DISCUSSION PAPER

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AN ECONOMIC ANALYSIS OF LOW-COST HOUSING OPTIONS IN EL SALVADOR

by

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ABSTRACT

This report applies the economic and social methodology for project analysis developed by Lyn Squire and Herman Van der Tak to the evaluation of low-cost housing options in El Salvador. Data was collected in 1977-78 on the 9 main housing options accessible to urban households in the lower half of the income distribution. The options included conventional housing, both single unit and multi-family; formal sites and services and upgrading; and the three main types of informal housing (squatter settlements, rental rooms and extra-legal subdivisions). For each option information was collected on costs (from both the executing agency and the occupants) and on imputed benefits (through imputed rents).

Efficiency and social parameters were calculated using the Squire-Van der Tak methodology. The housing options were then compared, using the Squire-Van der Tak approach to cost-benefit analysis, in terms of both efficiency and social benefits. The latter were estimated using weights for consumption by different income groups, and for impacts on consumption and investment. One of the innovations contained in the report is the estimation of private costs and benefits. These are derived by computing all costs and benefits from the point of view of the occupant of the unit rather than from the point of view of the nation. It was found that the rank ordering or projects (in terms of their economic rate of return and their net present value) was different for public and private estimates. The main reason for the difference was that most public housing programs contain an element of subsidy, either through not covering all costs or through below-market interest rates. These subsidies raise the private rate of return and encourage households to purchase or rent public housing options whose economic efficiency is lower than that of some of the informal sector options.

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SUMMARY OF THE REPORT

1. This study applies the socio-economic approach to project analysis developed by Lyn Squire and Herman Van der Tak, [1/] to the evaluation of the First World Bank financed sites and services urban housing project in El Salvador. The evaluation is based on a comparison, made in 1978, of two sites and services options with 7 other housing options provided either by public agencies or through the informal housing market, all of which were theoretically accessible to families in the lowest 50-60% of the urban income distribution. The study is intended to contribute to our understanding of the potential role of sites and services and squatter upgrading in urban shelter programs as well as to evaluate the utility of the Squire-Van der Tak methodology in a different context from those in which it has traditionally been employed.

2. The first El Salvador Sites and Services Project, which was executed by the Fundaction Salvadorena de Desarrollo y Vivienda Minima (FSDVM) was one of the first low-income urban housing projects to be supported by the Bank. As this was also one of the first projects to be completed it is hoped the results of the evaluation will be helpful in the definition of future Bank policies in the field of urban housing. Although the primary objectives was to evaluate the FSDVM project, the study included a systematic comparison of 9 different housing options in the formal and informal sectors. Consequently the report provides detailed comparative information on a number of alternative housing options such as squatter upgrading and tenement housing which present

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1/ Lyn Squire and Herman G. Van der Tak Economic Analysis of Projects, published for the World Bank by the Johns Hopkins University Press, 1975.

alternative approaches to the provision of shelter accessible to the urban poor.

3. The methodology itself has been widely discussed and criticized within and outside the World Bank and it is hoped this report will contribute to the discussion by examining the contribution to policy planning when the methodology is applied in a somewhat different context from earlier studies. Some of the methodological issues which are discussed include: the extent to which a technique based on marginal analysis can contribute to the definition of general policy; the validity of imputed market rents as an estimate of benefits; the utility of distribution weights to evaluate options in terms of their accessibility to low-income groups; and the problem of potentially important benefits which cannot be quantified within this methodology.

4. The urban housing market presents a number of different methodological questions from those found in earlier applications of the Squire-Van Der Tak methodology. The fact that the study is part of a four country longitudinal evaluation of low-income housing [1/] means that the researchers had access to types of information on costs and to some extent on benefits which are not usually available when this methodology is applied. For these reasons, it is hoped that the study will offer an opportunity to evaluate the potential value of the methodology in a new

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1/ The five year evaluation program, jointly sponsored by the International Development Research Center of Canada and the World Bank, covered Bank financed projects in El Salvador, Senegal, Zambia and the Philippines. The original project ended in 1980 although a one year extension was approved for Senegal and the Philippines.

context and hence will provide new insights into some of the problems of project evaluation.

