

Distributional Effects

If society feels that an additional unit of consumption in the hands of a poor man provides more additional utility than it would in the hands of a rich man it becomes necessary to adjust the consumption accruing to specific groups in terms of the marginal utility of an additional unit of consumption going to a person at the average level of consumption. To do so consumption benefits can be weighted by the ratio of the marginal utility of an additional unit of consumption going to the i^{th} consumption group to the marginal utility of an additional unit of consumption going to someone at the average consumption group. By multiplying the benefits accruing to the i^{th} consumption group by the distribution weight attached to a particular level of consumption (d_i), one is able to express this consumption in terms of the value of an additional unit

of consumption in the hands of the average group. The value of d_i could be greater than or less than one depending upon whether the i^{th} group's income before the project is greater or less than that of the average income group.

CHAPTER IV

THE SHADOW PRICE OF FOREIGN EXCHANGE

This chapter is mainly concerned with the empirical estimation of the shadow price of foreign exchange in Venezuela where the existing trade controls, mostly for protective purposes, had distorted the relative price structure in this market up to the point that the resulting resources allocation based on the domestic prices is suboptimal in terms of maximizing welfare. Thus, in making future investment decisions, "second best shadow prices" which reflect the true social cost and benefit of inputs and outputs should be used rather than the existing market prices.

A number of ways in which the trade distortions can be taken into account in project analysis had been suggested in the literature.¹ It is very difficult to say that a certain approach is better than another; it will all depend on the nature of the distortions and the specific

¹Edmar Bacha and Lance Taylor, "Foreign Exchange Shadow Prices: A Critical Review of Current Theories," Quarterly Journal of Economics, 85(2), (May 1971); A Kruger, "Some Economic Costs of Exchange Control: The Turkish Case," Journal of Political Economy, 74(October 1966); I. M. D. Little and J. A. Mirrlees, Manual of Industrial Project Analysis in Developing Countries, Vol. II. Social Cost Benefit Analysis (Paris: Development Center of the Organization for Economic Cooperation and Development, 1969); Daniel Schydrowsky, "Methodology for the Empirical Estimation of Shadow Prices," Boston University Discussion Paper Series Number 2, April, 1973; and UNIDO Guidelines.

situation of each country. In the case of Venezuela, where tariffs are the main source of distortions, and due to the lack of reliable data to use other approaches it seems adequate to analyze the problem of the distortion found in the foreign exchange market by the use of the LM method. Other methodologies, however, will also be discussed in detail.²

I. THE LM METHOD

The approach suggested by Little and Mirrlees, partially shared by the authors of the UNIDO Guidelines, proposed that if all goods which an economy can produce can be exchanged on an external market where prices are independent of the actions of this particular participant, then the evaluation of these products can be made in terms of their value in exchange regardless of their value in use.

By referring to the world market (border prices) to estimate the social cost and value of goods and services, the opportunities for external exchange are fully exploited. Another justification for using world prices is based on the absorption approach to the balance of payments. No matter how suboptimal the existing resource allocation may be in the country, any change in production unaccompanied by a rise in internal expenditures or, vice versa, any increase in expenditure unaccompanied by a rise in production will always affect the balance of

²The lack of reliable statistics also makes it difficult to use other approaches.

trade. This means that the increase in production brought about by a project can always be valued in terms of foreign exchange.³

In simpler terms the procedure suggested by Little and Mirrlees (and by Squire and van der Tak) involves the separation of benefit and costs into traded goods, potentially traded and nontradable goods. The shadow prices suggested for traded goods are the border prices f.o.b., for exportable goods and c.i.f., for importable goods and marginal export revenue or marginal import cost if external demand or supply is less than perfectly elastic.⁴ The nonpotentially traded goods could be valued at border prices or treated as nontradable depending upon the feeling of the evaluator as to whether the existing trade policies are temporary, will continue, or are likely to be changed. The nontraded goods and factors should be broken down into their direct and indirect use of traded goods and domestic factors of production. The factors of production, whether they appear as direct or indirect inputs (contributing to the production of nontraded input), are to be valued in terms of their marginal productivity in the production elsewhere of traded goods; that

³Marginal revenue (cost) = price $[1 - (1/\eta)]$ where η is the elasticity of demand (supply).

⁴The idea is that international prices represent real opportunities for the economy. Besides the rate at which it is possible to substitute one good for another at the relative world prices does not depend on the official exchange rate, which avoids in principle dependence on the OER which is often undervalued.

is, in terms of their alternative contribution to foreign exchange earnings.⁵ Each of the mentioned categories will be briefly discussed.

Traded Commodities

Imported commodities for which the elasticity of world supply is infinite⁶ should be valued at the c.i.f. border prices plus the relevant marketing cost revalued at their respective shadow prices. Export commodities under this category should be costed at the f.o.b. price minus the marketing margin revalued at accounting prices. In these cases it is understood that the impact in the economy of an increase in demand for, or increase in supply of, a good is the increase in the availability of foreign exchange by an amount which can be meaningfully obtained by the use of the relevant border prices.

For those tradeable commodities which face finite elasticities, the appropriate account price to use is the marginal export (import) revenue (cost), which may be expressed as the border price multiplied by $(1 - 1/\eta)$ where η is the elasticity of foreign demand (supply).

⁵According to LM, marginal social cost (MSC) is the value in terms of shadow prices of the resources required to produce an extra unit of a desired commodity. The marginal social benefit (MSB) is the benefit valued in social terms derived from supplying the economy an extra unit of a commodity.

⁶The infinite elasticity assures that domestic prices and hence domestic consumption and production remains unchanged.

Potentially Traded Commodities

This category includes the output of protected (with tariffs, quotas) industries whose marginal cost of increasing domestic production exceeds the importing cost. Under this case, to price an input supplied by any of these industries one must try to predict whether the supplier will be the lowest cost supplier and price the input in terms of the cost of that supply. If the supplier is the high cost domestic producer, the input has to be considered as a nontradable. However, if the input is produced by an industry which enjoys only temporary protection while it can efficiently compete against imports, then such input should be costed at border prices.

Nontraded Commodities

In this group fall those commodities having domestic supply prices which are below the c.i.f. prices but above the f.o.b. prices. Two basic cases can be distinguished. If an increase in demand for nontraded goods is satisfied by additional domestic supply maintaining the same price, then the relevant accounting price is the marginal social (MSC) of the increased production. To measure the relevant MSC, the nontraded good should be broken down into the different resources used in producing that good. Some of these inputs will be traded goods whose shadow price will be measured as it was mentioned before; others will be primary factors, such as labor, which should also be revalued at its relevant shadow price (see Chapter VII). Other inputs could be nontradable inputs which should in turn be evaluated through further decomposition until

everything is classified into traded goods and domestic factors of production. The shadow price of factors in fixed supply (land, minerals) is the opportunity cost to the economy of using these factors in terms of foreign exchange.

If the increase in demand, however, is satisfied by sacrificing consumption elsewhere in the economy the relevant shadow price is the foregone marginal social benefit (MSB) in consumption which can be measured for commodities entering final consumption by adding the losses in consumer surplus expressed or revalued in terms of the numeraire, and for intermediate, by estimating the social profit foregone. Under both cases allowances should be made for any reallocation of expenditure induced by the price rise. Also any social cost (benefit) transfer of income from consumers to producer has to be considered in the manner described in Chapter VI.

Conversion Factors

Conversion factors (CF) are a useful tool to change the value of nontraded goods (costs and benefits) measured at domestic market prices into their equivalent value at shadow prices (border prices). General CF are calculated for all goods, first of all, Standard Conversion Factor— α —or SCR, and then, several specific conversion factors for consumption goods, for intermediate and capital goods. In addition, conversion factors should also be estimated for specific nontraded goods and services such as transport, construction, electricity, and water supply. All these conversion factors seek to express in foreign exchange equivalent the marginal cost of producing these goods in the economy.

Relation between the Standard Conversion Factor
and the Shadow Exchange Rate

The ratio of the value at border prices of all exports and imports to their values at domestic prices bears a close relation to the concept of shadow exchange rate (ratio of the shadow to the official exchange rate) used to revalue a specific traded commodity in terms of its domestic currency, value at shadow instead of market prices.⁷ The relation is⁸

$$\frac{OER}{SCF} = SER, \quad (4-1)$$

where

SCF = standard conversion factor,

OER = official exchange rate, and

SER = shadow exchange rate.

According to equation 4-1 the SER concept combines two steps:

(1) transforms domestic prices into border prices, and (2) expresses that result in units of foreign exchange.

Standard Conversion Factor (SCF = α)

The SCF is used to provide the shadow price of goods which cannot be revalued at border prices because of lack of reliable statistics or lack of time. As a starting point, the general formula for conversion factor can be expressed as:

⁷This approach is followed among others by the UNIDO Guidelines where consumption measured at domestic price is the numeraire.

⁸Squire and van der Tak, p. 93.

$$\alpha = \sum X_J \Theta_J / P_J, \quad (4-2)$$

where

X_J = proportion of marginal expenditure devoted to the J^{th} commodity ($\sum X_J = 1$),

Θ_J = the shadow price, and

P_J = market price of the J^{th} commodity.

If it is assumed that export demand and import supply are infinitely elastic, that marginal changes in expenditures on nontraded goods is negligible (particularly true if X_J for nontraded is small or if Θ_J/P_J for nontradables is equal to the SCF), that income elasticities of total spending are unitary and/or that the average marginal propensities to spend on imported and exportable goods can be approximated by the relative size of imports and exports, equation 4-2 could be expressed as

$$\alpha = \frac{M + X}{M(1 + t_m) + X(1 - t_x)}, \quad (4-3)$$

where

α = SCF = ratio of the OER to the shadow exchange rate,

M = c.i.f. value of imports,

X = f.o.b. value of exports,

t_m = average tax on imports, and

t_x = average tax on exports.

Another way of arriving at equation 4-3 is by referring to the approach used by Balassa to measure the marginal value of foreign

exchange expressed as a percentage of the actual rate.⁹ The equation is

$$d = \frac{\sum_i EX_i (1 + S) + \sum_i \eta M_i (1 + T)}{\sum_i EX_i + \sum_i \eta M_i}, \quad (4-4)$$

where

d = conversion ratio,

E = elasticity of exports,

η = elasticity of imports,

X_i = value of exports of i number of goods (under protection),

M_i = value of imports of i number of goods (under protection),

T = ad valorem rates of tariffs, or the tariff equivalent of quantity restrictions, and

S = rate of export subsidies.

By inverting equation 4-4 and using values of tax instead of tax rates (t_x taxes or subsidies on export and t_m taxes on imports) one obtains the following relation:

$$\alpha = \frac{\sum_i EX_i + \sum_i \eta M_i}{\sum_i EX_i (1 - t_x) + \sum_i \eta M_i (T + t_m)}, \quad (4-5)$$

which expresses the average of the ratio of world to domestic prices of imports and exports weighed by the rates of protection of imports and

⁹Bela Belassa, "Estimating the Shadow Price of Foreign Exchange in Project Appraisal," Oxford Economic Papers, 26(2) (July 1974), 162-163.

exports, the weights being the relevant elasticities. According to Balassa this is a second best situation, and different weights should be used if it is assumed that this market will move to a first best or free trade position.¹⁰

Balassa's formula assumes that any amount of additional foreign exchange made available by a project leads to changes in the exchange rate and that a unit change in foreign exchange is distributed between an increase in imports and a decrease in exports in proportion to the relevant elasticities of demand for and supply of foreign exchange. However, this is not necessarily true. In fact, if the extra units of foreign exchange are used by the government to increase investment, no adjustment of the exchange rate has to take place; hence Balassa's assumption can be dropped. Besides, in light of the difficulty of estimating import and export elasticities and because of lack of statistics, one can assume that the elasticities all equal one. Under both cases ($\eta = 1$ or dropping Balassa's assumption) equation 4-4 reduces to:

$$\alpha = \frac{M + X}{(M + t_m) + (X - t_x)}, \quad (4-6)$$

where $\alpha = d$.

The numerator of equation 4-6 (and 4-3) is the foreign exchange value of the traded goods (border prices) and the denominator is the

¹⁰Balassa, Estimating Shadow Price of Foreign Exchange, 163. For a second best solution one should use point elasticities and arc elasticities in estimating the first best.

value of the same goods at domestic prices (excluding transport and marketing margins). Any quantitative trade restriction can be met by including an additional term in equation 4-6, say tQ_m , reflecting the tariff equivalent of quantitative restriction.¹¹

If one assumes that all exportables are exported (the marginal expenditure on export items at domestic prices is negligible) and that the income elasticity for import commodities are all unity the formula 4-6 can be further simplified to:

$$\alpha = \frac{M}{M + t_m} . \quad (4-7)$$

Conversion Factor for Consumption (β_c),
Intermediate (β_I), and Capital Goods (β_k)

Conversion factors could also be estimated from trade data for consumption (β_c) and for intermediate (β_I) and capital goods (β_k) provided that the relevant statistics are available. Estimates of β_c could be obtained by using consumption weights from a consumer's budget survey.

Conversion Factors for Nontradables

Although in many cases the accounting price of a nontraded good can be estimated by calculating its MSC, in a number of cases it will be very difficult to do so with the required accuracy. For example, the exact amount of inputs required in the production of a nontradable good will be hard to obtain unless a great deal of research is accomplished.

¹¹It can be calculated expressing the border price of the good(s) subject to a quota as a percentage of the retail market price less transport, handling, and marketing margin.

For this reason it is convenient to estimate specific conversion factors which provide a short cut to shadow price nontradable inputs such as electricity and construction. If there is a conversion factor for electricity, there is no need to work out the cost of generating one Kwh, the actual market cost can be multiplied simply by the electricity conversion factor. The procedure to estimate the conversion factors for nontradables is as follows:

1. Breakdown current and capital cost of 100 "bolivares" of the nontradable by its input;
2. Apply appropriate conversion factor to each input to obtain foreign exchange, equivalent cost;
3. Sum the economic cost of each input to obtain economic cost of 100 bolivares of the nontradable; and
4. Divide the economic cost by 100 to obtain conversion factor for the nontradable.

II. SOME ALTERNATIVE PROCEDURES TO ESTIMATE THE SHADOW EXCHANGE RATE

The UNIDO Approach

The UNIDO procedure only corrects for the distortions in relative prices within the traded good sector. To do so, it derives the SER as the MSV of foreign exchange in the protective (quotas, tariffs) situation which then apply to all items in a project that have directly or indirectly involved foreign exchange.

Traded Goods

To obtain the shadow price of a traded good the UNIDO Guidelines use border prices multiplied by the shadow exchange rate.

Nontraded Goods

To measure the value of an increase in production of nontraded goods the UNIDO Guidelines suggest the use of market prices provided that in the market competitive conditions prevailed. In the presence of any market imperfection (monopsony, rationing) it is necessary to correct the market price to reflect the consumer willingness to pay under the prevailing market conditions (shadow price).

For nontraded inputs whose purchase results in a reduction in the total supply of such inputs to the rest of the economy, their market prices (gross of tax) should be used as shadow prices provided that there are not imperfections in the market. If the demand for nontraded inputs gives rise to additional supplies in the same amount as required, UNIDO suggests to use the cost of supply of these inputs (net of tax) as their shadow prices, i.e., the costs of the resources used in producing the inputs.

The UNIDO Proposition to Measure the Shadow Exchange Rate¹²

Assuming that additional units of foreign exchange affect only the level of imports, the value of the SER can be calculated as follows:

¹²UNIDO Guidelines, pp. 213-220.

$$P_f^S = \sum_i \alpha_i \frac{P_i^{DOM}}{P_i^{CIF}}; \sum \alpha_i = 1, \quad (4-8)$$

where

P_f^S = shadow price of foreign exchange,

α_i = fraction of the increase in foreign exchange allocated to the i^{th} of n commodities at the margin,¹³

P_i^{DOM} domestic market clearing price, and

P_i^{CIF} = CIF price in national currency calculated at the official rate of exchange.

According to equation 4-8 the amount of goods and services that can be acquired with an extra unit of foreign exchange is $(\sum_i \alpha_i 1/P_i^{CIF})$ and the value to the consumer is this amount multiplied by the domestic market-clearing price of the i^{th} import; that is $\sum_i \alpha_i P_i^{DOM}/P_i^{CIF}$.

The formula does not include the imports of capital goods which explains why it is considered that P_i^{DOM} accurately reflects the marginal willingness to pay for the i^{th} import. Otherwise, it will be necessary to include the net present value of the consumption flow which a unit of capital good is able to generate throughout the time and which will differ from the domestic price due to discrepancies between the social rate of discount, the marginal productivity of capital, and the existing market rates of interest in the capital market.

¹³The presence of α_i 's means that the formula is based on actual and projected trade policies, not on optimal policies.

The proposition that the unique effect of the availability of additional units of foreign exchange is to increase the level of imports in the economy means that relative prices do not change, neither is there any effect on the internal production of goods and services. Hence, an increase in imports will be possible only if either the level of effective global demand rises (at the same relevant prices) or the relative price of imports decreases. Each case will be discussed in turn.

Changes in the level of effective demand. In most of the developing countries, with very few exceptions, the increase in foreign exchange earnings is mostly utilized to expand imports through an increase in effective demand, holding constant the rate of exchange. In this case, equation 4-8 adequately measures the shadow price of foreign exchange even though it excludes the imports of capital goods under the assumption that what limits growth is not the lack of foreign exchange to import capital goods but rather an inadequate savings structure.

It should be noticed however, that the increase in aggregate demand needed to absorb the additional imports will generate a higher level of domestic activity which affects the national production of goods and services. On the other hand, government expenditure may also rise as a result of the increase in custom duties. Since none of these effects are reflected in equation 4-8 it must be considered as a simple approximation of the exact estimate of the SER.

Change in relative prices. Another possible, but not frequent, effect of earning additional foreign exchange is that it allows changes

in the official exchange rate or downward adjustments of the import tariffs. In this case, estimates of the SER should take into account the changes in the consumer surplus generated by the lower internal price of imports due to the lower tariff bill. As long as the change in consumer surplus is considered negligible, equation 4-8 is a good approximation of SER estimate.

If instead of lower tariffs there is a change in the official exchange rate, the imports as well as the exports will be affected (except the case of inelastic export supply). In this case equation 4-8 is only considered as a first approximation of the right estimate only.

Some special cases.

1. Only tariffs.

In the partial disequilibrium context, under perfect competition the marginal utility of imports in the absence of taxation is

$$U_m = \sum m_i P_i, \quad (4-9)$$

where

U_m = marginal utility of imports,

m_i = marginal import share of good i , and

P_i = demand price of good i .

If the only distortion between the market price and the world price is due to the presence of tariffs (the Venezuelan case, except for the presence of few occasional quota or barriers), the SER will be greater than the OER by an amount equal to the percentage of the custom bill to the total import bill in terms of marginal changes. That is:

$$P_i^{DOM} = R(1 + t_i)P_i^{CIF}, \quad (4-10)$$

where

R = official exchange rate,

t_i = ad valorem tariff on commodity i , and

P_i^{CIF} = CIF price of commodity i .

Bringing together equations 4-8 and 4-10 the value of the SER can be written as:

$$P_f^S = R \sum \alpha_i \frac{(1 + t_i)P_i^{CIF}}{P_i^{CIF}} = R(1 + \sum \alpha_i t_i), \quad (4-11)$$

where $\alpha_i t_i$ represents the increase, in the margin, of the custom duties as a proportion of the increase in total imports. Two major estimation methods of $\alpha_i t_i$ can be used:¹⁴

- (a) $\alpha_i t_i = \Delta \text{ tariff revenue} / \Delta \text{ imports}$ measured for a few discrete periods of time (a semester or a year) and then averaged;¹⁵ or
- (b) Performing a regression analysis of the form $T = a + bM$ where T = tariffs, M = total imports, and b is the percentage in which the SER is greater than the OER.

2. Additional earnings in foreign exchange affects imports and exports.

¹⁴Schydowsky, "Methodology for the Empirical Estimation of Shadow Prices," p. 75.

¹⁵If it is assumed that $\partial M_i / \partial M = M_i / M$ then $P_f^S = R(1 + \text{tariff revenues/imports})$. This is a simpler formula but less accurate.

$$P_f^S = \sum_i \alpha_i \frac{P_i^{DOM}}{P_i^{CIF}} + \sum_j \beta_j \frac{P_j^{DOM}}{P_j^{FOB}}, \quad (4-12)$$

where

β_j = proportion in which export of item j is reduced as earnings in foreign exchange increase, and

P_j^{FOB} = international (fob) price of good j .

Equation 4-12 differs from equation 4-8 in that it adds the effect of diminishing export as a consequence of having earned additional units of foreign exchange. Less exports are possible only if export subsidies are reduced or if there is a revaluation of the exchange rate.

3. Tariffs and export subsidies.

In the presence of import tariffs and export subsidies the SER will be greater than the OER in the same proportion (percentage) in which the tariff revenue increase raises imports plus the percentage by which lesser subsidies diminish total exports. Hence:

$$P_i^{DOM} = R(1 + t_i)P_i^{CIF}, \quad (4-13)$$

$$P_j^{DOM} = R(1 + S_j)P_j^{FOB}, \quad (4-14)$$

$$P_f^S = \sum_i \alpha_i \frac{P_i^{DOM}}{P_i^{CIF}} + \sum_j \beta_j \frac{P_j^{DOM}}{P_j^{FOB}}, \quad (4-15)$$

$$P_f^S = R[\sum_i \alpha_i (1 + t_i) + \sum_j \beta_j (1 + S_j)], \quad (4-16)$$

since $\sum_i \alpha_i = \sum_j \beta_j = 1,$ (4-17)

$$P_f^S = R[1 + \sum_i \alpha_i t_i + \sum_j \beta_j S_j], \quad (4-18)$$

where

$\sum \alpha_i t_i$ = change in tariff revenue as a percentage change in imports, and

$\sum \beta_j S_j$ = change in export subsidies as a percentage change in exports.

If it is further assumed that the marginal composition of exports and imports is similar to the average composition

$$P_f^S = R \left[1 + \frac{\text{tariffs}}{\text{imports}} + \frac{\text{subsidies}}{\text{exports}} \right].$$

As was mentioned, one way of estimating $\sum \alpha_i t_i$ and $\sum \beta_j S_j$ is by either measuring Δ tariff revenue/ Δ imports for discrete periods or by performing a regression analysis of the form $T = a + bM = SX$ (T = tariffs, M = imports, S = subsidies and X = exports). Another method is by estimating the demand and supply elasticities of imports and exports. In fact, the increase in foreign exchange will be distributed between greater imports and fewer exports in proportion to their respective elasticities. In this case, the SER is expressed as a weighted average between the import tariffs and the export subsidies, using the relevant elasticities as weights.¹⁶

$$P = R \left[\frac{\sum_i \theta_i M_i (1 + t_i) + \sum_j \eta_j X_j (1 + S_j)}{\sum_i \theta_i M_i + \sum_j \eta_j X_j} \right], \quad (4-20)$$

¹⁶ Arnold Harberger, Project Evaluation, Collected Papers (Chicago: Markham Publishing Company, [no date]), p. 52; Balasa, "Estimating Shadow Price of Foreign Exchange," 162.

$$P_f^S = R \left[1 + \frac{\sum \theta_i M_i t_i + \sum \eta_j X_j S_j}{\sum \theta_i M_i + \sum \eta_j X_j} \right], \quad (4-21)$$

where

P_f^S = shadow price of foreign exchange,

R = official exchange rate

θ_i = demand elasticity of imports (i),

M_i = imports of i,

t_i = import tariffs on i,

η_j = supply elasticity of exports (j),

X_j = exports of j, and

S_j = export subsidies.

Schydrowsky's Approach

The discussion so far has focused on the derivation of a partial disequilibrium shadow price of foreign exchange; that is, assuming that the economy is in competitive equilibrium everywhere except in the foreign exchange market. The Schydrowsky approach, on the contrary, attempts to derive SER estimates under a general disequilibrium setting incorporating not only the distortions in the various markets, but also weaving the markets together. The problem with this method, although it stands as the most operationally applicable work, is that it still requires considerable refinement before it can be applied to real world data.

Under general disequilibria conditions the marginal utility of foreign exchange (SER) will arise from two sources: (1) the marginal utility of the commodities (or services) into which it is embodied in

use, and (2) the change in welfare arising as resources associated with the pattern of foreign exchange are transferred from the private to the public sector.¹⁷

According to Schydrowsky, the economy can absorb an extra unit of foreign exchange either to (1) increase the reserves of foreign exchange, (2) increase its net capital outflow or decrease its net capital inflow, (3) increase imports, and (4) reduce exports. In practice foreign exchange is mostly used to expand imports: (1) import of consumption goods, (2) imports of intermediate goods, and (3) import of capital goods.¹⁸ In addition, it is necessary to take into account the increased government tax generated by additional imports. The summary expression for the shadow price of foreign exchange (the value of a marginal dollar) can be written as:

$$P_f^S = R_t \alpha t, \quad (4-22)$$

where

P_f^S = shadow price of foreign exchange,

R_t = financial exchange rate,

¹⁷Schydrowsky, "Methodology for the Empirical Estimation of Shadow Prices," p. 7.

¹⁸The use of additional units of foreign exchange to increase reserves is not common and can be disregarded (it could be true in the short run). Its use to affect the net capital flow is much more common; however, this case can be considered as a special one of the import of a capital good yielding a product equal to the interest rate earned or saved (reduction in capital inflow—debt—saves payments abroad, foreign investments allow earnings). The case of export reduction is not too feasible and if so it takes place without revaluation of the exchange rate which is most often set in accordance with the cost of export production of existing export industries (oil, for example).

α = premium of shadow rate, and

t = time subscript.

$$\alpha = m_c P_{m_c} + m_I P_{m_I} + m_k P_{m_k} + t_m PG, \quad (4-23)$$

where

m = marginal share of expenditure on (c = consumption, I = intermediate, k = capital goods) imports from total foreign exchange expenditure,

P_m = marginal social utility of dollars spent on consumption goods P_{m_c} , intermediate goods P_{m_I} , and capital goods, P_{m_k} ,

t_m = average tariff and other taxes on imports per extra unit of foreign exchange expenditure, and

PG = excess of social marginal utility of the fiscal bolivar (national currency) over the social marginal utility of a private bolivar.

Consumer Goods

The price of consumer goods under normal conditions can be formed with the elements shown in equation 4-24.

$$P_{m_c} = \text{CIF} + \text{duties} + \text{port charges} + \text{transportation costs} \\ + \text{marketing margin} + \text{sales taxes}. \quad (4-24)$$

If port charges transportation costs and marketing margins are regarded as real costs then 4-24 can be rewritten as follows:

$$P_{m_c} = \text{CIF} + \text{duties} + \text{pro-rata of sales tax}, \quad (4-25)$$

$$P_{m_c} = 1 + t_{mc} + (1 + t_{mc})S_c, \quad (4-26)$$

$$P_{mC} = (1 + t_{mC}) (1 + S_C), \quad (4-27)$$

where t_{mC} = weighted average of tariffs of consumer goods imports.

Intermediate Goods

The social marginal utility of intermediate goods results from (1) the social marginal product of imported intermediate goods, and (2) the social marginal product of previously unemployed domestic factors of production which result employed as the level of economic activity expands. In symbols

$$P_{mI} = (1 + t_{mI}) + \frac{dGNP}{dM_I} \left(1 - \frac{dL^e}{dGNP} - \frac{dL^n}{dGNP} \times \frac{PL}{W} - \frac{dt_{mI}}{dGNP} \right), \quad (4-28)$$

where $(1 + t_{mI})$ = private demand price for intermediate imports.

The second term measures the value of the additional output generated in the economy by the adjustment in aggregate demand. From the increase in GNP it is necessary to deduct the value of wages of previously employed labor ($dL^e/dGNP$) as well as the wage bill of unemployed labor ($dL^n/dGNP$) which represent a real cost $(PL)/W$ and the tariffs collected on intermediate goods which are already included in the first term.

Since part of the increase in GNP will accrue to the government, adjustment is needed in equation 4-28 to adequately reflect the real situation which will eventuate. The net tax revenue will be:

$$\frac{dGNP}{dM_I} \left(1 - \frac{dL^e}{dGNP} \right) t_d, \quad (4-29)$$

where t_d = marginal tax revenue of all domestic taxation on income (import duties are excluded).

Incorporating the fiscal effect in equation 4-28 yields equation 4-30:

$$P_{mI} = (1 + t_{mi}) + \frac{dGNP}{dM_I} \left[1 - \left(\frac{dL^e}{dGNP} \right) (1 + t_d^{PG}) - \frac{dL^n}{dGNP} \frac{PL}{W} - \frac{dt_{mI}}{dGNP} \right]. \quad (4-30)$$

Capital Goods

The marginal utility of imported capital goods is given by the present value of the future consumption stream generated by its importation, which can be measured from the private price of the good imported and the social value of the chain of benefits it produces (i.e., from the shadow price of capital).

$$P_{mk} = (1 + t_{mk}) P_k, \quad (4-31)$$

where $(1 + t_{mk})$ converts the CIF price of the capital good into the equivalent domestic price and P_k represents the shadow prices of the future income generated by one bolivar of investment at market prices (the shadow price of investment).

By adding together equations 4-27, 4-30, and 4-31 one arrives at the Schydolowsky formulation to derive the general disequilibrium shadow price of foreign exchange.

$$\alpha = m_c (1 + t_{mc}) + m_c S_c \dots \quad \text{consumption imports}$$

$$\begin{aligned}
& + m_I (1 + t_{mI}) + m_I \frac{dGNP}{dM_I} \left[\left(1 - \frac{dL^e}{dGNP} \right) (1 + t_d PG) \right. \\
& \left. - \frac{dL^n}{dGNP} \frac{PL}{W} - \frac{dt_{mI}}{dGNP} \right] \dots \text{intermediate imports} \\
& + m_k (1 + t_{mk}) P_k \dots \text{capital imports} \\
& + t_m PG \dots \text{fiscal transfer.}
\end{aligned}
\tag{4-32}$$

III. NUMERICAL ESTIMATION OF THE VENEZUELAN SECOND BEST PARTIAL DISEQUILIBRIUM SHADOW PRICE OF FOREIGN EXCHANGE

This is the first effort to estimate the SER for Venezuela. The idea is to measure the marginal utility of foreign exchange in the economy which in turn depends on how the marginal increase in foreign exchange is absorbed; that is, the marginal utility of the commodities (or services) into which it is embodied.

An important aspect in calculating the SER is whether Venezuela's balance of payments will continue registering current account surpluses and increase in foreign reserves or if, on the contrary, the tendency is toward current account deficits and substantial decline in foreign reserves.

The rise in petroleum price which took place in the latter part of 1973 brought about a huge increase in external financial resources at the disposal of the economy. Yearly exports values increased by almost three times the average of Venezuela's exports during 1968-1972. This huge and rapid increase of exports earnings was immediately followed by a large expansion of imports which in the period 1974-1976 reached yearly figures 50 percent above the 1973 level.

Despite the rapid and sudden increase of imports, the current account balance and the foreign exchange reserves showed a dramatic improvement over the period. However, the level of petroleum output and the high level of investment adopted by the government would cause, according to the author's estimate, substantial decline in reserves as early as 1978 and the current account would turn into a deficit by 1980. Whether the deficits will start showing in 1978 or 1980 is not the important matter; what is relevant is that the tendency is toward a situation making the balance of payments difficult to manage. This means that the government will probably increase import tariffs, perhaps impose some barriers, and/or enforce the application of the existing import tariff regulations which actually are largely evaded or ignored.

It can be argued that in the long run, depending on the petroleum output, level of investment, and level of external borrowing, the balance of payments will be in surplus, deficit, or equilibrium. The case of a surplus is based on the alternative of increasing oil production to a certain limit over and above the current conservationist level using part of the existing capacity. The long-run deficit position, the most probable outcome in the author's view, recognizes that even if the petroleum output could be substantially increased it would be increasingly absorbed by the domestic needs and that petroleum exports will fall much faster than is expected, so the existing surplus will give way to a long-run deficit. The possibility that the balance of payments will be in long-run equilibrium is based on the assumption that the government will increase petroleum production and will also do its best to curb imports so as to achieve long-run equilibrium. To do so, it will first

attempt to enforce the application of the import tariff structure approved in 1973, which as was mentioned, has been largely evaded or waived. After 1978, the government may wish to make the tariff structure more uniform. This implies rising rates on products with very low tariffs as well as lowering some of the highest rates. One possible outcome might be that no product could be imported with less than a 15 to 20 percent tariff. Finally, a more vigorous export promotion program could be enforced. At the time of this study, there were no expected changes in the exchange rate.¹⁹ Based on the available evidence, it seems that the equilibrium case better reflects the most probable course of action the government will take to regulate its external trade.

Another necessary element to proceed with the SER estimate is to know how either the market or the government would allocate the additional units of foreign exchange earned in the future. The assumption made is that exports would not be affected and that all imports would increase proportionally (i.e., the marginal distribution of imports is the same as the average).

Finally the author recognizes that the data base is weak, but it is important to make a first attempt—partly to suggest a methodology and partly to make cautious conclusions on the basis of the best and admittedly fragile statistics.

¹⁹An important issue is the choice of means by which national industry will be promoted through protection whether by additional tariff protection or through devaluation. They provide equivalent protection for import substituting industries. For example, a 20 percent tariff with a 20 percent devaluation provides the same protection as does a 44 percent tariff and no devaluation.

SER Estimates

The LM Approach

As mentioned the LM procedure to deal with the distortions in the foreign-exchange market proposed:

1. The use of border prices f.o.b. for exportable goods and c.i.f. for importable goods.
2. Nontradable goods are divided in two groups:
 - a. Those which should be valued in terms of their marginal cost of production, and
 - b. Those whose value should be measured on the demand margin.
3. The nontradable goods which fall under group a should be broken down into the different resources used in their production until everything is classified into traded and domestic factors of production.
4. The value of nontradables grouped under b are converted into their equivalent value in foreign exchange by the use of their respective conversion factors. A general conversion factor can also be estimated which corresponds to the reciprocal of the shadow exchange rate.

Estimation of tradable good conversion factors. If tariffs are fully used and imports are freely permitted then information on tariff rates, plus other charges which are included in wholesale prices, is sufficient to calculate conversion factors for traded goods (as mentioned, a conversion factor is that factor by which one multiplies the price

paid by a project for an input—supposedly the wholesale price—in order to arrive at the foreign exchange equivalent). But only if there are actual imports, and import controls are absent, can these conditions be supposed to be met. The resulting calculation is illustrated below.

Price paid = 100

Less normal wholesale margin,
transport costs from port,
port dues = $20 \times \text{SCF}$ (.8 assumed) = 16

Tariff of 100% = 40

cif price = 40

Conversion factor = cif price + foreign exchange equivalent of
local charges/ price paid = .56.

The method does not require that the cif price be ascertained. But it does require knowledge of the value of the SCF. Estimates of the SCF are presented below.

If there are no imports of a tradable good, in which case the tariff may be partly or wholly redundant, or if there are import controls in which case the tariff may not be operative in determining the price paid, then the above method cannot be used to find the conversion factor.

In this case one has to work forward from the cif price. One finds an actual cif price (or a hypothetical one if there are no imports), and adds normal port dues, transport cost, and wholesale margin, adjusting these by the SCF. This gives the foreign exchange equivalent price (economic price) for an import or potential import. Assuming this import price is lower than the wholesale price of the same or closely comparable domestic good which is used in the project, then dividing the former by

the latter gives the conversion factor. When the imported input itself is used in the project, then of course the conversion factor is the foreign exchange equivalent price divided by the actual price (the two will differ only as a result of applying the SCF to the local cost involved, i.e., port dues, transport, and trading margins).

If the input is bought domestically at a price lower than the foreign exchange equivalent price of an import, then it is possible that some of the product concerned is exported, or ought to be exported. One can then find an actual or potential f.o.b. price, and subtract the foreign exchange equivalent (i.e., local costs adjusted by the SCR) of getting the product on board ship. The result is the opportunity cost of not exporting the good. The conversion factor is this latter price divided by the actual price paid.

For most goods it is obvious whether to make the import comparison or the export comparison. But for tradable goods which are in fact neither exported nor imported, an average of the conversion factors arrived at by the two methods is likely to give a good approximation of the economic cost of the good.

General conversion factors. This section develops the conversion factors required to change domestic market prices into border prices. The reason for this conversion is because the value of a traded commodity expressed in terms of its domestic price is usually overstated in comparison with its true social value. Since the trading opportunity cost reveals the social value of traded goods, domestic prices must be converted into border or traded prices.

The following conversion factors are calculated:

1. The Standard Conversion Factor (SCF = α).
2. The Conversion Factor for Consumption Goods (β_c).
3. The Conversion Factor for Capital Goods (β_k).
4. The Conversion Factor for Intermediate Goods (β_I).
5. The Conversion Factor for Electricity.

The formula for the estimates of conversion factor is given below.

It should be noted that the same formula may be applied for the SCF or the conversion factors for consumption capital or intermediate goods.²⁰

$$\alpha = \frac{M}{M + t_m},$$

where

α = SCF,

M = c.i.f. value of imports, and

t_m = value of taxes on imports

The standard conversion factor and the shadow exchange rate (SCF = α). The SCF is calculated from the data presented in Table 1. Two different estimates are presented: one using the data available from 1968-1976 and the other only considering the period 1974-1976. The reason for considering the 1974-1976 period separately is because it is

²⁰The formula assumes: (1) export demand and import supply are infinitely elastic, (2) marginal changes in expenditures on nontradables can be neglected, and (3) all income elasticities are unity. Since the marginal expenditure on exports goods at domestic prices is negligible, exportable items are excluded in the equation.

TABLE 1
BASIC DATA WORKSHEETS

Trade Data	Millions of bolivares										1974-1976	
	1968	1969	1970	1971	1972	1973	1974	1975	1976	Average	1974-1976	Average
1. Value of total imports (M)	9,035	9,354	9,855	11,021	12,522	14,389	21,491	30,460	27,713	16,204	26,555	
2. Value of total exports (X)	12,144	12,753	13,115	15,605	17,404	25,275	66,174	49,457	36,944	26,649	50,558	
3. $M_1 + X_1 = (1 + 2)$	21,149	22,107	22,970	26,626	29,926	39,664	87,664	79,917	64,657	43,853	77,113	
4. Taxes on total imports (T_m)	811	921	866	639	693	697	1,165	1,607	2,137	1,082	1,703	
5. Taxes on total exports (T_x)	-	-	-	-	-	-	-	-	-	-	-	
6. Subsidies on exports ($-T_x$)	-	-	-	-	-	-	-	-	-	-	-	
7. Net taxes on trade ($4 - 5 + 6$)	811	921	866	639	693	697	1,165	1,607	2,137	1,082	1,703	
8. Subtotal ($3 + 7$)	21,960	23,028	23,836	27,265	30,619	40,361	88,881	81,810	66,796	44,966	79,209	
9. $ScT [1 : (1 + 4)]$	92	91	92	945	947	954	948	948	928	937	939	
10. Value of producer goods imports (M_p)	2,986	3,086	3,352	3,891	4,414	4,624	7,521	11,932	10,855	5,851	10,103	
11. Value of producer goods exports (M_p)	-	-	-	-	-	-	-	-	-	-	-	
12. $(X) + (M_p) = (10 + 11)$	2,986	3,086	3,352	3,891	4,414	4,624	7,521	11,932	10,855	5,851	10,103	
13. Taxes on producer goods imports (T_{mp})	30	35	33	24	26	26	44	72	85	42	67	
14. Taxes on producer goods exports (T_{xp})	-	-	-	-	-	-	-	-	-	-	-	
15. Subsidies on producer goods ($-T_{xp}$)	-	-	-	-	-	-	-	-	-	-	-	
16. Net taxes on trade (producer goods)	30	35	33	24	26	26	44	72	85	42	67	
17. Subtotal	3,016	3,121	3,385	3,915	4,440	4,650	7,565	12,004	10,940	5,893	10,170	
18. $B_k [10 : (10 + 13)]$	99	99	99	99	99	99	99	99	99	99	99	
19. Value of consumer goods imports (M_c)	1,629	1,559	1,640	1,655	2,057	2,469	2,696	4,028	3,664	2,374	3,463	
20. Value of consumer goods exports (M_c)	154	149	211	202	308	378	365	355	259	250	334	
21. $M_c + X_c = (19 + 20)$	1,783	1,708	1,851	1,857	2,365	2,847	3,061	4,383	3,923	2,624	3,797	
22. Taxes on consumer goods imports (T_{mc})	152	172	162	119	130	130	221	343	406	204	325	
23. Taxes on consumer goods exports (T_{xc})	-	-	-	-	-	-	-	-	-	-	-	
24. Subsidies on consumer goods exports ($-T_{xc}$)	-	-	-	-	-	-	-	-	-	-	-	
25. Net taxes ($22 - 23 + 24$)	152	172	162	119	130	130	221	343	406	204	325	
26. Subtotal ($21 + 25$)	1,935	1,880	2,013	1,976	2,495	2,977	3,282	4,726	4,329	2,824	4,118	
27. $B_c [19 : (19 + 22)]$	915	90	910	931	940	950	924	921	900	920	924	
28. Value of intermediate goods imports (M_i)	2,085	2,221	2,501	2,832	3,125	3,235	6,450	7,525	6,845	4,313	6,940	
29. Value of intermediate goods exports (M_i)	11,014	11,589	11,913	14,356	15,964	23,492	63,466	46,339	34,617	25,861	48,141	
30. $M_i + X_i$	13,099	13,810	14,414	17,188	19,089	26,727	69,916	53,864	41,462	30,174	55,081	
31. Taxes on intermediate goods imports (T_{mi})	629	714	671	496	537	541	899	1,392	1,646	836	1,312	
32. Subsidies on intermediate goods exports ($-T_{mi}$)	-	-	-	-	-	-	-	-	-	-	-	
33. Net taxes on trade	629	714	671	496	537	541	899	1,392	1,646	836	1,312	
34. Subtotal ($30 + 33$)	13,728	14,524	15,085	17,684	19,626	29,268	70,833	55,287	43,159	31,043	56,426	
35. $B_i [26 : (26 + 31)]$	768	756	788	851	853	906	877	844	806	837	841	

Source: "Informe Económico." Caracas, Venezuela: Banco Central de Venezuela (1968, 1972, 1974, 1976; Tables A-VI-1 to A-VI-33), and own estimates.

believed that the change in the tariff structure which occurred in the late 1973 began to be felt in the economy in the year 1974.

$$\alpha_{1968-1976} = \frac{M}{M + t_m} = \frac{16204}{17286} = 0.937,$$

$$\alpha_{1974-1976} = \frac{M}{M + t_m} = \frac{26554}{28257} = 0.939.$$

The SCF is the reciprocal of the shadow exchange rate ratio, which when multiplied by the market exchange rate would give the shadow exchange rate (SER).

Taking the value of the SCF = 0.939, the conversion factor for foreign exchange will be equal to $1/0.939 = 1.065$ and the shadow exchange rate = $1.065 \times \text{OER} = 1.065 \times 4.3 = 4.58 \text{ Bs/US\$}$. This last figure can be taken as a reasonable lower limit estimate of the overvaluation of the official exchange rate over the period considered.

The reason why the author considers the estimate of 6.5 percent as the lower limit of the overvaluation is because the data used as value of tax on imports only refers to the real amount of tax collected by the government and not the real amount payable, the discrepancy being due to several reasons. Some of these reasons are evasion, government waivers, and misclassification of the merchandise for the purpose of tax payment due sometimes to lack of experience but most of the time because the custom officers do so deliberately for the benefit of the importer in exchange for some special "help or favor."

To give an idea of the differences between tariffs collected and payable it should be mentioned that in 1975, according to an estimate made

by the Venezuelan Central Bank, the total amount of taxes to be collected for concept of imports was "bolivares" 6,156 millions (US\$ 1.4 billion), but only Bs. 1,807 million were collected. In 1976 the total bill was of 5,620 million bolivares but only 2,137 million were actually paid. It is believed that in the years to come the government, in order to solve part of the expected deficit on balance of payments, will do its best to progressively enforce the application of the existing tariff structure. Assuming tariffs are fully collected the SCF will be $\alpha = 26554/30747 = 0.863$. The conversion factor for foreign exchange = $1/0.863 = 1.1587$. The Shadow Exchange Rate = $1.1587 \times 4.3 = 4.98$ Bs/US\$.

This figure can be taken as the expected upper limit estimate of the value to which the overvaluation of the official exchange rate tends to. At the present time, the use of a conversion factor of 1.112 is recommended, which means that the SER is equal to 4.78 Bs/US\$.²¹

Project evaluators must be aware of the change in tariff collections (or tariffs) throughout time, in order to be able to judge what value between 4.58 Bs/US\$ and 4.98 Bs/US\$ is the most appropriate to use in their estimates. Actually a sensitivity analysis must be done to detect how sensitive the economic rate of return of the project is to changes in the SER.

²¹Even though the government is not receiving the receipt of the total tax bill some one in the economy (custom officers) is getting a substantial part of what is not paid to the government. As the time goes by and the government tries to enforce the existing tariff legislation the existing domestic-world price ratios could not be maintained and the existing ratios would underestimate the value of foreign exchange.

The conversion factor for consumption goods (β_c). β_c is calculated from the data presented in Table 1, p. 69. Again two different estimates are presented, one covering the period 1968-1976 and the other using the data from 1974-1976.

$$\beta_c(1968-1976) = \frac{M_c}{M_c + t_m} = \frac{2374}{2577} = .92.$$

$$\beta_c(1974-1976) = \frac{M_c}{M_c + t_{mc}} = \frac{3462}{3785} = .914.$$

For the post-1977 period, the value of β_c , assuming tariffs will tend to be fully collected, will move toward 0.81 ($\beta_c = 3462.6/7271.6 = .81$).

The conversion factor for capital goods (β_k).

$$\beta_k(1968-1976) = \frac{M_k}{M_k + t_{mk}} = \frac{5851}{5893} = .99.$$

$$\beta_k(1974-1976) = \frac{M_k}{M_k + t_{mk}} = \frac{10102}{10169} = .99.$$

β_k , for the post-1977 period, assuming tariffs were fully collected, is estimated to be .98 ($\beta_k = 10102/10313 = .98$).

The conversion factor for intermediate goods (β_I).

$$\beta_I(1968-1976) = \frac{M_I}{M_I + t_{mI}} = \frac{4313}{5149} = .84.$$

$$\beta_I(1974-1976) = \frac{M_I}{M_I + t_{mI}} = \frac{5940}{8252} = .84.$$

β_{I1} for the post-1977 period, assuming tariffs were fully collected, is estimated to be = .67 ($\beta_I = 6940/10281 = .67$).

The conversion factors for nontradables. Estimates of the conversion factors for nontradables require that each good be broken down into traded and nontraded components by means of, say, an input-output table or sector surveys. Theoretically the breakdown should be repeated several times until everything is in terms of traded elements, labor, and residual nontraded components. Domestic indirect taxes and subsidies should be omitted since taxes are simply transferred within the economy. Depreciation should also be disregarded because it is an accounting cost and not a real cost to the economy. It should be pointed out that the use of the input-output table is only correct if the implicit average cost equals the required marginal cost of production which is possible only in the presence of constant production costs.

There is not an input-output table in the country from which to obtain the desired information to measure the CF of nontraded goods; hence, a short-cut procedure has to be implemented. In this work only the CF for electricity is considered. Other estimates are required for transport (broken down by road and rail), construction, and so forth, but such a task goes beyond the scope of this work.

Data on cost per kwh sold in 1976 was collected from the largest electricity companies in the country CADAPE, Enelven, Enelbar, Perijá and Carora), but only the information obtained from CADAPE²² will be used

²²CADAPE is a state company serving the electrical needs of around 50 percent of the total population.

for the purposes of the conversion factor's estimate, even though CADAFE serves most of the country. The CF obtained from the data of this company cannot always be used for the purposes of transforming the market price of electricity into its equivalent value at shadow prices (foreign exchange equivalent). If the energy is supplied by any other existing small electric companies in the country it is recommended that a separate conversion factor be calculated applying the same methodology but taking into account some regional aspects, such as the regional shadow price of labor, which may cause discrepancies between the electricity conversion factors among regions (the same is true for other nontradable goods or components).

A short-cut procedure to estimate the conversion factor for electricity follows:

1. Breakdown of cost per kwh sold by its inputs.
2. Apply appropriate conversion factors to each input to obtain foreign exchange equivalent cost.
3. Sum the economy cost of each input to obtain the economic cost of a kwh sold.

The conversion factor for electricity according to the results obtained in Table 2 is equal to 1.29.

The Shadow Price of Foreign Exchange²³

Another way of obtaining a first approximation of the proportion in which the SER is greater than the OER is by measuring the percentage

²³Of all the CF calculated only the SCF or the consumption conversion factor is equal to the inverse of the shadow price as proposed by Harberger, UNIDO Guidelines, Schydrowsky, Fontaine.

TABLE 2
BREAKDOWN OF ELECTRICITY COSTS (kwh) BY INPUTS

Inputs	Cost (cents) per kwh/sold (market prices)	Percentage (%)	Conversion factor	Economic Cost
A. <u>Current costs</u>				
1. Labor	4.57	38.3	.731 ^a	3.34
2. Fuel	1.11	9.3	7.56 ^b	8.39
3. Energy	1.16	9.8	.939 ^c	1.09
4. Materials	0.69	5.8	.939	0.65
5. Services	0.90	2.7	.731	0.66
6. Other	0.26	7.5	.939	0.24
7. Tax	0.33	14.9		
8. Depreciation	<u>1.78</u>	<u>2.1</u>		
Total Current Cost	10.80	90.4		
B. <u>Capital Cost</u>				
1. Equipment and construction	<u>1.14</u>	<u>9.6</u>	.99 ^d	<u>1.13</u>
Total (A + B)	11.94	100		15.50
Market Price Per kwh	12.00			

^aLabor conversion factor.

^bFuel's border price ratio \$12.10/\$1.60.

^cSCF = standard conversion factor

^d β_k = conversion factor for capital goods.

Source: Information supplied by CADAPE answering request for cost breakdown of selling a kwh.

relation between tariff revenue and the value of imports (see Table 3). Of course this assumes that the average composition of imports does not change as total imports increase ($\alpha_i = \partial M_i / \partial M = M_i / M$).

The results of Table 3 indicate that during the three years prior to this study the SER has been around 7.8 percent greater than the OER (if tariffs were fully collected the SER would have been 27 percent greater).

In order to eliminate the assumption of equality between the average marginal composition of imports and the marginal composition, a regression analysis of the form $T = a + bM$ (where T = tariff revenue and M = total imports) was performed to determine $dT/dM = b$. The results obtained indicate that dT/dM is around 7 percent which agrees with the rate of the overvaluation of the OER previously obtained. The estimate, assuming tariffs were fully paid or collected, implies that $dT/dM = .20$. That means a 20 percent overvaluation of the OER.

It should be noticed that by performing the regression analysis there is a danger of introducing additional distortions, particularly if rates have been changing during the period for which the estimated data is obtained. The problem is that in measuring tax elasticities with historical data it becomes very difficult to separate the effects of the change in the marginal composition of imports from the effect of the change in the rates. Furthermore, with historical data only the ex-post elasticities can be derived and there is not any assurance that the variables which determined the value of import elasticities in the past will equally affect the future values.

The approach used in this chapter to deal with the distortions in the foreign exchange market provides the project analysts with the

TABLE 3

TARIFF REVENUES AND TOTAL VALUE OF IMPORTS IN VENEZUELA

Years	Tariff Revenue (millions of Bs.)	Official Exchange Rate (Annual average)	Tariff Revenue (millions of US \$)	Total value of imports (CIF) (millions of Bs.)	Percentual relation (3 ÷ 4)
	(1)	(2)	(3)	(4)	(5)
1955	521	3.22	161.8	945.8	17.2
1956	538	3.24	166.2	1,141.5	14.6
1957	615	3.35	183.7	1,673.7	11.0
1958	663	3.35	198.0	1,427.8	13.9
1959	638	3.35	190.4	1,408.1	13.5
1960	541	3.35	161.4	1,182.7	13.6
1961	437	3.35	130.4	1,177.6	11.1
1962	416	3.35	124.2	1,297.0	9.6
1963	401	3.35	119.7	1,231.6	9.7
1964	481	4.50	106.8	1,226.2	8.7
1965	456	4.50	101.3	1,409.6	7.2
1966	480	4.50	106.6	1,292.4	8.2
1967	478	4.50	106.2	1,422.7	7.5
1968	811	4.50	180.2	2,007.0	9.0
1969	921	4.50	204.7	2,078.5	9.8
1970	866	4.50	192.4	2,190.0	8.8
1971	639	4.50	142.0	2,449.0	5.8
1972	693	4.40	154.0	2,852.7	5.4
1973	697	4.30	162.1	3,346.2	4.8
1974	1,165	4.28	272.2	5,021.3	5.4
1975	1,807	4.28	422.2	5,333.4	7.9
1976	2,137	4.29	498.1	4,852.4	10.2

Estimated value performing a regression analysis of the form $T = a + bM$

$$T_1 = 56.8 + 0.067M$$

$$R^2 = .67$$

$$T_2 = 169.7 + 0.205 M$$

$$R^2 = .58$$

(includes 1,438 and 1,310 millions of U.S. dollars in the years 1975 and 1976 respectively instead of the values included in the series).

Source: "Informe Económico." Caracas, Venezuela: Banco Central de Venezuela (1961, 1968, 1972, 1974, 1976; Tables A-VI-1 to A-VI-33). Nonpublished information supplied by the Central Bank and by the Ministerio de Hacienda; and own estimates.

required parameters to use the LM approach for valuing projects' inputs and outputs in terms of foreign exchange (border prices). It also provides an estimate of the shadow price of foreign exchange based on actual and expected trade policies which can be used in the calculation of national economic profitability as suggested by the UNIDO Guidelines.

CHAPTER V

THE ECONOMIC AND SOCIAL COST OF CAPITAL

The main purpose of this chapter is to sketch the conceptual framework for deriving the partial disequilibrium prices of time and capital in Venezuela. The analysis concentrates on the riskless cost of capital since the treatment of risk raises issues outside the scope of this work. Questions such as (1) the relative value of present and future consumption, i.e., the marginal rate of substitution between consumption at time "t" and at time "t - 1," and (2) the relative value of current investment in terms of current consumption, the opportunity cost of investment will be discussed in detail. A variety of answers to these questions will also be examined and finally several models will be used for determining the economic and social cost of capital in the country, including the empirical search, item by item, of the actual market rates of interest and capital yields considered relevant.

I. THE SAVINGS MARKET

The Venezuelan savings market is highly segmented both on the demand and on the supply sides. On the supply side, besides the foreign and government participation, there are a variety of savers who operate in several sub-markets. At the low end there are savers who have no other alternative than accumulating cash; and at the upper end there is the group whose consumption and savings decisions are made mostly as a function of what is going on in their own enterprises. Between these

two extremes there is a variety of individuals who participate actively in the Venezuelan financial system (savings deposits, time deposits, certificates, insurances). On the demand side there are two main groups of users of resources. On the one hand is the government demand to cover his financial gap and on the other is the private sector demand for investable funds.

The Financial System

At the time of this study, the Venezuelan financial system was efficiently channeling the country's current payments; it was offering financial instruments of several types: savings deposits, time deposits, insurance policies, mortgage bonds and development company bonds to savers, and was supplying adequate amounts of short-term financing to enterprises and long-term loans to finance house buyers and private enterprises.

Private financial companies were expanding very rapidly their long-term loans and the government was supplying increasing amounts of long-term financing through the Venezuelan Investment Fund, the Industrial Bank, the Agricultural Credit Fund, and the Urban Development Fund.

In addition to the Central Bank, the financial system was formed by thirty-two commercial banks (with 920 offices throughout the country); fifteen mortgage banks (not including the Worker's Bank which acts as a private commercial bank and as a mortgage bank); twenty-five savings and loan associations; thirty-two financial companies; four capitalization companies, and several insurance companies, investment banks, savings funds, and miscellaneous institutions. Also included were a group of

public institutions formed by the Venezuelan Investment Fund, the Venezuelan Development Corporation, the Agricultural Development Bank, the Industrial Bank, the Agricultural Credit Institute, the Social Security Institute, and several other institutions of smaller size.

The Central Bank and Interest Rates

The authorities of the Venezuelan Central Bank have the responsibility of fixing the active and passive rates of interest for all financial intermediaries in the market. The Secretary of Finance together with other cabinet members can also adopt some measures which affect the cost of capital in the economy. For example, in April of 1946, the government fixed the cost of capital in the country at a maximum of 1 percent monthly and this resolution has not been modified regardless of the many changes which have occurred in the economy since then.

Nominal interest rates have changed very little in Venezuela, and consequently the real interest moves mainly with prices. Commercial banks have charged about 10 percent for prime loans for many years, with a slight decline in 1974 and 1975, and also have paid the same rates for deposits for a long time: 4 to 5 percent for savings deposits and a range of 5 to 8 percent for time deposits, depending on their amount and term of withdrawal. All of these rates are subject to ceilings or minimums established by the Central Bank. In spite of the excess lending capacity of the commercial banks, they do not compete for borrowers by charging lower interest rates nor do they use interest rates to discourage term deposits when they do not need funds.

Mortgage banks have charged rates that fluctuate with narrow margins around 11 percent (not including commission charges) and have paid 8 percent for the mortgage bonds they have issued ever since they were established in 1960, due mainly to their prompt repurchase at par by the issuing banks.

Public financial institutions, with the exception of the Venezuelan Investment Fund, generally charge subsidized rates that range from 3 to 8 percent for agricultural loans and 6 to 9 percent for industrial loans.

In the light of the rigidity of nominal interest rates, real rates change with inflation rates. In fact, the real yields of mortgage bonds, the real interest rate charged by commercial banks for prime loans, real rates of official loans, etc., range from -2 to -12 percent. What will be the real impact of negative interest rates in the savings market is not clear at all—it will depend on the government's overall policy to decelerate inflation. The Central Bank authorities approved several policies aimed toward drying up excess liquidity and to permit monetary expansion to proceed afterward at a diminishing rate in order to slow down inflation without jeopardizing real growth.

The Capital Market

The Venezuelan capital market at the time this study was made was still at an early stage of development and did not fulfill a very important role within the financial system. The lack of development of the capital market has been due to the low levels of saving and investment observed prior to 1974 and to the attitude of private savers, particularly enterprise owners who did not sell stock in the market in order to avoid

other people's participation in their business. This situation, however, was rapidly changing. The level of saving and investment substantially increased and savers acquired large amounts of financial instruments of many types. Also, enterprise owners were better disposed to sell part of their stock due in part to (1) strong fiscal incentives; (2) the "Decision" 24 of the Cartagena Board, which obliges foreign owned companies to sell half of their capital stock before 1990 as a condition to enjoy tariff reductions for their products in the Andean Market (Colombia, Ecuador, Peru, Bolivia); and (3) acceptance of the idea that the sale of stock is a good thing and an additional instrument to increase financial resources.

II. THE PRODUCTIVITY OF CAPITAL AND THE TIME PREFERENCE OF CONSUMERS (STP)

In a perfect capital market profit maximizing entrepreneurs would increase the capital stock to the point where the marginal productivity of a unit of capital would equal the market rate of interest. Utility maximizing consumers would increase their savings to the point where their marginal rate of time preference was equal to the market rate of interest. Therefore a marginal unit of investment (with return equal to the market rate of interest) will be equally valuable to society as a marginal unit of consumption. If this were the case, the market rate of interest could be used to discount the series of net benefits from a public project to a present value. Most economists recognize that in an economy with market imperfections, the traditional capital theory view that a single interest rate equates the marginal time preference of

savers with the marginal productivity of capital is no longer applicable. In fact, under disequilibrium two different parameters are necessary to measure both concepts: the relative value of future consumption in terms of current consumption, the social time preference rate, and the relative value of current investment in terms of current consumption, the opportunity cost of investment. A social time preference is a normative measure which reflects society's valuation of the relative value of present and future consumption. The social opportunity cost (SOC) is a measure of the value to society of the best alternative use of funds.

III. THE STP FUNCTION AND THE MARKET INTEREST RATES

For a long time it has been accepted that in a perfect capital market the rate of private investment would measure both the marginal productivity of capital and the marginal time preference of consumers so as to maximize society's welfare. The use of this market interest rate, however, even under perfect capital markets would be inadequate to maximize society's welfare over time, unless all other assumptions of perfect markets are fulfilled, since the individual savers cannot have the information necessary for rational intertemporal decisions [lack of knowledge of: (1) future prices, (2) return in each private investment option, and (3) savings and investment decisions of society as a whole]. In fact, due to the imperfections in the capital market as well as in other markets, the private marginal productivity of capital will differ from the social marginal productivity and the private rate of time preference will differ from the social rate of time preference, so the private or weighted average market rate cannot be accepted as

reflecting either the social marginal productivity of capital or the social rate of time preference.

The differences between the social and the private marginal productivity of capital are mainly due to the distortions which affect the markets for all goods and factors, particularly the presence of corporate taxes. The discrepancies between the private and social marginal rates of time preference arise mainly because of the fact that the welfare level of future generations is not considered in the private time preference and because private time preferences reflect the existence of risks for individuals which are not necessarily risks for society as a whole.

According to the UNIDO Guidelines a social discount rate reflecting government preferences should be used in public policy decisions. This rate is expressed in terms of the elasticity of marginal utility with respect to consumption multiplied by the rate of growth in per capita consumption. Only if it is assumed that the path the economy will follow over time is the best of all feasible paths (defined in terms of institutional, political and technological constraints), one could substitute the use the marginal productivity of capital for the social rate of discount.¹

In spite of the agreement that social decisions should not be made on the basis of market or opportunity cost discount rates, it is not equally clear what the proper nature of the social time preference rate should be. Of course, a precise definition of a social utility-consumption

¹UNIDO Guidelines, p. 163.

function capable of evaluating society's consumption through time is not possible. Besides, the changes in taste, population, levels of expectation, distribution of consumption, etc., pose insuperable problems in considering interpersonal and intertemporal comparison. Nevertheless, while these problems make difficult the exact specification of a social utility consumption function they do not preclude the analysis of the subject.

IV. SOCIAL TIME PREFERENCE RATE (STPR)

The social time preference rate can be considered as a measure of society's marginal rate of substitution of consumption in the time "t" for consumption in time "t - 1." Symbolically if " d_t " is the rate of substitution between time "t" and "t + 1," then

$$d_t = MRS_{t+1,t} - 1 \quad (5-1)$$

which implies that the STP is determined by the level of consumption and its rate of growth, the consumption utility function, the rate of population growth and the pure time preference rate used.

More explicitly, assuming that marginal utility of consumption is declining² and can be represented by a constant elasticity function, the

²If $U = f(P, C/P)$, where "U" is social utility, "C" is total consumption and "P" is population, decreasing or marginal utility of per capita consumption means that $\partial U / \partial (C/P) > 0$ and $\partial^2 U / \partial (C/P)^2 < 0$. Although economists have accepted the notion of diminishing marginal utility of individual consumption this does not necessarily mean that increasing total consumption would have diminishing marginal utility.

time preference can be expressed in terms of the growth per capita consumption and the elasticity of the marginal utility.³ If one defines

C = Per capita consumption,

MUC = Marginal utility of per capita consumption,

t = Time subscript,

$STPR$ = Rate of social time preference,

d = Pure time preference,

n = Elasticity of the MUC , and

g = Rate of growth of per capita consumption,

then

$$MUC_t = C_t^{-n} \quad (5-2)$$

$$MUC_{t+1} = C_{t+1}^{-n} (1 + d)^{-1} = (1 + d)^{-1} [C_t (1 + g)]^{-n} \quad (5-3)$$

$$1 + STPR = \frac{MUC_t}{MUC_{t+1}} = \frac{C_t^{-n}}{(1 + d)^{-1} C_t^{-n} (1 + g)^{-n}} = (1 + g)^n (1 + d) \quad (5-4)$$

$$1 + STPR \sim (1 + gn) (1 + d) = 1 + gn + d. \quad (5-5)$$

$$\text{If } STPR \text{ is zero, then, } 1 + STPR \sim 1 + gn \text{ or } STPR \sim gn. \quad (5-6)$$

As Feldstein mentioned, several economists (Hirshleifer, Milliman and Dehaven, Mishan) have proposed to ignore time preference completely and to consider as the relevant discount rate the rate of return on private investments, implying that the best alternative use to which public resources could be put is in the private sector. This way of

³M. S. Feldstein, "The Social Time Preference Discount Rate in Cost Benefit Analysis," Economic Journal, 74(June, 1964), 374-379.

reasoning ignores that the actual opportunity cost of any resource is the alternative use to which they would have been put. In the case of perfect markets, if resources are not used in a given activity they would be used in the best alternative in which they could be used. Under distorted markets, however, this is not necessarily so; hence it is desirable to distinguish between what could be done with resources and what would be done with them.⁴

Some other writers hold the view that the relevant discount rate is the weighted average of different rates of return. Harberger for example proposes that the project evaluation discount rate be a weighted average of the "marginal rates of productivity of capital in the various sectors from which investment is displaced, and of the marginal rates of time preference applicable to the various groups (if any) whose saving is stimulated (through higher interest rates) by the additional government borrowing."⁵ This approach ignores the multitude of individuals who do not save at all as a result of not being offered a sufficiently attractive rate of interest. Nonsavers could have time preferences greater than the return they could obtain in the market as savers. Thus it is not

⁴M. S. Feldstein, "The Inadequacy of Weighted Discount Rates." Richard Layard, ed., Cost Benefit Analysis [Suffolk, England: Richard Clay, (The Chaucer Press) Ltd., 1974.]

⁵Arnold Harberger, "The Opportunity Costs of Public Investment Financed by Borrowing." Excerpt from A. C. Harberger, "Professor Arrow on the Social Discount Rate," in G. G. Somers and W. D. Wood, eds., Cost Benefit Analysis of Manpower Policies, Proceedings of a North American Conference, Queens University, Kingston, Ontario: Industrial Relations Center, 1969, p. 81.

sufficient to have an average of interest rates paid; it is required to take into account the time preference of nonsavers.

Besides, the use of a simple discount rate or a fixed weighted average interest rate may lead to erroneous social choices since it provides only an appropriate measure of the opportunity cost of capital at the market prices. Furthermore, since the choice between projects depends on the relatively desirability of the net benefit stream, the only meaningful way of aggregating each benefit stream is by discounting it at the STPR, which is the relevant rate for the intertemporal aggregation of benefits, and not by the discount rate (unless the opportunity cost equals STPR).

Another case in which the private discount rate is not relevant for evaluating a project is when its financing does not require transfer of resources from the private sector (a self-financing project). In this case, only the STPR is relevant to appraise the project.

The preceding considerations serve to emphasize that only the STPR is relevant for intertemporal aggregation of benefits and that the use of the private discount rate may lead to mistaken project choices. Thus, the problem of opportunity cost measurement and intertemporal aggregation must be kept separate if one desires to assure the correct selection of alternative investment projects.

V. THE LM APPROACH

According to the LM approach,⁶ the choice of a discount rate depends on the numeraire in which the benefits are expressed. If consumption is the numeraire, the appropriate rate of interest is the consumption rate of interest (CRI) which measures the fall in the value of a unit of consumption over time in relation to the value of that unit currently received. The rate of fall over time depends on the price people will have to be paid to wait for a year to consume—their pure time preference—and the diminished marginal utility of an additional unit of consumption received in the future.

If government income is the numeraire the appropriate discount rate is the rate of fall in the value of government income over time—the accounting rate of interest (ARI). The ARI can refer to either the economic accounting rate of interest (EARI) and/or the social accounting rate of interest (SARI).

The Consumption Rate of Interest

The consumption rate of interest was defined earlier as

$$\text{CRI} = n_g + \rho \quad (5-7)$$

where

n = elasticity of marginal utility with respect to consumption,

⁶Little and Mirrlees, Project Appraisal, pp. 270-286; Squire and van der Tak, pp. 109-117.

g = rate of growth of per capita consumption, and

ρ = rate of time preference.

The purpose in using the CRI is to ensure that the government preferences concerning future consumption or growth and current consumption are adequately reflected in project selection. A country heavily concerned with growth should use a low CRI which means that future consumption benefits from current investment are not heavily discounted.

An economy that is more interested in current consumption than in growth but is not interested in income distribution (low value of n) should set ρ to a high value, i.e., $\rho = 5$. On the other hand, an economy concerned with growth and income distribution should use a high value of n and set ρ to a very low value ($\rho = 0$ or $\rho = 1$). Countries not interested in income distribution (low n) but which are concerned with growth could use an intermediate value for ρ .⁷

The Economic Accounting Rate of Interest (EARI ρ)

If one is not concerned with distributional considerations and public income deficiencies, then the rate to be used to discount future benefits and costs is the marginal productivity of capital (q) measured at border prices, which is also the EARI, that is, the efficiency discount rate.

⁷Squire and van der Tak, pp. 109-110.

Indeed if investment/savings is the numeraire, the appropriate discount rate should be the investment accounting rate of interest (the fall in the value of investment over time). However, a simpler way of estimating the EARI is by measuring the marginal product of capital (q) in the public sector, that is, the net return earned by an additional unit of public investment at border prices. In other words, q indicates the marginal rate of transformation between present and future foreign exchange, while CRI measured the social marginal rate of substitution between present and future consumption.

The Social Accounting Rate of Interest (SARI)

As mentioned, the ARI measures the fall in the value of an additional unit of government income over time. ARI is in fact that "rate of discount which balances the supply and demand for public investible resources. As such the ARI should equal the internal social rate of return on the marginally acceptable project."⁸

Roughly ARI could be obtained by the following formula:

$$ARI = q - h, \quad (5-8)$$

where

q = marginal product of capital, and

h = distributional impact of public investment on private sector consumption.

⁸Ibid., p. 114.

To derive h one must notice that since " s " is the proportion of q that accrues to the public and private sector, it follows that $(1 - s)q$ is the proportion of units of foreign exchange accruing to private sector consumption. If it is assumed that the additional units of foreign exchange accrue to people with the average level of consumption, then

$$h = (1 - s)q(1 - 1/V_\beta) \quad \text{and} \quad (5-9)$$

$$ARI = sq + (1 - s)q/V_\beta$$

Accounting Rate of Interest	=	Rate of Reinvest- ment	+	Rate of Consumption Generation in Terms of the Numeraire
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where

s = marginal propensity to save,

q = marginal product of capital,

V = value of public income, and

β_c = conversion factor (consumption goods).

See Chapter VI for greater details on the meaning and derivation of V .

As it can be observed in equation 5-10 the value of ARI could be greater or less than the marginal product of capital depending on whether $1/V_\beta > 1$. In case the additional units of consumption accrue to people under the average consumption level, the term $1/V_\beta$ should be replaced by d/V_β (see Chapter VI for the meaning and derivation of d). So CRI will be greater or less than q depending on the ratio d/V (d will be greater than one if the final beneficiaries have a level income under the average consumption level and vice versa). Furthermore, if the consumption

generated by public investment is less valuable than public income, it follows that ARI decreases when "s" does.

The accounting rate of interest could be equal to or greater than the consumption rate of interest. Since the CRI was defined as the rate at which the weight one would now give to future consumption falls over time and the ARI (the discount rate of uncommitted income) as the rate at which the weight of uncommitted income in the future falls relative to uncommitted income now, then V , the weight given to uncommitted income divided by the weight given to consumption, falls over time at a rate equal to the difference between the ARI and the CRI. That is

$$\frac{dV}{dt} = \text{ARI} - \text{CRI}. \quad (5-11)$$

From this relation one can observe that V will fall faster if investment is currently highly productive, and less rapidly if incomes are expected to rise fast (large CRI). If growth is expected or the government is highly concerned with present consumption the value of CRI will tend to be high. ARI should be large either because resources are so scarce that only few highly productive projects can be undertaken or because the available resources are being used efficiently.

To define what the rate of decline of V will be over time it is necessary to have a detailed model of the economy; however, in the absence of such a model it seems realistic to assume a rate of decline for V equal to one half the difference between the ARI and the CRI. Of course, V does not always have to decline over time. For example, if government income maintains a constant premium in relation to private

consumption the same discount rate is used with either, and $ARI = CRI$. If on the contrary, government income is more valuable than private consumption ($V > 1$), and a gradual improvement is expected in the allocation of resources between the private and the public sector, then the value of V tends to decline.

VI. THE COST OF CAPITAL IN THE VENEZUELAN ECONOMY

The following sections of this work explore some approaches for deriving reasonable and practical estimates of the private and social cost of capital in the economy. The first approach consists of deriving the marginal productivity of capital in the economy through the use of a production function of the Cobb-Douglas type. In the model used, the changes in gross domestic product are explained in terms of changes in capital stock, labor, education, and a time trend for technological progress:

$$Y_t = a_t C_t^k K_t^b L_t^c E_t^d U_t^e,$$

where

Y = gross domestic product,

C = capacity utilization of capital,

K = capital stock,

L = labor,

E = labor force's average years of education, and

U_t = disturbance term.

Unfortunately, the results obtained from this model were completely meaningless, mainly due to the multicollinearity found among all the

independent variables. It should be pointed out that regardless of the results the usefulness of this type of model for the purpose of determining the equilibrium price of capital is very limited since it is highly aggregative, and assumes that factor payments are determined by perfect competition and that their relative shares in national product are constant.

Estimates of the Cost of Capital Based on Market Rates

The approach to estimate the cost of capital discussed in this section consists of analyzing the different interest rates and capital yields considered to be most relevant in the country: bank interest rates, government borrowing rates, returns on private investment and equity capital.

Bank Interest Rates

Bank interest rates in Venezuela include (1) the Central Bank rates, (2) deposit rates, (3) mortgage bonds rates, (4) other bond rates, and (5) lending rates.

Central bank rates. The criteria by which the Venezuelan Central Bank (VCB) fixes the rates charged to the commercial banks and other financial institutions have been relatively constant throughout 1974-1976. The discounting rate charged is equal to 3 percent below the facial rate of the document being discounted, but it can never be under 4.5 percent, except for documents related to the financing of agricultural activities in which case the rate can be as low as 3 percent. The rate for

advances varies, depending on the collateral, between 8 and 9 percent for private securities (8 percent for mortgage bonds) and between 5 and 8 percent for public securities.

The weighted average rate on all credit operations of the VCB in 1976 was 6 percent and it has increased to 7 percent in the first half of 1977. Total 1976 commercial banks' borrowings from the Central Bank amounted to around 10 percent of the resources of the commercial banking system.

Deposit rates. These rates are also subject to the minimums and ceilings imposed by the Central Bank. Interest on savings deposits in 1976 was set at 5 percent annually while current deposits carried no interest. The total amount of savings in 1976 was bolivares 9,271 million (U.S. \$2,156 million), and bolivares 10,637 million (U.S. \$2,478 million) in the first half of 1977.

Maximum permissible rates on term deposits (nonnegotiable) were 8.5 percent annually (8 percent for negotiable deposits), but it can fluctuate as shown below. The information was obtained from a survey among several banks and from nonpublished information obtained from the Departamento de Investigaciones Financieras y de Credito (DIFIC) del Banco Central de Venezuela.

Minimum Terms	Maximum Amount	Annual Interest Rates			
		Negotiable	Certificate	Nonnegotiable	Certificate
		Minimum	Maximum	Minimum	Maximum
(bolivares)					
90 days	100,000	-	-	5.5	6.5
180 days	250,000	6	7	6.5	7.5
360 days	250,000	7	8	7.5	8.5

The total amount of term deposits of the banking system in 1976 was bolivares 10,720 million (U.S. \$2,493 million) and bolivares 14,430 million (U.S. \$3,356 million) during the first half of 1977.

The weighted annual average rates of all bank deposits in 1976 was 5.9 percent.

Mortgage bond rates. Up to now the financing of the mortgage banks has been done by bond issuing, which earns 8 percent a year net of income taxes. The total amount of mortgage bonds in the market at the end of 1976 was bolivares 10,746 million (U.S. \$2,499 million) and it increased by bolivares 1,568 million during the first half of 1977. By 1976 the Investment Banks also had issued bonds for bolivares 700 million, with the same characteristics and conditions as the mortgage bonds.

Other bond rates. By the end of 1976 private credit institutions have issued bonds totaling bolivares 350 million with an average yield between 8 and 9 percent a year.

Lending rates. Commercial bank lending and discount rates are fixed by the Central Bank at a maximum of 10 percent including all fees except for the cases in which the banks use resources of the Agricultural Fund and the Industrial Fund for agricultural and industrial loans whose rates cannot be greater than 7.5 and 9 percent, respectively. The prime borrowing rate fluctuates between 9 and 9.5 percent. The total lending of commercial banks in 1976 amounted to bolivares 45,000 million (U.S. \$10,465 million).

The lending rates of the mortgage banks are set at 10.5 percent a year plus 1 to 2 percent on fees, depending on the type of operation. The total amount of mortgage loans in 1976 was bolivares 11,465 million (U.S. \$2,666 million).

The maximum lending interest rate charged by the investment banks has been set at 11 percent a year. However, they are allowed to charge substantial commission fees on outstanding balances which fluctuate between 1 and 5.5 percent a year depending on whether the loan will be to finance the acquisition of vehicles (5.5 percent), housing (1 percent), or for industrial purposes (3 percent). The total lending of the investment banks in 1976 was bolivares 6,090 million.

The savings and loan associations' lending rates are set by the National Bank of Savings and Loans between 8 and 9 percent a year (8.75 percent for financing the acquisition of low income housing). Total lending in 1976 amounted to bolivares 4,245 million and the weighted average real rate of these loans was 8.75 percent per year.

The weighted average lending interest rate of the banking system was 10.3 percent in 1976.

An examination of the operations of the "Agricultural Fund" and the "Industrial Fund" as well as "CORPOINDUSTRIA" dealing in medium and long term financing was made. These institutions provided during 1975-1976 around bolivares 4,000 million of long-term financing. Interest rates charged on the loans approved have ranged between 4 and 8 percent per annum. In effect these lending rates have been set by the government with the aim of promoting new agricultural and industrial activities.

From this survey it is concluded that the average deposit rate of the banking system in Venezuela is 5.9 percent, with average lending rates of 10.3 percent. From these rates the most significant may be the 10.5 percent rate charged by mortgage banks on loans with a high degree of safety.

Another important long-term lending institution in the country is the Venezuelan Investment Fund (VIF) established by the government in May 1974 to hold and invest abroad the additional tax revenues from the petroleum sector, until the time these funds can be productively utilized domestically to assist in financing national projects. So far the institute has approved several operations for bolivares 12,720 million to be invested in secured loans to state and private companies and bolivares 7,651 million to be invested in preferred and common stocks of such companies. The estimated weighted average lending interest rate has been 8.4 percent and it has ranged between 8 and 10.5 percent. The weighted average rate of preferred stock is 8 percent. It should be pointed out that the VIF is the only institution in the country whose lending rates are not regulated; however, since the lending philosophy of the VIF is that of a development bank, the interest rates charged on its operation cannot provide a definite clue to the cost of capital.

Government Borrowing Rates

During 1976 the long-term internal public debt represented by securities was bolivares 2,446 million, issued at 7 percent a year. The effective weighted average of these securities was 7.4 percent. Table 4 shows the weighted average effective yields of fifty of the most important

TABLE 4
WEIGHTED AVERAGE YIELD OF FIFTY OF THE MOST IMPORTANT PRIVATE
AND PUBLIC SECURITIES IN VENEZUELA

YEAR	QUARTER	PUBLIC SECTOR (%)	PRIVATE SECTOR (%)	TOTAL (%)
1976	I	7.3	9.0	7.4
	II	7.1	9.4	7.6
	III	7.7	8.2	7.7
	IV	7.4	10.1	7.8
1975	I	7.0	9.1	7.3
	II	6.8	9.5	8.0
	III	7.4	9.5	7.9
	IV	7.4	9.0	7.6
1974	I	7.4	9.6	8.0
	II	7.4	9.9	8.1
	III	7.3	9.6	7.9
	IV	5.2	9.8	6.1
1973	I	7.7	11.0	7.9
	II	7.5	10.0	8.3
	III	7.2	7.6	7.3
	IV	7.4	9.3	7.9
1972	I	7.4	8.4	7.6
	II	6.5	9.9	7.0
	III	7.2	9.8	7.8
	IV	7.5	10.4	8.3
1971	I	7.0	9.7	7.0
	II	7.0	9.1	7.4
	III	7.0	9.7	7.2
	IV	7.5	10.3	7.7
1970	I	7.1	9.9	7.4
	II	6.9	8.1	7.0
	III	7.0	9.8	7.7
	IV	6.7	9.2	6.8
1969		7.0	9.7	7.3
1968		6.8	9.6	7.1

Source: Nonpublished records of the Departamento de Investigaciones Financieras y de Credito (DIFIC) del Banco Central de Venezuela and "Informe Mensual Departamento de Valores." Caracas, Venezuela: Banco Central de Venezuela, Diciembre 1976, pp. 8-10; and own estimates.

private and public securities issued since 1968. Treasury bills (short term) are not common, but when they have been used their rates range between 5 and 6 percent a year.

At the end of 1975 Venezuela's long-term external public debt payable in foreign exchange amounted to bolivares 5,932 million (U.S. \$1,379.4 million). Table 5 shows the average maturity, average grace, and average interest of Venezuela's external public debt as of December 31, 1971, and of 1975. It should be pointed out that the structure and characteristics of this debt improved significantly in 1974-1976 as a result of the substantial prepayments of the hardest loans made during 1973-1975.

This average interest of 5.9 percent does not appear relevant for the purposes of providing an adequate order of magnitude of the market's current evaluation of the cost of capital since such a rate reflects a relatively large volume of specific nonconventional loan assistance, i.e., the use of resources from the Special Fund of the Inter American Development Bank to which the country will not have access in the near future at least. Besides, this rate would appear relevant only if loans could become available in sufficient volume to drive down the domestic cost of capital to a level of 6 percent, which is highly unlikely. In fact the Republic signed a syndicated loan agreement in March of 1977 amounting to bolivares 5,160 million (U.S. \$1,200 million) at a rate of LIBOR + 1 and 1/8. More recent loans and bond issues indicate that the future average public external borrowing rate may be in the neighborhood of 8 percent.

TABLE 5
STRUCTURE OF VENEZUELA'S EXTERNAL PUBLIC DEBT
DECEMBER 31, 1971—DECEMBER 31, 1975

	Total Debt	
	1971	1975
Average Maturity (Years)	12.8	13.6
Average Grace (Years)	3.5	3.7
Average Interest (Percentage)	6.1	5.9

Source: "Informe Economico." Caracas, Venezuela: Banco Central de Venezuela (1972, 1976; Tables A-V-45 to A-V-65) and nonpublished information supplied by the Venezuelan Central Bank; and own estimates.

Returns on Private Investment and Equity Capital

A sample of the firms registered in the Caracas Stock Exchange shows a considerable spread of the weighted rate of return on capital which presumably is due to variations in the degree of risk between industries. Besides the risk element, some of the firms included have been enjoying profits due to monopoly. It should be pointed out that firms' capital is expressed in terms of book value, while profits are affected by tax exonerations, tax evasion, and accelerated depreciation. Hence, the economic significance of the resulting rates of return is limited. Table 6 shows the weighted rates of return inclusive of undistributed profits, but after taxes, on capital.

A more significant indicator of the economic cost of capital is perhaps the weighted average rate of return on the common stock on the various industrial companies listed on the Caracas Stock Exchange. This was computed as the ratio between accrued dividends and the market price of the stock. The results of the computation shown in Table 6 indicate that the weighted annual average rate of return on common industrial stock listed on the Caracas Stock Exchange ranged from 7 percent in agriculture to 45 percent in insurance companies. This high average return observed in insurance companies during 1975 and 1976 was due to the sudden transfer of the fiduciary funds of the oil companies after the nationalization of this industry in 1974.

Private Bonds

During 1976 private companies in the country issued bonds by an amount of bolivares 361 million with the following characteristics

TABLE 6
RATE OF RETURN ON CAPITAL OF ALL FIRMS LISTED ON THE
CARACAS STOCK EXCHANGE

Sector	Weighted Average Return Capital			Weighted Average Return per Share		
	1976	1975	1974	1976	1975	1974
Industry	12.40	13.57	10.96	16.03	15.91	14.08
Commerce	30.88	23.56	28.55	25.51	16.50	8.54
Iron	14.39	16.79	18.22	31.42	41.25	52.75
Services	4.59	8.65	7.04	13.35	12.95	13.41
Insurance	17.34	23.64	14.81	45.48	80.59	31.22
Agriculture	8.45	14.47	19.10	6.64	13.09	9.63

Source: Boletín de la Bolsa de Caracas. Caracas, Venezuela: Bolsa de Valores de Caracas, Año No. 29, No. 354, pp. 43-60; and own estimates

(information obtained from nonpublished information of the Departamento de Investigaciones Financieras y de Credito del Banca Central de Venezuela):

Total Amount	Term (Years)	Rates		
		<u>8 1/2</u>	<u>9 3/4</u>	<u>10</u>
30	10	-	-	30
101	12	-	10	91
30	18	30	-	-
<u>200</u>	20	<u>-</u>	<u>-</u>	<u>200</u>
361		30	10	321

The average weighted rate on private bonds in 1976 including the aforementioned fixed income securities issued by private credit financial institutions was 10.0 percent.

The first conclusion that emerges from the above survey is that the empirical search approach provides only a rough order of magnitude of the market's current evaluation of the cost of capital. In fact, commercial banks' lending rates do not appear significant as indicators of the economic cost of capital in the country nor do the lending rates charged by the mortgage banks, investment banks, specialized credit institutions (except for the Venezuelan Investment Fund), since these are all administered rather than dictated by the market forces. Perhaps a more relevant indicator is the freely determined average yield of 7.4 percent on private and public securities.

The rates of return on common stock in various industries (Table 6, p. 105) which were based on share prices as determined in a free capital market also appear to be significant. These returns, however, reflect

different risk premiums and are affected by the distortions of other markets in the economy, particularly the labor market.

There is not a definite answer from this approach to the question of the private cost of capital in Venezuela. At best one may venture an estimate of its order of magnitude on the basis of the long-term average riskless lending rate of the Venezuelan Investment Fund which is 8.4 percent. Of course, an appropriate risk premium should be added to this rate to better reflect the private cost of capital in the economy.

It should be borne in mind that it was not the intention of the author to suggest the use of any of the rates obtained from this market survey to convert future benefits and costs of a project to the common basis of the present. The intention of the survey was simply to show the market's current evaluation of the cost of capital (private cost of capital).

In the following sections an attempt will be made within the LM tradition to derive the consumption rate of interest, the marginal productivity of capital, and the social rate of interest for the Venezuelan economy.

Consumption Rate of Interest (CRI)

As mentioned, the CRI is defined in terms of two value judgment parameters perceived and set by the government: (1) the elasticity of marginal utility with respect to consumption (n) and the rate of time preference (ρ), and (2) one directly observed, the growth of per capita consumption (g).

The marginal utility of consumption as explained in Chapter VI must be based on the explicit or implicit policies of income distribution of the Venezuelan government. Current policies indicate concern not only for redistribution of consumption, but also for growth. If the government values n equal one it means that it values marginal utility two times higher for a man (or family) with a given level of consumption than for a man (or family) with a consumption level twice as high. It is felt that even though there is an interest for redistribution, a value of n that equals one will not properly reflect the government's policy of growth with mild redistributive effects, which would rather call for a value of n at some intermediate value, i.e., between zero and one. It appeared reasonable to place the value of n for Venezuela at .80 based on the perceived value judgment of the government regarding the intratemporal and intertemporal trade off between consumption groups.

The pure time preference rate is also a value judgment parameter which according to the methodology employed in this study, as explained in Chapter VI, should reflect the government's preference between consumption and growth. It measures the social value of present versus future consumption. The need of current consumption in the country is being met in part by some redistributive measures which has been taken into account in setting the value of n . Thus the government concern with growth can be better reflected by having a low time discount rate. The author thinks that a value of ρ of 2.5 percent reflects a continuation of the desired emphasis on growth.

The estimation of g , of 3.9 percent, was made taking into account the expected growth of consumption expenditures between 1976 and 1985 and the growth of population.

Substituting the values discussed into equation 5-7, the following value of CRI is obtained:

$$CRI = (.80)(.039) + (.025) = .0562$$

or $CRI \sim .06$

Marginal Product of Capital in the Public Sector (q)

To derive the marginal product of capital in the public sector, the first aspect considered was to determine whether the public investment budget was relatively fixed. In this regard the findings indicate that the investment budget is relatively fixed, since for each planning period (five years) the Central Bank and the Congress agree on the amount of resources to be spent and the specific sources of financing. Besides, political and fiscal reasons in 1975-1976 forced the government to cut and postpone several investment projects in order to be able to complete its 1976-1980 investment program. It was not possible, however, to identify the marginal project(s) or sector(s).

In estimating q two sets of public investment projects were used: (1) those whose financing have already been approved by the Venezuelan Investment Fund, and (2) several projects which are being considered by the VIF for financing during the next four to five years. Fourteen projects were selected as representatives of the major sectors of public investment in the country. They all had been appraised by the technical

team of the VIF and contained adequate information which permitted the revaluation of costs and benefits at efficiency prices to estimate their efficiency rate of return. The total cost of the projects considered was bolivares 39,830 million (U.S. \$9.3 billion) which represents 50 percent of the total proposed nonpetroleum public investment program during the period 1976-1980.

The final estimate of q is a weighted average rate of return of the fourteen projects selected. Table 7 presents the results for each project. The weighted average return of all the projects considered was 9.76 percent.

Accounting Rate of Interest

An interesting way of deriving the value of ARI for Venezuela would have been by revaluating the fourteen projects which were used to estimate the economic cost of capital (q) in terms of social prices, that is, taking into account distributional considerations and the value of public income. This, however, was not possible. Instead it was calculated from national accounts data by using equation 5-10.

$$ARI = sq + (1 - s)q/V,$$

where

V = value of public income, and

s = global marginal propensity to save.

The value of V of 1.25 was obtained in Chapter VI and it is defined as the accounting price of public income expressed in terms of the marginal utility of consumption at the average level of consumption. The value

TABLE 7

RATES OF RETURN FOR SELECTED PROJECTS FINANCED BY THE
VENEZUELAN INVESTMENT FUND

Construction Period	Project Title	Sector	Amount (U.S. \$ million)	IRR at Efficiency Prices
1976-1980	Steel Production (SIDOR)	Metallurgy	4,163	10
1975-1974	Aluminum (ALCASA)	Metallurgy	186	14
1976-1979	Aluminum (VENALUM)	Metallurgy	581	12
1975-1977	Silage	Agriculture	68	12
1976-1979	Cement I	Manufacturing	120	13
1976-1979	Cement II	Manufacturing	76	9
1977-1980	Cement III	Manufacturing	90	11
1976-1979	Energy (CADAPE)	Energy	462	8
1976-1988	Hydro Power (EDELCA)	Energy	2,974	9
1977-1980	Shipyard (DIANCA)	Industry	69	10
1977-1984	Steel (ACELCAR)	Metallurgy	275	13
1976-1980	Gold Mining (MINERVEN)	Mining	58	8
1976-1980	Coal Production (CAMINA)	Mining	139	3
1976-1980	Gold Mining (VENORCA)	Mining	2	50

Weighted average IRR = 9.76 percent.

The estimate of q of 10 percent is based on the assumptions that the efficiency rates of return of the selected projects are representative of the public investment alternatives in the country.

of s was estimated from national account data. It was based on the assumption that both public and private investment have on the average the same impact on consumption. Given this assumption s was estimated as the change in consumption at constant prices as a proportion of the change in GDP at constant prices. The 1974-1976 average value of s was found to be .47.

$$ARI = (.47)(.10) + (1 - .47)(.10) / \frac{1.25}{.914} = .074 \sim .075.$$

$$ARI \sim .075.$$

Another way of estimating the accounting rate of interest could be by determining the real rate of return on Venezuela's foreign lending or alternatively by measuring the rate at which the country is borrowing from abroad.

Since the ARI is the rate of fall in the value of public income measured in foreign exchange, it follows therefore that the rate of return on the Venezuelan Investment Fund's portfolio invested abroad (medium term securities—5 years—and long-term lending—10-20 years) could be taken as a lower limit of the ARI because this portfolio is in terms of the numeraire. The estimates made indicate that actually the average rate of return of the Fund's portfolio invested abroad is 8.1 percent. Alternatively, since the country is also borrowing from abroad then the ARI should be at least equal to the marginal cost of that borrowing. As mentioned, loan agreements signed in the 1976-1977 period indicate that the average borrowing rate may be in the order of 8 percent. Once inflation is taken into account both rates will come down

to around 2 percent (assuming a rate of inflation of 6 percent). The relevant ARI, however, for the purpose of project selection is still the estimated value of .075.

It should be pointed out that the difference between the value of CRI and ARI will tend to diminish and turn into equality at some day in the future (T). At that time (T) society will value consumption as much as savings (this topic will be discussed in more detail in Chapter VI).

The use of the various rates so far derived will depend on the numeraire in which the intertemporal stream of net benefits is expressed. When consumption is the numeraire the relevant discount rate is the CRI. Alternatively if savings is taken as the numeraire the net benefits have to be discounted at the accounting rate of interest. If one is not concerned with income distribution considerations and or public income deficiencies then the relevant discount rate to be used is the efficiency marginal productivity of public capital (q).

CHAPTER VI

DISTRIBUTION WEIGHTS

This chapter outlines the general rationale for the inclusion of distributional considerations in social benefit-cost analysis. Attention is also paid to the detailed derivation of distributional weights and to the manner in which they can be taken into account in project appraisal.

Concern with the integration of efficiency and equity in project appraisal has led to recommendation in project evaluation manuals prepared for international institutions to introduce income distributional considerations in the analysis of investment projects undertaken by developing countries. The OECD manual prepared by Little and Mirrlees "called for attaching different weights to the consumption of different income groups."¹ In the revised volume, Project Appraisal and Planning for Developing Countries, they proposed that the weights should express the objectives of the government;² however, no indication is given as to how the weights are to be determined.

The UNIDO Guidelines proposed the introduction of income distributional considerations in project appraisal by weighting the consumption increments accruing to people in various income groups that result from the projects' implementation.³ The basic notion behind these

¹Little and Mirrlees, Manual of Industrial Project Analysis, p. 42.

²Little and Mirrlees, Project Appraisal, p. 234.

³UNIDO Guidelines, p. 77.

weights is that they should directly reflect political value judgments. They are to be derived on the basis of choices made by policymakers in regard to specific projects hoping that after many choices a consistent pattern of weighting would emerge.⁴

The general approach set forth by Squire and van der Tak also expressed the view that if the desired income distribution cannot be achieved by macroeconomic tools, the government can use the allocation of investment resources as an alternative method of redistributing income.⁵

Schydolowsky, in a work prepared in the context of a consulting agreement with the Inter American Development Bank, also advised on the convenience of including distributional considerations in social benefit-cost analysis. He said:

It is not sufficient to undertake the usual translation of the physical benefits and costs of a project into units of contribution to income or consumption of the representative citizen. This representative citizen is different for each project, since the distribution of benefits of the project are different and hence it is necessary to go further and standardize the consumption of income denominated and costs in terms of a utility numeraire.⁶

⁴Ibid., p. 144.

⁵Squire and van der Tak, pp. 3-6.

⁶Daniel M. Schydolowsky, "A Note on Distributional Considerations in Social Benefit/Cost Analysis," Boston University Discussion Papers Series Number 3, April, 1973, p. 1.

I. GENERAL RATIONALE OF DISTRIBUTION WEIGHTS

The justification for considering distributional weights in project appraisal resides in the acceptance that the social value of a unit of benefit depends, at least on part, on who gets the benefits. In other words, it is necessary to assign different values to marginal increments in consumption accruing to different income groups and to get away from the idea of continuing standardizing the consumption of income (benefits and costs) in terms of a common money numeraire which assumes consumer equilibrium and that the marginal utility of income is equal for all individuals when, in fact, it is very likely to be different for different individuals.

In connection with the redistribution objective, the same question raised in Chapter II may be asked: why should the distributional consideration be a matter of concern in individual projects when there are other instruments such as taxation and transfers which are more efficient to achieve the desired distribution of income? or why not let projects be judged only on the basis of their contribution to consumption or growth? The answer is that to the extent that more efficient means are fully effective in achieving income redistribution, there is no need to include distributional considerations in project selection. Indeed, it would be sufficient to maximize the aggregate consumption contribution through an adequate choice of projects.

To assume that the desired redistribution of consumption in the country is to be achieved independently of investment decisions is an illusion. In the first place, the Venezuelan tax system is very weak.

Besides, the attitude of the relevant political and pressure groups as well as other institutional and administrative reasons prevent taxation of the rich to the level necessary to reduce the existing inequalities. Furthermore, the idea of increasing the consumption of the poorest classes through direct subsidies is not appealing to several groups and institutions in the country.

Of course, regardless of the institutional obstacles to mitigate inequalities in the country, the government insists on the need of improving the lot of the still larger segments of the Venezuelan population with low incomes and poor living conditions due to unemployment, underemployment, or employment in activities of low productivity. Consequently, in 1974 policies were issued on wage and salary increases as the main instrument for achieving a more equitable income distribution. This, however, has not had any significant effect as a distributive measure. In fact, the available data suggests that in spite of these measures, the inequalities have increased throughout the time. (The GINI coefficients of income concentration associated with the Lorenz curve in the metropolitan area of Caracas, according to the author's estimate, went from .44 in 1966 to .50 in 1975.)⁷

To sum up, since the effectiveness of the redistributive tools fall short of achieving the desired distributional goals, then the inclusion of distributional considerations in project choice become justified.

⁷The estimates were made using a household survey made by the Venezuelan Central Bank in the metropolitan area of Caracas in the years 1966 and 1975.

Besides, the consideration of the effect of income distribution in project appraisal is a key element to assume the welfare maximization criteria, particularly if one recognizes that other government objectives, such as a more efficient agricultural sector, full employment, better living conditions, better education and housing facilities are only means to attain more fundamental objectives which, in the end, relate to the distribution of both current and future consumption. Additionally, it should be pointed out that income inequalities in the long run limit the pace of economic growth while in the short run the capital formation affects income distribution.

II. INTRODUCING DISTRIBUTIONAL WEIGHTS IN PROJECT APPRAISAL

If the interest lies only in efficiency then the economic value of the increase in net consumption is an adequate measure of the project's benefits. However, when distribution weights are considered necessary, then, the net benefits accruing to different individuals should be weighted in accordance with the social welfare maximization criteria and summed up to obtain the total social value of the project. The basic notion behind the weights, rooted in the tradition of Pigorian welfare economics, is that the consumer's marginal utility of income declines as income rises; hence, any distributional adjustment implies lowering the valuation of benefits accruing to higher income groups and raising the valuation of benefits to the lower income groups.

Two main groups can be distinguished immediately—the public sector and the private sector—and, within the private sector, the net benefits

will accrue to several income groups. Assuming that as a result of a project the income of a group in the private sector is increased by Y and that the rest of the benefits are consumed by the public sector (no savings involved), the total cost of the increased resources most likely is not equal to Y because of the distortions of the several markets in the economy; thus Y should be adjusted to obtain its real resource cost. If the adjustment factor is β then, the real economic value of the increase in resources accruing to the private sector is $Y\beta$, and the public sector retains control over the remainder; that is, $E - Y\beta$, where E is the project's net increase in real resources.

If the increase in welfare associated with the increase of real resources (consumption) to the government is valued W_g and that related to the increase in consumption of a particular income group is W_c , then the measure of social benefit ($S\beta$) is:

$$S\beta = (E - Y\beta) W_g + YW_c. \quad (6-1)$$

Since the LM numeraire is the value of resources that are freely available to the public sector then the weight of $(E - Y\beta)$ should equal one. To do so in equation 6-1, and maintain price relativities, everything must be divided by W_g so one obtains:⁸

$$S = (E - Y\beta) + Y\omega, \quad (6-2)$$

where

$$\omega = W_c/W_g,$$

⁸Squire and van der Tak, pp. 51-56.

$(E - Y\beta)$ = increase in real resources in public sector, and

$Y\omega$ = social welfare from increased consumption of the private sector.

Equation 6-2 can also be written in the following manner:

$$S\beta = E - Y(\beta - \omega). \quad (6-3)$$

Net social benefits = Net efficiency benefits - Net social cost of increased private sector consumption.

Equation 6-2 allows the project analyst to distinguish between the efficiency (economic) benefit and the social benefits (cost) of a project. Net efficiency benefits will be derived as usual. The only additional estimate to be done is that related to the income accruing to each group. The values of β and ω are national parameters which should be supplied by the planning agency of the country.

It should be noticed that the introduction of distributional considerations does not imply changes in the income distribution itself. It takes as given the income distribution and adjusts for the different marginal utilities of income arising from it. This is exactly a second-best estimate since the existing distribution is taken as given even if it is not optimal. Readjusting the income distribution implies a first best procedure which does not correspond to reality, unless such a change is expected.

III. DISTRIBUTIONAL PARAMETERS

Social Value of Private Consumption (ω)

As mentioned, the social value of private consumption is the value of a marginal increase in private consumption, measured at domestic prices, in terms of the value of public income measured at border prices, that is, relative to the value of free foreign exchange in the public sector (the numeraire). It can be expressed as:

$$\omega = \frac{W_c}{W_g} = \frac{\Theta \text{ units of private consumption}}{1 \text{ unit of public income}}, \quad (6-4)^9$$

where

ω = value of private consumption at consumption level C relative to the numeraire,

W_c = marginal social value of private consumption at consumption level C, and

W_g = marginal social value of foreign exchange in the public sector.

The derivation of the parameters in equation 6-4 can be carried out in two steps: first, with respect to the welfare value of private consumption (W_c)—for instance someone at the average level of consumption $\bar{W}_c$, where the bar denotes average. If " d_1 " is used to denote the weight to be attached to specific consumption groups, then one obtains:

⁹Ibid., p. 60.

$$d_i = \frac{W_c}{W_{\bar{C}}} . \quad (6-5)$$

This means that a marginal increase in consumption (at domestic prices) accruing to someone having a consumption of C is worth " d_i " times as much as a marginal increase in consumption of someone at the average level of consumption $\bar{C}$, hence $d_i > 1$ if $C > \bar{C}$ and $d_i < 1$ if $C < \bar{C}$.

The second step in the derivation of " ω " consists in measuring the social value of public income (V) relative to the value of consumption of someone at the average level of consumption, that is:

$$V = \frac{W_g}{W_{\bar{C}}} . \quad (6-6)$$

By putting together equations 6-4, 6-5, and 6-6, one obtains:

$$\omega = \frac{W_c}{W_g} = \frac{W_c}{W_{\bar{C}}} \frac{W_{\bar{C}}}{W_g} . \quad (6-7)$$

thus

$$\omega = d \times \frac{1}{V} = \frac{d}{V} . \quad (6-8)$$

In other words, ω depends on two factors d , which is designed to allow for the different values assigned to marginal increases in consumption by different groups (a pure income distribution parameter) and V , which is designed to allow for the ratio of the different values assigned to public income (measured at border prices) and private consumption (measured at the average level of consumption " $\bar{C}$ ").¹⁰

¹⁰Consequently, social benefit = efficiency price + $Y (\beta - d/V)$.

Social Value of Public Income (V)

The social value of public income is the price of public investment expressed in terms of the marginal utility of consumption at the average level of consumption. To derive "V" one must examine how public income (measured in foreign exchange) is used, given that at the margin public income is used for different purposes such as education, defense, industrial investments, and health, "V" should be interpreted as a weighted average of the values of different types of public expenditures (the weights are the proportion of each in the marginal unit of expenditure). If V_i is defined as the value of " i^{th} " expenditure expressed relative to the value of $\bar{C}$, then:

$$V = \sum_j a_j V_j, \quad (6-9)$$

where

a = proportion of public expenditure on the i^{th} activity, and

V_j = value of i^{th} activity relative to value of $\bar{C}$.

Theoretically, all V_j should equal V since at the margin the government tries to assure that the additional expenditure has the same value in all uses. Hence, in order to know the value of "V" one could identify only one " V_j ", for instance assessing the value of public investment relative to the private average level of consumption ($\bar{C}$). In practice, however, there is no equality at the margin of the value of additional expenditure for all purposes, but in the light of the difficulty involved in trying to measure all the V_j a reasonable working assumption could be that all V_j approximately equal "V".

Since public investment is the major component of public expenditure its value may be assessed by assuming that a unit of public investment produces a stream of output (measured in foreign exchange) equal to the marginal product of capital (q). This " q " accrues to someone at the average level of consumption allowing an increase in consumption of q/β (where β is the ratio of domestic to border prices) and since it is assumed that while consumption is increasing diminishing marginal utility takes place, future consumption must be discounted by a rate which reflects the rate of growth of consumption " g " and the rate of diminishing marginal utility " n ". As mentioned, this discount rate is known as the consumption rate of interest (CRI) or social discount rate (see Chapter V for greater detail on CRI), and may be expressed as:

$$i = ng + \rho, \quad (6-10)$$

where

i = CRI,

n = parameter of utility function, and

ρ = time preference rate.

The present value of the consumption stream generated by a unit of investment can now be expressed as follows:

$$V = \sum_{t=0}^{\infty} \frac{q}{\beta(1 +)^t}, \quad (6-11)$$

$$V = \left[\frac{q}{i} \right] / \beta. \quad (6-12)$$

A more comprehensive definition of "V" presented by Squire and van der Tak to take into account the impact of savings and the rate at which the reinvested part saved continues to produce an added flow of consumption benefits in the future can be expressed as follows.¹¹

$$V = \sum_{t=0}^{\alpha} (1 - s_t)q_t \cdot \frac{1}{\beta_{ct}} \prod_{t=1}^t (1 + s_t q_t) / \prod_{t=0}^t (1 + i)^t, \quad (6-13)$$

where

- V = social value of public income,
- (1 - s) = global marginal propensity to consume (public sector),
- s = global marginal propensity to save (public sector),
- q = marginal product of public capital,
- i = CRI,
- $\prod$ = denotes multiplication, and
- β_c = consumption conversion factor (shadow to market prices of consumption goods).

The first term of equation 6-13, $[(1 - s_t)q_t \cdot 1/\beta_{ct}]$, as before gives the value of the consumption arising from public sector investment expressed in domestic prices (division by β_c is necessary because "q" is valued in terms of border prices). The second term, $\prod_{t=1}^t (1 + s_t q_t)$, expresses the value of the capital stock growing at a rate of $s_t q_t$ and the third term is the factor which discounts the first and second term at the CRI = i.

¹¹Squire and van der Tak, p. 141.

Under this formulation "V" expresses the present value of the consumption out of the public income expressed in terms of a consumption numeraire in "t" number of periods. The problem in deriving "V" from equation 6-13 is that there is no empirical evidence of how s, q, and i will change throughout the years. Hence, the most realistic assumption to be made is that i, s, q, and β_c are constant over time and to make an estimate of the number of years (t) it will take for savings to become optimal. Along these lines "V" can be formulated as follows:¹²

$$V = \frac{(1-s)q}{(i-sq)\beta_c} \left[1 - \left[\frac{(1+sq)}{1+i} \right]^{t+1} \right] \quad (6-14)$$

Where the first term of the equation, $(1-s)q/(i-sq)\beta_c$, measures the proportion of the marginal product which is consumed in the private sector discounted at the rate $(i-sq)$ which is the CRI minus the

¹²Colin Bruce, Social Cost Benefit Analysis: A Guide for Country and Project Economists to the Derivation and Application of Economic and Social Accounting Prices. Washington, D.C.: World Bank Staff Working Paper No. 239, August 1976, p. 26. Assuming constant s, q, i and β_c

$$V = \frac{(1-s)q}{(1+i)\beta_c} \left[1 + \frac{1+sq}{(1+i)} + \frac{(1+sq)^2}{(1+i)^2} + \frac{(1+sq)^3}{(1+i)^3} + \dots + \frac{(1+sq)^t}{(1+i)^t} \right]$$

Using the formula for the summation of a finite series equation 6-14 may be rewritten as

$$V = \frac{(1-s)q}{(1+i)\beta_c} \left[\frac{1 - \left[\frac{(1+sq)}{(1+i)} \right]^{t+1}}{1 - \frac{1+sq}{1+i}} \right]$$

$$V = \frac{(1-s)q}{(1+i)\beta_c} \left[1 - \left(\frac{1+sq}{1+i} \right)^{t+1} \right]$$

proportion of the marginal product saved (sq), since the productivity of savings (sq) produces future additional benefits which reduce the rate which should be used to discount the benefits of investments instead of consuming. The term $[(1 + sq)/(1 + i)]^{t+1}$ compounds the savings out of the capital stock up to period $t + 1$, discounted at the CRI. This third element is subtracted from one to deflate the first term which discounts the net present value of the added deferred consumption beyond the point "t" to infinity (t is point where savings become optimum).

Consumption Distributional Weights (d)

Any set of income distribution weight is based on some kind of value judgment and therefore is not susceptible to objective measurement. Whatever the implicit value judgment is, however, to derive a set of distribution weights a utility function has to be specified. Any utility function where the marginal utility of consumption (U_c) is taken to depend on the initial level of consumption (C) and the parameter of the utility function (n) will serve the purpose. The formulation chosen by Squire and van der Tak seems to be as good as any (an isoelastic function):

$$U_c = C^{-n}, \quad (6-15)^{13}$$

where

U_c = marginal utility,

¹³The negative sign for n indicates a falling value for the elasticity of marginal utility as income rises.

C = level of consumption, and

n = elasticity of marginal utility.

Total utility is obtained by integrating equation 6-15, i.e.

$$U_{(c)} = \frac{1}{1-n} C^{1-n}, \text{ if } n > < 1 \quad (6-16)$$

$$U_{(c)} = \log_e C, \text{ if } n = 1 \quad (6-17)$$

The basic assumption behind equation 6-15 is that the marginal utility of consumption declines as the level of consumption increases. The advantage of this formulation is that the function can be used to reflect government preferences. For example a high value of n implies a more egalitarian objective, since the higher n the higher the rate of diminishing marginal utility.¹⁴ It seems that the values of n would probably center around one. Values close to zero or two, although possible, may be considered extreme. For example a value of $n = 2$ means that the marginal utility is four times higher for a person with a given level of consumption than for a person with a consumption level twice as high. Values ranging from .5 to 1.5 seem to be more reasonable.

To be able to measure all consumption changes of different people and at different points of time, a numeraire is needed. Such a numeraire could be the marginal utility of consumption at average level of current consumption. That is, the consumption distribution weight (d) for

¹⁴Squire and van der Tak, p. 63.

marginal changes in consumption can be estimated by relating actual utility to the average by dividing through by $\bar{C}$.¹⁵ Hence,

$$d = U_c/U_{\bar{c}} = (\bar{C}/C)^n, \quad (6-18)$$

where

d = consumption distribution weight,

U_c = marginal utility at consumption level c ,

$U_{\bar{c}}$ = marginal utility at average level of consumption,

$\bar{C}$ = average consumption level, and

C = consumption level C .

Table 8 illustrates how the value of "d" changes with different consumption levels and with different values for "n" (different value judgments).¹⁶

If n is set equal to zero, as it is traditionally done in project evaluation when distributional weights are ignored, all increases in consumption are equally valuable regardless of the existing level of consumption of the final consumer. Higher values of n imply a pronounced bias in favor of the poor.

Where nonmarginal changes in consumption are involved, particularly if the distribution of income suffers significant changes and one desires to continue expressing the value of such increase in consumption at the average level of consumption (that is in terms of $\bar{C}^{-n}$) the equivalent formula is:

¹⁵Squire and van der Tak, p. 63.

¹⁶Adapted from Squire and van der Tak, p. 64.

TABLE 8
VALUES OF d FOR MARGINAL CHANGES IN CONSUMPTION

Existing Level of Consumption	Value of Distribution Weight (d) = $(\bar{C}/C_1)^n$					
	$\bar{C}/C_1$	n=0	n=.5	n=1	n=1.5	n=2
10	10.00	1.0	3.16	10.00	31.62	100.00
25	4.00	1.0	2.00	4.00	8.00	16.00
50	2.00	1.0	1.41	2.00	2.83	4.00
75	1.33	1.0	1.15	1.33	1.53	1.77
100*	1.00	1.0	1.00	1.00	1.00	1.00
150	0.66	1.0	0.81	0.66	0.54	0.44
300	0.33	1.0	0.57	0.33	0.19	0.11
600	0.17	1.0	0.41	0.17	0.07	0.03
1000	0.10	1.0	0.32	0.16	0.03	0.01

*Average consumption = $\bar{C}$

Source: Squire and van der Tak, p. 64.

$$d = \frac{U(C_2) - U(C_1)}{\bar{C} - n}, \quad (6-19)$$

where

C_1 = old consumption level (consumption without project), and

C_2 = new consumption level (consumption with project).

A value of d which will equate the increase in consumption of a given group to the marginal utility of someone at the average level of consumption is

$$(C_2 - C_1) d = \frac{U(C_2) - U(C_1)}{\bar{C} - n}. \quad (6-20)$$

Dividing both sides by $(C_2 - C_1)$,

$$d = \frac{U(C_2) - U(C_1)}{\bar{C} - n (C_2 - C_1)}. \quad (6-21)$$

Table 9 indicates how the value of "d" changes for different values of n , C_1/C_2 , and $\bar{C}/C_2$.¹⁷

An increase in consumption from C_1 to C_2 (i.e., $C_1/C_2 = .5$) will make $\bar{C}/C_2 > 1$. The lower C_1/C_2 and the higher $\bar{C}/C_2$ the higher the weight. For example, if $\bar{C}/C_2 = 2$ and $C_1/C_2 = 0.5$ and $n = 1.5$ the value of d is 4.69. However, if the increase in consumption accrues to a high income group, i.e., $\bar{C}/C_2 = 0.5$ and $C_1/C_2 = 0.75$ d will be low, particularly if n is high.

¹⁷Ibid.

TABLE 9
VALUES OF CONSUMPTION DISTRIBUTION WEIGHT (d) FOR
NONMARGINAL CHANGES IN CONSUMPTION

$\bar{c}/c_2$	c_1/c_2	n=0	n=0.5	n=1.0	n=1.5	n=2.0
2	0.25	1.00	1.86	3.70	7.54	16.00
2	0.50	1.00	1.64	2.77	4.69	8.00
2	0.75	1.00	1.47	2.33	3.45	5.30
1	0.25	1.00	1.32	1.85	2.67	4.00
1	0.50	1.00	1.16	1.39	1.66	2.00
1	0.75	1.00	1.04	1.15	1.22	1.30
0.5	0.25	1.00	0.66	0.92	0.92	1.00
0.5	0.50	1.00	0.58	0.69	0.59	0.50
0.5	0.75	1.00	0.52	0.57	0.43	0.33

Source: Square and van der Tak, p. 66.

Derivation of a Global Distribution Parameter (D)

Sometimes one may not obtain enough information about the final beneficiaries of a project; hence, the effects of the project on consumption may be difficult to trace or be so general that many income groups will have to be examined. In such cases the use of a global distribution weight (D) should be used; this is defined as "the ratio of (a) the social value of an additional unit of consumption distributed according to the present income distribution pattern to (b) the social value of an additional unit of private consumption of a person at the average level of income."¹⁸ It should be pointed out that D is a national parameter which does not depend on the income distribution impact of the project in hand

If $n \neq 0$, D is derived as:

$$D = \frac{\sigma^n(\sigma - 1)^{1-n}}{n + \sigma - 1}, \quad (6-22)^{19}$$

where

n = elasticity of marginal utility, and

σ = distribution of consumption parameter.

If σ equals one the distribution of consumption will be perfectly egalitarian and as σ approaches zero the distribution of consumption becomes increasingly inegalitarian. To estimate σ one can derive the the GINI coefficient of a given income distribution. Symbolically,

¹⁸Bruce, p. 43.

¹⁹Squire and van der Tak, pp. 137-139.

$$\sigma = \frac{1 + \text{GINI}}{2 \text{GINI}} .$$

(6-23)²⁰

As illustrated below, for $n = 0$, the social value of consumption is equal for all income classes, $D = 1$. For $n = 1$, an increase in consumption by a rich and a poor man implies the same absolute increase in their respective utilities, again $D = 1$. For $n > 0$ implies that marginal utility is greater for a poor man than for a rich man. If $n > 1$ that means that the government is giving considerable weight to income distribution. The following table shows the values of summary distribution weight (D) for different values of σ and n .²¹

σ	n			
	<u>0</u>	<u>.5</u>	<u>1.0</u>	<u>2.0</u>
1.5	1.0	0.86	1.0	1.8
2.0	1.0	0.94	1.0	1.3

IV. NUMERICAL ESTIMATION OF DISTRIBUTIONAL PARAMETERS IN VENEZUELA

Value of Public Income

Equations 6-12 and 6-14 provide two ways for estimating the value of public income. Estimates of "V" using these equations as well as two other methods will be presented and then the consistency of the principal social parameters will be checked.

²⁰See Appendix A for the derivation of the GINI coefficient.

²¹Squire and van der Tak, p. 67.

According to equation 6-12 the value of V equals $[q/i]/\beta = .0976/.056/.914 = 1.90$. This means that in 1977 a unit of public income was worth 1.90 units of consumption accruing to consumers at the average income level.

The value of V according to equation 6-14 can be expressed symbolically as:

$$V = \frac{(1-s)q}{(i-sq)\beta} \left[1 - \left[\frac{(1+sq)}{(1+i)} \right]^{t+1} \right]$$

Before using equation 6-14 it is necessary to say a word about the values of s, q, i and derive T, the date when savings is just sufficient to finance the optimum amount of investment and thus when the accounting rate of interest equals the consumption rate of interest (see Chapter V for greater details). The value of s to be used will be the global marginal propensity to save and q is the marginal productivity of public capital. The rate of interest is the consumption rate of interest (CRI) estimated in Chapter V.

Estimates of T: Time to reach equality in public and private income. As mentioned T is the number of years it will take for public investment and private consumption to be approximately equally valuable to the government. The value of T should ideally be derived from an

optimal economic development path model if available; otherwise, some less rigorous approaches should be used to approximate its value.²²

For example the value of T could be approximated by the year the labor force employed in the modern sector is fairly constant or approaches the proportions reached in industrialized countries. By the end of 1976 the active labor force engaged in mining, industry, construction, and utilities was around 24 percent of the total labor force. If the total labor force continues to grow at the rate of 4.5 percent per annum until 1985, and the modern sector labor force maintains its growth rate of 5 percent, it will reach 30 percent of the total labor force (assuming the rate maintains constant) in the year 2000, that is, almost 25 years before it compares with the levels in industrialized countries. A value of T of 24 years could be tentatively accepted as the period of time which must elapse before the Venezuelan government will consider public income and private consumption equally valuable.

Substituting values in equation 6-14 one obtains,

$$V = \frac{(1 - .47) (.10)}{[.056 - (.47) (.10)] .914} 1 - \left[\frac{1 + (.47) (.10)}{(1 + .056)} \right]^{25},$$

$$V = 1.25.$$

Thus in 1977 a unit of public income was worth 1.25 units of consumption accruing to consumers at the average income level.

²²The approach using the date at which the rate of savings as a proportion to GNP in the economy will be similar to other industrialized countries also allows to get an idea of the value of T. However, the lack of reliable data did not permit the use of this approach.

The value of public income in terms of average consumption "V" will be greater than unity as long as the accounting rate of interest (ARI) and the consumption rate of interest (CRI) are not equal. By assuming that the yearly differences between the CRI and ARI (details on the meaning and derivation of the CRI and ARI are offered in Chapter V) diminish throughout time, i.e., until the government values public income equal to private consumption, V could also be expressed as follows:

$$V = [1 + 1/2 (ARI - CRI)]^T, \quad (6-24)$$

where

V = value of public income,

ARI = accounting rate of interest,

CRI = consumption rate of interest, and

T = date in years when ARI = CRI.

Substituting values in equation 6-24 one obtains

$$V = [1 + 1/2 (.075 - .056)]^{24}$$

$$V = 1.25.$$

Thus a unit of public income (savings) was worth 1.25 units of consumption accruing to consumers at the average income level. This was the value of V in 1977 and it would be expected to decrease in time.

Consumption Distributional Weights

The function suggested to derive the marginal utility of consumption (equation 6-15) requires some knowledge on two constants: (1) the

average consumption level $\bar{C}$, and (2) the elasticity of marginal utility of consumption.

The expected average consumption level per family in the country which resulted from dividing yearly 1976-1985 levels of consumption at constant prices by yearly total population in the same period was around bolivares 3,000 per month. The 1975 average consumption level per family in the metropolitan area of Caracas was bolivares 3,000 a month, according to the household survey made by the Venezuelan Central Bank in that year.

The elasticity of marginal utility of consumption. The commitment of the government to improve the large segments of the population of low incomes and poor living conditions has resulted in several policies which are indirectly concerned with redistribution of consumption and directly related to promote growth. In fact, the 1976-1980 public investment program is mainly aimed to promote growth.

The objectives of growth with mild redistribution effects mean that n should be set at an intermediate value between .5 and one. For the purposes of this work n was set at .80 based on the perceived value judgment of the government regarding income distribution. That is, the value of n corresponds to the weight given by the government to marginal increases in income.

As mentioned in Chapter II another approach to derive the elasticity of marginal utility is by assuming that total utility is composed of two separable additive terms, i.e., food and nonfood utilities, and then taking the ratio of the i^{th} commodity's income elasticity to its

compensated own price elasticity. Lack of reliable data did not allow estimates of marginal utility to be obtained by this procedure. However, it should be pointed out that whatever value derived by this method—assuming ordinal utility—cannot be taken as a measurement of welfare cardinal utility; hence, it is not comparable to the value and meaning of n in this study.

Determining the d s. Equations 6-18 and 6-21 can be used for estimating the values of the distribution weights (d 's) depending upon whether changes in consumption are marginal relative to the average consumption level or nonmarginal. Using equation 6-21 for nonmarginal changes in consumption with a value of $n = .8$, and comparing the value of $\bar{C}$ with the urban average monthly salary in 1976 of 1,150 bolivares, a value of (d) equal to 1.42 is obtained.

$$d = \left(\frac{C_2^{1-n} - C_1^{1-n}}{C_2 - C_1} \right) \frac{\bar{C}_n}{1 - n} = \left(\frac{4.96 - 4.09}{1850} \right) \frac{605}{.2} = 1.42 .$$

It should be noticed that d is a pure number, thus as long as n is known one can relate any level of consumption to the average level and obtain other values.

Critical Consumption Level (C^*)

The critical consumption level (C^*) is that level of private consumption (measured in domestic prices at the average level of consumption) which will be considered by the Venezuelan government to be equally as valuable as a unit of public income (measured in foreign

exchange). Put in symbolic terms this can be written as the level of consumption for which the value of d is such that $d/V = \beta$.

It is very difficult to measure C^* precisely; however, there are several methods to approximate its value. A first approximation is the income level at which the government provides substantial subsidies to maintain a minimum consumption standard. Another method is by referring to the level of income (consumption) at which income tax is not payable. All this sound rational, but it assumes that the fiscal policies of the government proposals reflect the wish for income distribution, which is not necessarily the case, at least in Venezuela.

A minimum level for C^* could be the consumption guaranteed by the government's minimum rural wage policy enforced since 1974. This minimum wage legislation assures workers in the rural agricultural sector wage income of around bolivares 400 a month, plus daily meals which raises the cash equivalent income received per month to around bolivares 500. This, however, need not necessarily be the level at which government regards a unit of extra consumption as having the same social value as a unit of additional public revenue, but it certainly represents a minimum value of C^* .

A more realistic value of C^* could be bolivares 2,400 a month, which is close to the level of income at which income tax is not payable. In other words, at the level of bolivares 2,400 a month the government is indifferent between having an additional unit of income or leaving it to the individuals for private consumption (all measured in foreign exchange).

One of the advantages of estimating a value for C^* is that it allows to test the consistency of the value of V . In other words, once one has determined the values of d and n an estimate of V implies an estimate of the critical consumption level and vice versa. As mentioned, the critical consumption level is the level for which $V = d/\beta$. Given that $d = (\bar{C}/C)^n$, for the level C^* , $d = (\bar{C}/C^*)^n = V\beta$. Substituting values into this last equation one can obtain estimates of V and C^* which can be compared with the ones already estimated.

$$d = (\bar{C}/C^*)^n = \left(\frac{3000}{2400}\right)^{.80} = 1.20 . \quad (6-25)$$

$$V\beta = (1.25) (.914) = 1.15 . \quad (6-26)$$

The close correspondence between the estimated values of C^* and V with the calculated value of V with equations 6-25 and 6-26 suggests that a consistent set of social parameters has been obtained.

Regardless of the significance of the estimates it is necessary to point out that the formula suggested for the derivation of the distributional effects simply provides the theoretical rationale for the approach to integrate equity and efficiency in project appraisal, as well as some indication of the value of the parameters involved—but never should they substitute the analyst's good judgment in arriving at realistic values of d and V .

The Global Distribution Parameter (D)

Derivation of the global distribution parameter (D) can be meaningfully done by applying equation 6-22:

$$D = \frac{\sigma^n (\sigma - 1)^{1-n}}{(n + \sigma - 1)} ,$$

in which σ , the distribution of consumption parameter, can be estimated in terms of the GINI coefficient of the distribution of consumption (G).

To derive estimates of the consumption distribution coefficient (see Appendix A for details on the derivation of GINI coefficients) data on income and expenditure were obtained from the 1975 household survey made by the Central Bank of Venezuela in the metropolitan area of Caracas. Of course, a value of G for the Caracas area does not necessarily apply to the country as a whole but the author feels that it stands as a very good approximation of the GINI coefficient of the distribution of income in the large urban centers. Table 10 shows the resulting pattern of income and expenditures of the families interviewed in Caracas. Similar estimates should be obtained for other cities or regions in the country.

The estimated GINI coefficient of consumption concentration associated with the Lorenz curve was of .68 (the level of expenditure-consumption per decile was taken to determine the curve of consumption concentration). By substituting this value into equation 6-23 one obtains:

$$\sigma = \frac{1 + \text{GINI}}{2 \text{ GINI}} = \frac{1 + .688}{(2)(.688)} = 1.22 ,$$

and

$$D = \frac{\sigma^n (\sigma - 1)^{1-n}}{(n + \sigma - 1)} = \frac{(1.22)^.8 (1.22 - 1)^.20}{(.8) + 1.22 - 1} = \frac{.87}{1.02} = .85 .$$

The GINI coefficient of income concentration associated with the Lorenz curve was of .50 (using the level of per capita income). If

TABLE 10

INCOME AND EXPENDITURES OF FAMILIES PER DECILE IN THE
METROPOLITAN AREA OF CARACAS—1975

Deciles	Number of Families	Income level per decile	Total income per decile	Average income per decile	Total expenditure per decile	Average expendi- ture per decile
1	49,558	0- 926.00	29,200,323.68	589.22	55,183,727.73	1,113.52
2	49,711	927-1,320.00	56,631,248.22	1,139.21	69,885,347.98	1,405.83
3	49,675	1,321-1,709.00	76,283,744.49	1,535.66	89,382,493.35	1,799.34
4	49,411	1,710-2,099.00	94,521,614.13	1,912.97	92,475,676.24	1,871.56
5	49,550	2,100-2,599.00	115,803,426.56	2,337.10	120,999,163.60	2,441.96
6	50,241	2,600-3,260.00	146,356,661.81	2,913.09	124,394,491.02	2,475.96
7	49,169	3,261-4,099.00	179,259,837.31	3,645.79	149,428,841.11	3,039.09
8	50,034	4,100-5,250.00	230,060,596.94	4,598.09	179,097,090.84	3,579.51
9	50,105	5,251-7,560.00	314,740,426.06	6,281.62	238,208,979.70	4,754.20
10	49,352	7,561-and more	628,459,177.07	12,734.22	327,205,590.15	6,630.04

Source: Information gathered from the 1975 Household Survey made by the Venezuelan Central Bank in the metropolitan area of Caracas.

instead of using the coefficient of consumption concentration ratio one uses the income concentration ratio the value of D will be equal to .926. For the purposes of this work the relevant value of D is that expressed in terms of the consumption concentration ($D = .85$).

As mentioned the global value of D can be used by the project analyst to weight the distribution of consumption in cases in which he cannot obtain enough information about the final beneficiaries of the project. The assumption behind the use of the distributional weight D is that an extra unit of consumption generated by a project will be distributed in a way that will leave the present distribution unchanged. If income groups were normally distributed around the mean, then an additional unit of consumption could be assumed to have the same weighted average marginal utility as a unit of consumption at the average level of consumption. The skewness of the consumption distribution, however, implies that this is not always the case. In Caracas, for example, where consumption groups are not normally distributed around the mean, the "d" ratios of the consumption groups above the average level ($d < 1$) outbalance the "d" ratios of the consumption groups below the average level so that an additional unit of consumption distributed will have a value lower than that of a unit going to a person at the average consumption group.

CHAPTER VII

THE ECONOMIC AND SOCIAL PRICE OF LABOR

This chapter attempts to examine the methodological aspects related to the numerical estimation of second best partial disequilibrium shadow price of labor in the Venezuelan economy.

As seen in previous chapters, the need for considering shadow wage rates distinct from market wage rates arises from the fact that prevailing market wages do not necessarily reflect the opportunity cost of labor because of institutional factor or market imperfections. Among the most outstanding characteristics and distortions of the Venezuelan labor market are:

I. DUAL LABOR MARKETS, MIGRATION, AND CURRENT UNEMPLOYMENT

The economy is split in a backward traditional rural sector with very low wages which contributes little to national production and often has substandard social conditions, and an industrial urban sector in which two distinctly separable categories can be distinguished: (1) the highly industrialized protected sector where unskilled labor is paid several times the income of a rural worker, and (2) a traditional urban nonprotected sector where salaries for unskilled workers are higher than in agriculture but still much lower than those paid in the organized or protected industrial sector. In the urban center there is a scarcity

of qualified skilled workers and operators in practically all occupations and trades.

The existing duality, however, rose and exists because of government legislation (i.e., protection, minimum wages), collective bargaining agreements, and company hiring policies to attract personnel.

Another important feature of the labor market is the increasing flow of workers from rural into urban areas attracted by higher wages. In fact, the relatively tight labor supply in rural areas and its scarcity in some regions, in times when there are surpluses of unused and badly used manpower in the cities, shows the effect of rural-urban migration mainly due to the difficulty of raising agriculture wages to the necessary level to offset the lure of cities. Even though young rural workers can find employment in the agricultural sector, they prefer to give up this opportunity and migrate to the cities to take the risk of becoming unemployed or a badly employed urban worker (nonprotected sector) almost always attracted by the hope of obtaining a well paid job in the urban protected sector.

As a consequence of the rapid growth and strength of Venezuela's economic expansion, at the time of this research there was an acute shortage of management personnel, technicians, and skilled workers of all kinds, and a relatively tight supply of agricultural workers. In spite of this deficit of qualified personnel existing in the country, a relatively high level of unemployment (including educated youth) and low productive workers are mainly originated by (1) employment conditions associated with extreme poverty, (2) labor turnover (frictional unemployment), (3) lack of coincidence between skill demanded and

supplied, and (4) lack of coincidence between wages paid in agriculture and those which will attract urban unemployed back to the rural areas.

The first category includes workers who are handicapped by lack of skills, lack of contacts, or lack of steady working habits. Besides, people within this group are often limited in their search and access to jobs by the obligation of presenting police and health certificates which they cannot easily obtain or cannot obtain at all due to ignorance or bureaucratic complications (red tape). Frictional unemployment is just a consequence of labor turnover; however, its level could be drastically reduced if the organization of the market is improved, i.e., improving the quality of communication between demanders and suppliers of jobs. Unemployment due to insufficient preparation is expected to persist until the level of education is improved and geared to producing the technicians who are demanded by the industrial and agricultural sector. Finally, the unemployment originating in the unwillingness of the urban unemployed and/or low productive workers to return to the countryside to fill the unsatisfied demand in that sector means that in agriculture the existing wages do not compensate the disutility of working and living in rural areas.¹

Of course, the unemployment figures for Venezuela, measured in a conventional way, would not seem to be of importance. However, once it is recognized that overmanning is a salient feature of the economy and

¹According to the data published by the "Ministerio de Fomento, Encuesta de Hogares por Muestreo 1976," of the 7 million persons who were 15 years and older in Venezuela in the second semester of 1976, 3.9 million were economically active and 3.7 million were actively working and 221 thousand workers were unemployed (6 percent unemployment).

that a considerable part of the labor force is engaged in unproductive work (i.e., attendants in fully automatic elevators, restroom watchers) it becomes evident that the official data hide a large number of disguised unemployment (part-time work, jobs which provide submarginal incomes, employment in which the level of productivity is below that attainable with the existing level of technology) which should together with the existing rate of unemployment be properly understood and weighted for the purposes of deriving the shadow wage of labor in the economy.

Having thus sketched some of the current outstanding features and causes for distortions in the Venezuelan labor market, the next step is to examine the methodology set forth among others by Harberger, the UNIDO Guidelines and the OECD Manual to derive the shadow wage rate, with the hope of grasping the concepts which may be relevant to the Venezuelan situation.

II. THE UNIDO AND THE LM PROCEDURES

The approaches used by the OECD Manual and the UNIDO Guidelines are very much similar and in fact could be identical were it not for the different numeraires (the use of different numeraires, however, does not cause any discrepancy in terms of the final selection or recommendation of a project).

The UNIDO Approach²

The shadow wage rate according to the UNIDO Guidelines can be derived by taking into account three elements: one is the value of the product foregone elsewhere in the economy, another is the indirect cost incurred as a result of the reallocation of resources in favor of consumption which often accompanies expansion of employment, and the third one is the income redistribution effect. Each element will be discussed in turn.

Direct opportunity cost. The direct opportunity cost of hiring an extra worker is equal to the social value of the marginal product foregone elsewhere as a consequence of the worker's withdrawal. Although the identification of the direct opportunity cost is conceptually easy, it may become exceedingly difficult to measure, particularly if the economy faces unemployment and/or underemployment. Furthermore, if it can be assumed that the foregone output would have been entirely consumed, it is possible to ignore the differences between social value of investment and consumption and to identify the social value of the output foregone with the market value of the marginal product. The Guidelines assumes that the direct opportunity cost of labor (Z) is less than the capitalistic sector wage (w) which is designated as the relevant wage for industrial projects.

Indirect costs: Effects on the rate of savings. Assuming that a unit of investment creates " q " jobs then the annual increment to the

²UNIDO Guidelines, pp. 201-212.

income of capitalists is equal to the nominal profit rate

$$Y - w\ell, \quad (7-1)$$

where

Y = annual increment to output provided by one unit of capital
(incremental capital output ratio),

$w\ell$ = wage bill per unit of capital, and

ℓ = marginal labor : capital ratio.

If capitalists save S^{cap} of their incomes and consume the remainder, the aggregate consumption value of their annual income from a marginal unit of investment is

$$p^{\text{inv}} S^{\text{cap}} (Y - w\ell) + (1 - S^{\text{cap}}) (Y - w\ell), \quad (7-2)$$

where p^{inv} = shadow price of investment.

If workers do not save then the consumption they derive from a marginal unit of investment is measured by

$$(W - Z)\ell. \quad (7-3)$$

By adding equations 7-2 and 7-3 one obtains the aggregate consumption value of the income generated by a unit of investment.

$$p^{\text{inv}} S^{\text{cap}} (Y - w\ell) + (1 - S^{\text{cap}}) (Y - w\ell) + (w - z)\ell. \quad (7-4)$$

Since the shadow price of investment can be defined as "the present value, at the social rate of discount, of the entire stream of aggregate

consumption,"³ (which is represented by equation 7-4) one could, assuming the parameters of formula 7-4 can be treated as constant over time, derive P^{inv} as the ratio of equation 7-4 to the social rate of discount.⁴ Thus,

$$P^{inv} = \frac{P^{inv} S^{cap} (Y - wl) + (1 - S^{cap}) (Y - wl) + (w - z)l}{i} \quad (7-5)$$

Solving for P^{inv} one obtains the result

$$P^{inv} = \frac{(1 - S^{cap}) (Y - wl) + (w - z)l}{i - S^{cap} (Y - wl)} \quad (7-6)$$

It should be noticed that S^{cap} (the propensity to save out of capitalist income) is greater than S^* (the overall propensity to save) which is an average of propensities to save in the economy. Moreover, the parameter Y measures the incremental output: capital ratio. Hence

$$Y - zl = q, \quad (7-7)$$

and

$$S^{cap} (Y - wl) = S^*q, \quad (7-8)$$

so that

$$(1 - S^*)q = (1 - S^{cap}) (Y - wl) + (w - z)l. \quad (7-9)$$

Equation 7-9 reflects the shadow price of investment in the surplus-labor economy and from it one can measure the indirect cost of employment.

³Ibid., p. 205.

⁴In the absence of reinvestment the UNIDO Guidelines defines the shadow price of investment as the ratio of marginal productivity of capital to the social rate of discount (q/i).

If the cost of creating an additional job is financed by taxation of "capitalists" (who reduce their consumption and investment in the ratio $(1 - S^{\text{cap}}; S^{\text{cap}})$) there is a transfer of income from "capitalists" to the workers equal to the wage bill, that is, capitalists' consumption declines by $(1 - S^{\text{cap}})$ and workers' consumption rises by w . Now, since the aggregate consumption objective places a weight on current investment equal to the discounted present value of future contributions to consumption resulting from the marginal unit of investment (that weight is the shadow price of investment whose value is always likely to exceed one), a reduction on capitalists' current investment (equal to the wage bill) means that the aggregate-consumption value of the income reduction becomes

$$[(1 - S^{\text{cap}}) + p^{\text{inv}} S^{\text{cap}}] w, \quad (7-10)$$

where

$(1 - S^{\text{cap}}) w$ = reduction in aggregate consumption, and

$p^{\text{inv}} S^{\text{cap}} w$ = aggregate consumption value of the reduction on investment.

To obtain the indirect cost of employment one must subtract from equation 7-10 the increased consumption of the additional worker (w); thus,

$$[(1 - S^{\text{cap}}) + p^{\text{inv}} S^{\text{cap}}] w - w = S^{\text{cap}} (p^{\text{inv}} - 1) w. \quad (7-11)$$

The shadow wage including direct and indirect cost is then equal to:

$$w^* = z + S^{\text{cap}} (p^{\text{inv}} - 1) w. \quad (7-12)^5$$

Redistributional benefits and costs. If one desires to incorporate income redistributional effects in the derivation of the SWR (w^*) then equation 7-12 should be modified to take into account the gain and losses of workers and "capitalists." Assuming a redistributional weight of zero to capitalists there is a need of adding only the new workers consumption ($w - z$) properly weighted with a redistributional premium of say "K" and deducting the loss of future wages due to the reduction in private investment.⁶ So the present value of workers' foregone consumption can be defined as

$$p^{\text{wkr}} = \frac{(w - z) \ell}{i - S^{\text{cap}} (Y - w\ell)}, \quad (7-13)$$

where p^{wkr} = present value of workers' foregone consumption.

The loss for each new job created is the product of loss per unit of investment displaced (p^{wkr}) and the loss of investment per job created, S^{cap}, w . That is

$$p^{\text{wkr}} S^{\text{cap}} w. \quad (7-14)$$

The value of the aggregate consumption loss is then equal to $K^{\text{pwr}} S^{\text{cap}} w$ and the net gain to workers will be

⁵Equation 7-12 expresses the shadow wage rate (SWR) in terms of the aggregate consumption objective.

⁶For each unit of investment foregone, " ℓ " jobs are foregone in perpetuity, each of which would produce a net annual consumption increment of $w - z$.

$$K (w - z) - K p^{wkr} s^{cap} w, \quad (7-15)$$

and the shadow wage rate (SWR) will be:

$$SWR = Z + s^{cap} (p^{inv} - 1) w + K [Z + (s^{cap} p^{wkr} - 1) w] \quad (7-16)$$

where

$s^{cap} (p^{inv} - 1) w$ = is the cost that measures the relative value of investment with respect to current consumption which the market wage rate w does not account for. Since the marginal propensity to save of workers is zero, aggregate consumption is increased by the full amount of wages w ,

Z = is the direct opportunity cost measured as production lost by withdrawal of the laborer from his previous activity. Z is assumed to be less than w , the wage rate in the organized sector,

$K [Z + (s^{cap} p^{wkr} - 1) w]$ = this is the redistribution component of the formula. K is the income weight for laborers consumption, and

s^{cap} = is the marginal propensity to consume of capitalists and p^{wkr} is the present value of workers consumption lost as a result of displaced investment.

The (OECD) LM Approach⁷

The LM methodology considers that to determine the real cost of employing labor one must consider together the cost of the commitment to consumption and the value of the consumption. The consumption effect of creating a new job is divided into three parts: (1) the effect on people (or firms) in the sectors which lose some labor (or some unemployed); (2) the effect on those who move; and (3) the effect on an increase in wages.

The effect on people in the sectors which lose labor. If a worker consumes more than the amount he produces (his marginal product) his departure generates a gain to people in that sector, otherwise there will be a loss. In the rural area, for example, it is quite likely that the consumption of the potential young migrant worker (a) is higher than his contribution to production (m) so his departure will generate a gain to his family of $(a - m)$. In other cases there may not be very much difference between a and m in which case there is no reason to expect a gain to the rest of the community (rural or urban).

Since each case will depend on the conditions of the area or sectors concerned, the methodology does not offer any specific formula to deal with the measurement of the consumption effect created by departing workers on the people in the sector from which they moved. If one designates "a" as the previous consumption of those who move out of a sector as a result of the creation of a new job (say average consumption

⁷ Little and Mirrlees, Project Appraisal, pp. 234-280.

of those workers most likely to migrate) and "m" as the marginal product, the total possible gain expected will be equal to $(a - m)$. This gain should be weighted by the appropriate consumption weight $V^*(a)$: each $(a_i - m_i)$ should be weighted by the consumption weight most appropriate to the group which makes the gain.⁸

The effect on those who move. Neglecting any effect on wages, the total consumption gain (c) from movements is $c - a$ (or $c - \sum a_i n_i$). Putting this result together with the previous gain $(a - m)$ one obtains the result $c - \sum m_i n_i$ or simply $c - m$ for short. However, since the two components may have attached different consumption weights these must be taken into account, so the change $c - a$ should be valued as $V^*(c) - V^*(a)$ and the change $a - m$ as $r(a) (a - m)$.⁹

The effect of an increase in wages. The increase in demand for labor may bring about an increase in real wages and therefore an increase in consumption (c) whose social value can be expressed as $LV^*(c) dc/dL$ where L = workers, c = consumption and V^* = the weighting factor of the group.

In synthesis the value of the extra consumption generated by the creation of a new job is

⁸The derivation of these weights was considered in Chapter VI.

⁹These formulae do not take into account the possible extra effort of the migrant worker. In the case that increased consumption results from increased effort it can be said that there is little or no real increase in welfare.

$$r(a) (a - m) + V^* (c) - V^* (a) + V^* (c) L \frac{dc}{dL}, \quad (7-17)$$

where

- $V^* (a)$ and $V^* (c)$ = consumption weights,
 $r(a) (a - m)$ = consumption weights,
 a = previous consumption of those who move out of a sector as a result of the creation of a new job,
 c = consumption, and
 L = workers (employment).

Having considered the consumption effect one must include the commitment effect in order to arrive at the shadow wage formula. If G denotes the value of uncommitted government income, measured in terms of consumption committed through employment then I/G measures the social value of a unit of consumption so committed and the SWR can be expressed as

$$SWR = C' - \frac{I}{G} (c - m) \quad (7-18)$$

where

- C' = additional resources devoted to consumption (it measures the commitment to consumption),
 c = consumption of the wage earner,
 m = marginal productivity of the wage earner,
 $(c - m)$ = increase in the worker's own consumption,
 G = the present value of a unit of investment relative to current consumption generated by the extra employment, and
 I = value of a unit of resource uncommitted.

Another way of expressing the SWR formula is:

$$SWR = m + (c' - c) + (I - \frac{I}{G})(c - m)$$

where the first term is the marginal product of labor; the second expresses the cost to provide the consumption level of c (transport, overheads) and the last term measures the cost of having an extra amount $(c - m)$ committed to consumption.

The distinction between C' and c is necessary because C' includes transport costs, costs of urbanization and the amount by which total social wage costs are increased as a result of the new employment.

The SWR formula can be rewritten as

$$SWR = [c + d - e + L \frac{dc}{dL}] - [V^*(c) - V^*(a) + r(a)(a - m) + V^*(c) L \frac{dc}{dL}],$$

(7-19)

where $[c + d - e + L \frac{dc}{dL}]$ shows how C' is made up, " c " being consumption of the wage earner at accounting prices, " d ", transport cost, " e ", employment premium (cost-savings of reducing unemployment) and $L \frac{dc}{dL}$ the increased consumption of workers as a result of upward pressures in the wage rate created by the expansion of the demand for labor.

$$[V^*(c) - V^*(a) + r(a)(a - m) + V^*(c) L \frac{dc}{dL}]$$

shows the benefits to the workers and his family created by the new job, $V^*(c) - V^*(a)$ is the increased utility of consumption $r(a)(a - m)$ is the extra consumption of the group from which the new worker is drawn

weighted by $V^*(a)$; and $V^*(c)$ $L \, dc/dL$ is the increased consumption of other workers weighted appropriate to their standard of living.

Both UNIDO and the OECD methodologies depend on the relative income weights given to the consumption (or investment) of different income groups and on the relative marginal value of saving as opposed to consumption. Both approaches should yield similar results; the only difference is that UNIDO chooses consumption as the numeraire and the OECD Manual uses government savings but the analyses are essentially the same.

III. THE SUPPLY PRICE OF LABOR

The notion of voluntary supply price of labor has been proposed by Harberger as an alternative to measure the social opportunity cost of labor.¹⁰

The idea is that the wage at which a worker is willing to present himself for a job measures his social opportunity cost. That is, he takes the wage that the worker is willing to receive for a new job as the measure of opportunity cost rather than the wage he received in his previous job.

To develop his proposition he starts by recognizing that the social opportunity cost of rural labor to be used on an agricultural project (in a rural area) is the going wage in the project area, while that to be used in an urban project is the prevailing wage in the unprotected sector of the labor market in that area. In the case of urban wages he

¹⁰Harberger, Project Evaluation, pp. 162-168.

goes on to distinguish those which are held above the market clearing level from those which are determined freely in the market. He calls the former the "protected sector wage" and the latter "unprotected sector wages."¹¹ His proposal is that "the unprotected-sector wage" for a given skill classification of labor and in a given labor market area is the best available measure of the social opportunity cost of that type of labor in that area."¹²

Of course, the ideal situation to measure the social opportunity cost of a migrant worker, say from the rural to the urban area, would be to know his reservation price; that is, the price at which he is ready to offer his services. Since one cannot get inside the head of each worker in order to find out his voluntary supply price for a given job (besides, one cannot predict who will be employed) a good proxy could be the use of unprotected sector wages because they represent, in effect, what the workers who leave the unprotected sector to accept a job in the protected sector were willing to work for (unprotected sector wages are a good proxy if there are comparable working conditions; otherwise there is a need of adjusting to take this aspect into account). No matter how many links there may be in the vacancy replacement chain, in the end the total gain of generating a new urban job will be adequately measured by the

¹¹As mentioned wages can be held above the market clearing level by government legislation, collective bargaining power, hiring policy, etc. The unprotected sector is comprised by companies with the higher labor turnover, shorter waiting list of applicants, etc.

¹²Harberger, Project Evaluation, p. 163.

difference between the newly created wage and the wage corresponding to workers of equivalent skills and capacity in the unprotected sector.

IV. ESTIMATES OF THE SHADOW PRICE OF LABOR IN VENEZUELA

Thus far some of the most outstanding methodologies which can be used to derive general shadow wage rates have been shown. Now attention is focused on the application of these propositions to the Venezuelan case. One point must be stressed at the outset: since shadow prices for labor vary depending on regional characteristics, skills, location, and time, their estimate in the author's view should be project specific. Nevertheless an attempt will be made to discuss the factors which affect SWR estimates and to conclude with some specific illustration of particular shadow price estimates that, despite the variation which may exist, will hopefully have a fairly wide application.

The Economic Conversion Factor for Labor

In line with the LM approach, if public income and private income distribution are not taken into account, the economic price of labor (efficiency price) is given by the border price content of labor's foregone marginal product. Thus, one of the key issues consists of analyzing the labor market in order to be able to identify what activities or section (or areas) ultimately supply labor to fill new job openings and how to measure the foregone marginal product of that labor.

The economic efficiency price of labor (its opportunity cost) can be expressed as

$$\beta_L = M\beta_C, \quad (7-20)$$

where

β_l = conversion factor for labor at economic prices,

M' = foregone marginal product of labor, and

β_c = conversion factor for consumption.

The value of M' should be broken down into its traded and nontraded components; the traded elements should be valued directly at border prices and the nontraded must be converted to their border price equivalents by the use of the relevant conversion factor. This task is very difficult to accomplish in practice, hence the use of the consumption conversion factor is recommended instead.

Considerations on the treatment of foregone output. Whenever a project demands an additional unit of labor, the foregone output of this labor in its best alternative use represents the major components of the social cost of using that labor. Hence the first piece of information to shadow price labor should be an estimate of output foregone. Provided that the market for the type of labor concerned is reasonable efficient, the relevant market wage of that labor could be taken as a first approximation of the marginal product (foregone output). It is believed that in the light of the labor market situation which actually faces the country (acute shortages of workers of all types), the marginal product of labor equals or exceeds its wage.

In measuring foregone output the project evaluator should pay attention to the seasonal variation of wages especially during slack agriculture seasons, in which the output foregone is less than the market wages prevailing in that market. Even if the foregone output is

negligible during the slack season (it is very difficult to conceive an area in the country in which foregone output is zero), it may be expected that the labor force will be more or less fully employed during the peak season. Thus, the best recommendation in these cases is to adjust market wage for seasonal variations by, say, taking a yearly average wage.

To adequately determine foregone output and hence the cost of labor, it is necessary to identify the proper supply source from where labor is likely to be drawn in general (this task is more accurate if it is done at the project level). In Venezuela close to 70 percent of the working labor force can be considered unskilled (they have less than six years of formal education). These are mainly laborers working in agriculture and workers in the service sector. In fact, 96.5 percent of laborers in agriculture and 57 percent of employees in services fully fit the unskilled category. Table 11 shows a breakdown of the labor force by sector and educational level and a similar breakdown by occupation and wages and by sector and wages is given in Tables 12 and 13, respectively.

There are several likely directions for the movement of workers in the country: (1) between firms in a specific agricultural area; (2) between one agricultural area and another agricultural area where wages are higher; (3) between the agricultural sector and the modern sector (i.e., construction, manufacturing, mining, utilities); and (4) between firms in the modern sector in the same area and interareas.¹³

¹³The country could be classified into four regions according to the pattern of labor migration: (a) states with net in-migration; Federal District, Anzoategui (Barcelona and Pto. La Cruz); Carabobo (Valencia); Zulia (Maracaibo); Aragua (Maracay); Lara (Barquisimeto); Miranda,

TABLE 11
LABOR FORCE BY LEVEL OF EDUCATION—1976

	Total	Educational Level			Professionals Technicians and Others
		Illiterate	Grammar School	High School	
Agriculture	696,391	372,831	299,233	19,384	4,943
Mining	43,623	3,072	20,974	11,149	8,428
Manufacturing	587,580	65,279	346,550	128,933	46,818
Utilities	39,761	3,699	19,213	11,715	5,134
Construction	295,484	58,192	181,119	42,177	13,996
Commerce	687,305	116,008	387,338	145,932	38,027
Transport and Communication	219,745	15,343	143,356	49,966	11,080
Financial and Insurance Services	139,269	3,342	37,978	60,208	37,741
Social Services	991,662	117,169	451,830	211,993	210,670
Nonspecified	2,403	125	660	1,192	426
TOTAL:	3,924,808	782,539	2,011,497	735,149	395,623

Source: Encuesta de Hogares por Muestreo, Resumen Nacional. Caracas, Venezuela: Dirección General de Estadísticas y Censos Nacionales, Segundo Semestre 1976, p. 226.

TABLE 12
AVERAGE MONTHLY SALARIES OF SELECTED UNSKILLED OCCUPATION
IN THE URBAN AND RURAL AREAS

Occupation	Weighted Average Wage
	(in bolivares)
A. <u>URBAN</u>	1,269
Laborers	1,209
Farming	699
Drivers (trucks, buses, taxis, etc.)	1,200
Arts and Crafts	1,379
Services (janitors, watchman, cleaning, etc.)	696
Other	2,131
B. <u>RURAL</u>	749
Laborers	715
Farming	506
Drivers (trucks, buses, etc.)	870
Arts and Crafts	837
Services (janitors, postoffice, cleaning, etc.)	857
Other	1,263

Source: Encuesta de Hogares per Muestreo, Resumen Nacional.
Caracas, Venezuela: Dirección General de Estadística, Segundo Semestre
1976, p. 125.

TABLE 13
LABORERS AVERAGE MONTHLY SALARIES

Sector	Laborers	Self-employed
	(in bolivares)	(in bolivares)
A. Urban	1,209	1,081
Agriculture	731	710
Mining	2,167	2,083
Manufacturing	1,189	700
Utilities	1,484	1,751
Construction	1,141	1,252
Commerce	1,052	1,043
Transport and Communications	1,337	1,642
Financial Services	1,361	2,716
Other Services	1,188	591
B. Rural	715	629
Agriculture	510	600
Mining	1,246	200
Manufacturing		1,051
Utilities	910	
Construction	942	741
Commerce	1,557	708
Transport and Communications	866	1,414
Financial Services	571	2,626
Other Services	836	472
C. TOTAL	1,126	895

Source: Encuesta de Hogares per Muestreo, Resumen Nacional.
Caracas, Venezuela: Dirección General de Estadísticas, Segundo Semestre
1976, pp. 115-123.

The statistical evidence shows however that agriculture and even more ample, the rural areas, continues to be the main source of unskilled labor in the country. It is the sector from which labor would ultimately be drawn to satisfy the increasing demand for unskilled jobs in other sectors of the economy. The main factors inducing rural workers to move out are (1) to perceive higher wages in the modern sector; (2) to look for better living conditions (i.e., services, utilities, education, recreation), and (3) because of the psychological effect of being a city man rather than a "campesino" (hillbilly). Thus, in general, it can be argued that a job opening in the modern sector leads to an eventual movement of workers from the agricultural sector (rural area) no matter how many links there may be in the vacancy replacement chain.

The discussion above leads to the following conclusions: (1) the opportunity cost of labor to be used on a project in a rural area is the going wage in that area for that particular skill; and (2) the social opportunity cost of unskilled labor to be used in the modern sector is the prevailing average wage in the agricultural sector since any job opening in this sector leads to an eventual movement of labor from the rural area, even if the worker comes by way of previous intrasectoral movements.

It is clear from the above that for the purpose of estimating the efficiency wage ratio it is necessary to obtain the average value of the output foregone by the movement of a worker from the agricultural sector.

Bolivar; and (b) states with net out-migration: Cojedes, Falcón, Mérida, Nueva Esparta, Sucre, Táchira, Guárico, Apure, Monagas, and Territorios.

An attempt was made to approximate the value of marginal product foregone by deriving the product per worker in the agricultural sector (see Table 14). Unfortunately, the results obtained from the macroeconomic data available were misleading. For instance, by 1976 the estimated product per worker was around 40 bolivares a day which was higher than the expected value of product per worker in rural areas due to the fact that agricultural GDP figures include the value of urban industrial agricultural output and marketing services which distorts the real value of the production per worker in the rural areas. Therefore, two alternative procedures were used. One was to assume that the proportion of the worker's wage accounted by his marginal product is closely approximated by the ratio between the lowest average real wage paid to hired workers in agriculture and the average real wage paid to hired workers in those activities in the modern sector which are most likely to be occupied by the outmigrating agricultural laborers (w). And the other perhaps more accurate consists in estimating the ratio between the average wage of rural hired workers and that of laborers in activities which are most likely to be occupied by the rural worker in the urban centers. This corresponds to an estimation of the premium paid laborers over their marginal product due to institutional reasons.

According to the data presented in Tables 12 and 13, pp. 165-166. the average money wages for laborers in agriculture was 510 bolivares per month (W_a) and that of laborers in general was 1,187 bolivares (W_u) (average of laborers and self employed in those activities in the modern sector which are most likely to be occupied by the migrating agricultural laborers). Then, the ratio of marginal product foregone (M_a is equal to

TABLE 14
PRODUCT PER WORKER IN THE AGRICULTURE SECTOR

Year	Agriculture Sector		
	GDP	Labor Force	Product per worker ^a
	(in millions of bolivares)	(in thousands of people)	
1971	3791	697.5	20.5
1972	3937	705.0	21.0
1973	4579	712.0	24.3
1974	5651	719.5	30.0
1975	6974	707.9	37.3
1976	7367	696.4	40.0

^aBased on 264 days of work per year.

Source: Encuesta de Hogares por Muestreo, Resumen Nacional.
Caracas, Venezuela: Direccion General de Estadisticas y Censos Nacionales,
Nacionales, Segundo Semestre 1976, p. 18, and "Informe Economico."
Caracas, Venezuela: Banco Central de Venezuela (1968, 1974, 1976,
Table A-VI-2).

$$M_a = \frac{W_a}{W_u} \equiv \frac{510}{1187} = .43, \quad (7-21)$$

where

M_a = ratio of laborers' marginal product foregone in agriculture to the potential wage they can obtain in the modern sector,

W_a = average wage of laborers in agriculture, and

W_u = average wage of potential jobs for agricultural workers in the modern sector.

Then, to derive the efficiency wage rate β_ℓ —EWR—(the shadow rate without incorporating the value of changes in aggregate consumption and savings brought about by the new job) M_a from equation 7-21 is multiplied by the consumption conversion factor (alternatively the weighted efficiency border price ratio for agricultural output (BPR_a) can be used.

$$EWR = M_a (CCF) = \beta_\ell, \quad (7-22)$$

$$= .43 (.914) = .39,$$

where

EWR = efficiency wage ratio (conversion factor for labor at economic prices), and

CCF = consumption conversion factor (the CCF used is 0.914).

The value of $EWR = .39$ represents the efficiency border price content of an average agricultural laborer's foregone output when he moves to a job in the modern sector.

If instead of using the average wage of hired workers in agriculture one uses the average wage of unskilled rural workers (749 bolivares per

month) and compares it with the average wage of unskilled urban worker (1,269 bolivares per month) the following relation is obtained:

$$M_r = \frac{W_r}{W_u} = \frac{749}{1269} = .59, \quad (7-23)$$

and

$$EWR = M_r (CCF) = .59 (.914) = .54, \quad (7-24)$$

where

M_r = ratio of laborers' marginal product foregone in the rural area to the potential wage they can in the urban areas (unskilled labor),

W_r = average wage of unskilled workers in the rural area, and

W_u = average wage of potential jobs for unskilled rural workers in the urban areas.

Again, in this case the value β_ℓ of .54 represents the equivalent economic border price content of an average rural worker's foregone output when he moves to fill a job vacancy in the urban modern sector (unskilled).

Social Wage Ratio

An important component of the conversion factor for labor which has been ignored so far is the net social cost-benefit of increased wage in terms of intertemporal and interpersonal objectives functions of the government. The changes in income have to be adjusted to obtain their relevant social cost or benefit which in turn will depend on the proportions consumed and saved and the disutility of effort.

Considerations on the disutility of efforts. Generally speaking a new job frequently involves an increase in effort on the part of the worker (longer working hours, tight schedule). The disutility of this increased effort is a matter that also has to be taken into account in deriving the shadow wage rate. To measure the net disutility of efforts in a perfect labor market, one could obtain the difference between the laborer's wage for the new and the old job, since the new wage is the price which induces the worker (price of disutility) in a particular employment and reflects the worker's supply price (his reservation price) and his private evaluation of all the pleasant and unpleasant characteristics associated with the new job.

If the market is imperfect, wage differences are not a good guide to measure differences in supply prices for different occupations. In this case any disutility of effort which may be involved in a new job has to be measured directly. In the case of Venezuela estimates of changes in marginal labor product may provide an adequate estimate of changes in supply price and increase effort. If a project draws labor from a full-time employment area, it is logical to assume that there is no increased effort involved. If, on the contrary, labor is drawn from the pool of unemployed (or underemployed) a rough estimate of the supply price of the labor involved may be attempted by using, for example, Harberger's approach. The resulting value measures the private cost of

increased effort relative to the change in income that is required to offset that increased effort.¹⁴

The social wage ratio. The shadow wage rate (including all of its components) can be estimated using the following expression:

$$SWRA = M' \beta_c + C \beta_c - \Delta C \frac{d}{V} + \Delta C (e \Theta \frac{d}{V}) / W_m, \quad (7-25)^{15}$$

or

$$SWRA = [M' \beta_c + \Delta C (\beta_c - \frac{d}{V} \Delta C (e \Theta \frac{d}{V}))] / W_m, \quad (7-26)$$

where

SWRA = social wage ratio,

M' = laborer's marginal product foregone,

β_c = consumption conversion factor,

ΔC = ratio of increase in consumption value at domestic prices,

W_m = average wage of laborers in the modern sector,

d = weighted average income distribution weight,

V = social value of public income, and

$e \Theta \frac{d}{V}$ = net social cost of laborers increase effort in terms of his consumption increment

Other elements can be added to equation 7-25 to take into account additional considerations such as the effect upon consumption of family

¹⁴Since the private cost of the increased effort may not be an adequate measure of the real social cost involved (it could be higher or lower) it is necessary to adjust it according to whether or not the government considers increased effort as a cost.

¹⁵For the purposes of the estimates it is assumed: (1) that the government puts a value on the disutility of effort, and (2) the social cost of any migration and education is negligible.

migration. This aspect is ignored in this work because it is not considered important.

The first term of equation 7-25 has already been discussed in the opportunity of deriving the economic value of labor.

The second term represents the foreign exchange cost to the government of the increased consumption. The third term is included because additional consumption is also a benefit. This additional consumption has to be weighted by the income distribution parameter d (estimated in Chapter VI) and its value should be converted into public income by dividing by " V ".

The third term measures the social cost per unit of additional income (Θe). Here " e " is the ratio of the wage earner's own evaluation of his disutility of effort to his additional income and Θ the ratio of the social to the private evaluation of the disutility of effort. ($\Theta = 1$, if government values increased effort in the same way as does the private individual and if $e = 1$ it means that the increased income of wage earners is exactly offset by the disutility of effort.)

The term $(\beta_c - d/V)$ in equation 7-26 is the distribution weight which should be applied to all increases in consumption valued at market prices. The details on the derivation of the values of " d " and V were presented in Chapter VI.

As was the case with the estimation of the EWR it is proposed to work with two major groups of laborers, those who work in the agricultural (alternatively the rural sector) sector and make wages W_a and those that work in the modern sector that make W_u .

The first term of equation 7-25 is the foregone marginal product of laborers in agriculture (510 bolivares). The second part, the change in consumption (ΔC) of the agricultural workers wage can be measured by the difference between $(W_u - W_a)$. Thus, the net social cost is equal to the product of ΔC by the proper distributional weight factor $(\beta_c - d/V)$.

That is:

$$(W_u - W_a) (\beta_c - \frac{d}{V}), \quad (7-27)$$

or $677 (.914 - 1.80/1.25) = 619 - 974 = -355.8$.

Finally the third term of equation 7-26 takes into account the net social cost of the agricultural (or rural) worker's increased effort in terms of the social value of his increased consumption. It has been assumed that the government finds less valuable the rural or agricultural laborer's increased effort than his increment to consumption due to the changes in job. Hence Θ has been set at .8. On the other hand, it is assumed that the agricultural worker finds more valuable his increment in consumption than his increased effort. This seems to be a logical assumption because when the worker is willing to move to a job in the modern sector he is already valuing more the increase in his wages, in addition to the value he places on the new city environment, than the disutility of effort. Therefore, the parameter e has been set at .75. Hence the net social cost of increased effort is:

$$[C (e \frac{d}{V})] = 677 (.8) (.75) \frac{1.80}{1.25} = 585 . \quad (7-28)$$

Substituting the values obtained into the SWRA formulation (equation 7-26) one gets:

$$SWRA = [M\beta_c + \Delta C(\beta_c - \frac{d}{V}) + \Delta C(e\theta \frac{d}{V})]/W_u, \quad (7-29)$$

$$SWRA = \frac{510(.914) + 677(.914 - \frac{1.80}{1.25}) + 677(.8)(.75)(\frac{1.80}{1.25})}{1187} = .585,$$

$$SWRA = .585.$$

This is the value by which market wage should be multiplied to obtain the social value of generating a new unskilled job.

Efficiency and Social Wage Ratio of Skilled Labor

So far the methodology and derivation of the social wage rate mainly applies to the cases in which the type of labor demanded is that belonging to the unskilled and to some extent the semiskilled categories. In the case of scarce skilled labor the procedure to derive the SWR is the same as above except that the marginal product of this labor, for a given skill classification and in a given urban market area, is proposed to be better measured by the going market wage in that area.

It is beyond the scope of this work to present a detailed and updated analysis of the skilled wage rates in the different labor markets of the economy. Nevertheless two surveys were conducted (in Caracas and Guayana) and secondary sources of information were reviewed (Central States) to obtain an idea of the remuneration of the Venezuelan labor force of the most important regions of the country (Central States, Guayana, and Caracas). Table 15 shows the average wage per skill classification in

TABLE 15

AVERAGE DAILY SALARIES OF SKILLED AND SEMISKILLED LABOR IN THE AREAS
OF THE CENTRAL STATES, CARACAS, AND GUAYANA

Skilled Category	Formal Education	Central States		Federal District		Guayana	
		Average		Average		Average	
		Wage/Day		Wage/Day		Wage/Day	

^aDoes not include persons with salaries above bolivares 7,000 a month.

Valencia, Caracas, and Guayana, respectively.¹⁶ It is hoped that this information, properly updated throughout the time, will be enormous help for many purposes, one of which is in the measurement of economic opportunity cost of various types of skilled labor.

The project evaluator must be very careful in identifying the most probable source of the skilled labor required and the going wage of that type of skill in that area. Also great attention has to be paid to the distribution weights which should be applied to the increases in consumption of the groups concerned.

The Social Shadow Wage Ratio of Skilled Labor

The shadow wage rate of skilled labor will vary depending upon the skills involved and the geographical areas which will ultimately supply labor to fill new job openings. In most of the cases the analyst cannot predict the specific regions of the country which will supply the project labor needs. Hence, it will be helpful if the different skilled occupations in the country can be grouped by regions into different comparable categories as shown in Table 15, p. 177, for the areas considered in this research.

Once an adequate classification has been established, the procedure to estimate the social shadow wage ratio is very simple. Suppose a new

¹⁶The data for the Guayana region was obtained from the personnel records of almost all the public and private firms in the area (August 1977). In Caracas, the data was obtained through personal interviews to ascertain the wages which are typically being paid to workers of different skills and occupations. The information on the average wages paid in Aragua and Carabobo was obtained from private and confidential surveys made by the Camara Industrialde Valencia in most of the firms in the area.

project in Guayana needs several technicians within a given skill category, i.e., "average skilled" category, and that the most likely area to supply these skills is the central region of the country (i.e., Carabobo). By turning to Table 15, p. 177, one notices that the desired personnel from the category called "average skilled" have an average daily wage rate in the central area of bolivares 110 per day while in Guayana it is bolivares 116 per day.¹⁷ Assuming that the public and private valuation of disutility of effort remains as set before for unskilled labor (disutility of effort will vary considerable interregions), the social shadow wage ratio can be estimated by using equation 7-29:

$$SWRA = M\hat{\beta}_c + \Delta C(\beta_c - \frac{d}{V}) + \Delta C(e\theta \frac{d}{V})/W_u, \quad (7-30)$$

$$110(.914) + -(.914 - \frac{.93}{1.25}) + 6(.8) (.75) (\frac{.93}{1.25}) = \frac{104.3}{116} = .90$$

This value of .90 is the daily social wage ratio to use in project appraisals for the Guayana regions when the labor demanded fits the "average skilled" category and when the most likely supplier of this skill is the central area of the country (Carabobo, Aragua).

This approach is very practical and promising; however, the classification of the various skills need refinement before they can be used with complete confidence in project appraisals.

¹⁷Appendix B shows a breakdown of the different occupations included in each of the skill categories shown in Table 15.

CHAPTER VIII

SUMMARY

The parameters developed following the Little and Mirrlees methodology are designed to put all the values which could be encountered in an investment project in terms of present value of uncommitted government income measured in foreign exchange (the numeraire).

A summary of the final values for the efficiency and social parameters appears in Table 16. Several problems were encountered in gathering the necessary statistics required for the derivation of these parameters. Specifically, there were problems in determining reliability and consistency in public finance data, in obtaining consistent trade information, and in reconciling the trade statistics with national income accounts. It was very difficult to obtain cost breakdowns sufficiently disaggregated for most of the important nontraded commodities.

Estimates of the standard conversion factor and the conversion factors for consumption, intermediate, and capital goods were based on a time series breakdown of global trade and trade taxes. It was also possible to estimate a conversion factor for nontradable, electricity, in this study by using a simple procedure to obviate the lack of sufficient and reliable information on electrical cost breakdowns. No estimates of conversion factors were made for other nontradable items such as those involved in transportation and construction because of

TABLE 16
SUMMARY OF NATIONAL ACCOUNTING PARAMETERS

Parameters	Notation	Values
<u>Efficiency Parameters</u>		
Standard Conversion Factor	SCF(α)	.863-.939
Consumption Conversion Factor	β_c	.81-.914
Intermediate Goods Consumption Factor	β_1	.67-.84
Capital Good Conversion Factor	β_k	.98-.99
Conversion Factor for Foreign Exchange		1.06-1.16
Shadow Exchange Rate	SER	4.58-4.98
Conversion Factor for Electricity	CFE	1.29
Unskilled Wage Rate	β_l	.39
Semiskilled Wage Ratio		Varies depending on area and skill
Skilled Labor Wage Ratio		Varies depending on area and skill
Marginal Productivity of Capital for Public Sector	q	.0976
<u>Social Parameters and Key Social Variables</u>		
Wage Ratio (Unskilled Labor)	SWR	.585
Accounting Rate of Interest	ARI	.075-.081
Value of Public Income (Method 1)	V	1.25
Value of Public Income (Method 2)	V	1.25
Consumption Rate of Interest	CRI	.056
Elasticity of the Marginal Utility with Respect to Consumption	n	.80
Pure Time Preference	ρ	.025
Critical Consumption Level	C*	Bs 2,400/Month
Global Marginal Propensity to Save	(S)	.47
Number of Years until Public Income and Private Consumption Equalize	T	24 years
Market Cost of Capital	r	.059-.25
Average Level of Consumption	C	Bs 3,000/Month/family
Net Social Value of Increased Consump- tion of Rural Unskilled Worker	d	1.42
Gini Coefficient	Gini	.688
Global Distribution Parameter	D	.850

lack of data. In this study, however, a simple procedure for developing such estimates was suggested.

National accounts statistics were extensively used in estimating efficiency and social parameters. To estimate the marginal propensity to consume and to save, the consumption figures in the national account were expressed in terms of the gross domestic product of constant prices. The global constant marginal propensity to consume and to save was used in estimating the social value of public income (V) and the accounting rate of interest (ARI).

A survey of the most relevant market interest rates in capital yields existing in the country was undertaken to provide a rough order of magnitude of the market's current evaluation of the cost of capital. It was concluded that the private average cost of capital in the economy ranged from 5.9 percent to 25.0 percent.

The consumption rate of interest was calculated to be .065, which is the proper rate to discount benefits when consumption is the numeraire. The economic accounting rate of interest, or marginal productivity of capital, was obtained by reevaluating the benefits and costs at efficiency prices of the most representative projects of the public sector's investment. The final estimate of the marginal productivity of public capital was .0976.

The social accounting rate of interest was estimated by three different methods and the values were found to be between .075 and .081.

Regarding the estimates of distributional weights, a value of .80 was given to the elasticity of marginal utility hoping that it would adequately reflect the commitment of growth and equity (mild distribution

effect) of the Venezuelan government. A value of 2.5 was assigned to ρ , the rate of pure time preference, which appeared to fit the government commitment to growth and equity. The number of years until public income was likely to be considered optimum was estimated to be 24 years. Per capita increase in consumption was based on the forecasts made by the agencies responsible for macroeconomic forecasting.

A value of public income was estimated using several formulas. The resulting values of V were crosschecked with the estimated values of the critical consumption level. It was concluded that the value of C^* , bolivares 2,400 a month, which is very close to the level of income below which income taxes are not payable, and the corresponding value of V of 1.25 were reasonable for Venezuela.

Finally, a global distribution parameter (D) was derived to assist project analysts to weight the distribution of consumption where there was inadequate information about the final beneficiaries of the project. The value of D was estimated to be .85 primarily because of the skewness of the distribution of consumption goods based on the household survey made by the Venezuelan Central Bank in 1975 in the metropolitan area of Caracas.

Consideration was also given to the derivation of the economic and social wage ratio for skilled, semiskilled, and unskilled labor taking into account the sector which ultimately supplies labor to fill a new job. The economic and social wage ratio for unskilled laborers was estimated to be .390 and .585, respectively. The social wage ratio of skilled labor can adopt different values depending on the areas demanding and supplying the labor needs and on the skill classifications involved.

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APPENDICES

APPENDIX A

Corrado Gini proposed two coefficients to measure the concentration of consumption (or income) in the hands of the richest groups of the country: (1) the concentration ratio "R" and (2) the concentration index "N". For the purposes of this work the interest is on "N" because it not only expresses the consumption (or income) concentration but also the form of the consumption distribution curve. The estimate of this concentration index can be explained in terms of Figure 1 as the relation between B/A + B. The diagonal line OD illustrates a perfectly egalitarian distribution of consumption where, for example,

Egalitarian Distribution	Percentage				
Cumulative Percentage of Population	10	30	50	90	100
Cumulative Percentage of Consumption	10	30	50	90	100

As one approaches an egalitarian distribution the Lorenz curve approaches the diagonal line so area A tends to be equal to zero and B becomes so large the B/A + B (which is defined as the Gini coefficient), equals one.

Conversely if the situation is one of perfectly inegalitarian distribution of consumption, the concentration curve becomes more concave to OC and CD until B/A + B = 0. Estimates of the Gini coefficient require calculation of areas A and B of Figure 1. Area B could be defined as the integral of the concentration curve

$$B = \int_0^1 1 - (1 - Q) \frac{N - 1}{N} dQ,$$

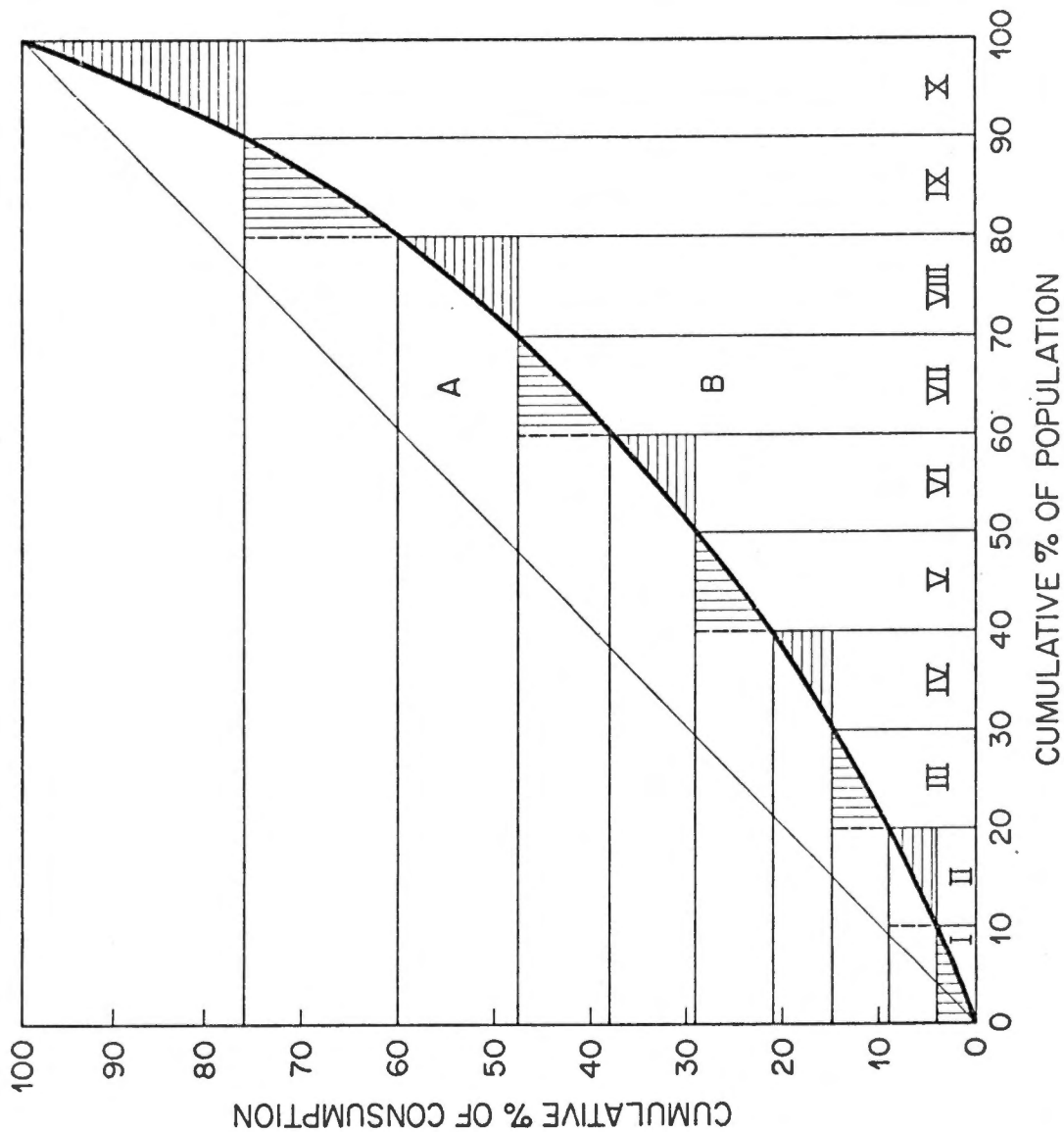


Figure 1. Distribution of Consumption in the Metropolitan Area of Caracas.

where

Q = cumulative percentage of population receiving a given income,

and

N = distribution parameter.

However, since N is unknown it is necessary to estimate the area B by a simpler method, i.e., through the summation of discrete segments of the area under the curve. The procedure, although not as accurate as integrating the area under the curve, consists of breaking down the cumulative percentage of population into ten segments of 10 percent intervals (the larger the number of segments the better it will be) as it was done in the case of the Caracas household survey used in this study to derive D , and estimating the area of each of the ten resulting rectangles. In Figure 1, p. 190, for example, the area of any of the ten segments is defined as

$$B_j = C_j (E_j - E_{j-1}),$$

where

B_j = area of segment j ,

C_j = cumulative percentage of consumption enjoyed by the poorest K_j percent of the population, and

E_j and E_{j-1} = boundary values of the j^{th} segment.

Hence, the area under the Lorenz curve can be expressed as follows:

$$B = \sum_{i=1}^n C_i (E_i - E_{i-1}).$$

The Gini coefficient can be easily calculated by dividing B by the value $A + B$ where A is always equal to .50 since both axes go from zero to one.

APPENDIX B

Three of the most important areas of the country, Caracas, the central states, and Guayana, were selected for the purposes of studying the going wages for skilled occupations. In the case of Guayana the information was obtained from the July 1977 payrolls of almost all the industrial firms in the area. From a total of 14,000 persons classified by wages and occupations in these records, only 4,000 were considered to fit the skilled or semiskilled categories mentioned in Table 5, p. 103. In the Central States both the analyses of several companies' payrolls as well as a recent confidential study made by the "Camara Industrial de Valencia" were used to obtain an idea of the wages earned by several skills. From a total of 15,000 workers and employees classified by wages and occupations only 4,620 were included in the skilled and semiskilled category to which Table 5 refers. In Caracas the information was obtained from a survey made by the author and from the payrolls of several firms and public institutions (the government tabulator was also extensively used).

The approach used in Caracas to determine wages per skill classification was somewhat different from those used in the other two areas. It basically consisted of determining the most likely remuneration of given skill classifications, based on the several sources of information available.

A summary follows of how the different skills were classified, based on the characteristics of the job to be done, the experience required, and the responsibility involved.

SKILLS CLASSIFICATION

OccupationA. Highly Skilled

Plant Managers and Administrators
Chief Engineers
Senior Economists
Senior Sociologists
System Analysts
Other Professionals with more than ten years of experience with managerial abilities

B. Skilled

Administrative Deputy Managers
Maintenance Superintendents
Construction Superintendents
Production Superintendents
Economists I
Engineers I (electronic, mechanical, chemical, civil, metallurgical, electrical)
Other Professionals I (university and technical level) with five to ten years of experience (physicians, lawyers, architects, biologists, statisticians)
Translators I

C. Average Skilled

Cost Analysts
Computer Programmers
Laboratory Workers
Engineers II (civil, electrical, mechanical, chemical, industrial, metallurgical, geological)
Public Accountants II
Topographers II
Administrators II
Assistant Superintendents
Project Comptrollers
Industrial Relationists
Special Activities
Chemical Analysts
Other Professionals (university and technical level) with few years of experience (biologists, physicians, architects, lawyers, geologists, statisticians)

OccupationD. Highly Semiskilled

General Supervisors
Chief Technicians
Draftsmen
Supervisors: mechanical, maintenance, carpenters, plumbers,
electricity, services
Office Supervisors
Bilingual Secretaries
Executive Secretaries
Cashiers
Nurses
Assistants to Different Professionals (university and technical
level)

E. Semiskilled

Foremen I
Carpenters, Plumbers, Painters
Electricians
Mechanics
Mechanics (wagon drill)
Supervisors: construction, forge
Supervisors: welding, industrial furnaces
Assistants (to professionals, i.e., engineers, economists)
Milling Machine Operators
Secretaries II

F. Average Semiskilled

Foremen, Construction II
Electricians II
Crane Operators
Carpenters II
Equipment Operators
Mechanics II
Special Welders
Industrial Security Officers
Quality Control Operators
Millers
Secretaries III

VITA

Nelson E. Rodriguez Soto was born in Valencia, Venezuela, on March 2, 1944. He attended Colegio Don Bosco in Valencia and obtained his high school diploma in 1959. He first attended university in Venezuela and later on transferred to Tennessee Technological University at Cookeville, Tennessee. In August 1966, he received a Bachelor of Science degree in agricultural economics. The following September he accepted a graduate research assistantship at the University of Tennessee, Knoxville, and began working toward his doctoral degree in agricultural economics. In June 1969 he entered a special program in economics at Harvard University and later on in the same year he was employed by the Inter American Development Bank as a country economist. He went back to Venezuela in 1972 and since then has occupied several government positions. He returned to the University of Tennessee and received his Doctor of Philosophy degree in December 1977.

He is married to Luisa Aponte, and they have two daughters and one son.