5. An innovation not included in earlier applications of the Squire-Van der Tak method is the analysis of private, as well as public, costs and benefits. The study complements the normal estimation of public costs and benefits with an estimation of the costs and benefits accruing to the owner-occupier of each housing type. If there are any price distortions, resulting for example from government housing subsidies to certain groups, then the individual household may make a choice among housing options which, although maximizing his or her private utility, is not the best choice from the point of view of the nation. In this way it is hoped the comparison of public and private costs and benefits will help us understand better the dynamics of the housing market.

Methodology

6. The study covers the 9 main housing options potentially accessible to the poorest 50 percent of families in San Salvador. The sample includes three types of public low-income housing (one multi-family medium rise apartment and two types of single-family units); three options based on upgrading or sites and services and the three main types of housing produced through the informal market (squatter settlements, tenement housing and extra-legal subdivisions).

7. For each option a representative project was selected. Cost data was obtained from the producer, and interviews were conducted with a sample of families to obtain information on their housing costs and income. These souces were complemented by the sample survey work already conducted as part of the World Bank-IDRC supported Monitoring and Evaluation Program and by other secondary sources.

8. The estimation of Efficiency and Social parameters follows closely the Squire-Van der Tak methodology. Three indicators were used for the Efficiency analysis: the Economic Rate of Return, Net Present Value and Net Present Value divided by the discounted total costs. For the social analysis two different assumptions were made about the priority given by the government to income redistribution; the first assumed a low priority (with n, the weighting factor being equal to 0.5) and the second assumed a higher but still only moderate priority (n=1.0). The analysis of the social impact of projects on income distribution and on the preference for consumption over investment was made under both of these assumptions.

9. An important innovation was the introduction of a Private Benefit-Cost analysis in which estimations of costs, benefits and net benefits were made in terms of costs and benefits actually incurred by households. This is a potentially useful method for evaluation of the impact of price distortions on the efficiency of resource allocation.

10. The nature of the study introduces a number of interesting methodological features. The first unusual feature is that nine different housing options are studied, rather than the two or three which are normally compared. This does not affect the logic of the analysis but introduces a greater complexity into the interpretation of the results.

11. A second feature which complicates the analysis is the fact that the options are not exclusive. It is quite possible to recommend the simultaneous construction of several of the options, rather than selecting between mutually exclusive alternatives as is usually the case with this type of analysis. This permits a discussion of the extent to which a

technique which indicates which alternative produces the highest marginal net benefits can contribute to general planning of an overall housing policy.

Structure of the Report

12. The Report contains three chapters and two appendices. The detailed computations have been assigned to the appendices. Chapter One present an analysis of the low-income housing market in El Salvador and shows the ways in which housing policies have restricted the access of low-income households to public housing. This chapter describes each of the types of housing option included in the analysis.

13. Chapter Two presents the methodology and is divided into five sections. Section 1 explains briefly the methodology for the estimation of social and efficiency parameters. The estimating procedures are presented in greater detail in Annex 1. Sections 2 and 3 explain the methodology for efficiency and social cost-benefit analysis. Section 4 explains the procedures for estimating private costs and benefits, and Section 5 explains the sample design and procedures for data collection.

14. Chapter Three presents the results of the analysis and discusses their policy implications. Recommendations are also included for future research.

15. Appendix 1 presents the methodology for the estimation of efficiency and social parameters. Appendix 2 explains the procedures used for the estimation of costs and benefits for each of the 9 housing options studied. All of the main tables are included so that the interested

reader can repeat any of the analysis using different assumptions.

Summary of the Main Findings

16. Table 1 presents the main findings of the analysis of public costs and benefits. Each of the 5 indicators mentioned in paragraph 7 is included. Table 2 ranks each housing options from 9 (highest) to 1 (lowest) on each of the five indicators. The final column presents the average rank of each project on all 5 indicators. 1/

17. The housing projects are classified into three groups. The first group, upgrading and sites and services includes the IVU (Urban Housing Institute) slum upgrading, and two of the FSDVM (Salvadorean Low-Cost Housing Foundation) sites and services projects. The second group includes the three types of housing produced through the informal market and the final group includes three traditional public low-cost housing programs (one medium rise and two single family units).

18. The highest ranking group contains the two FSDVM sites and services projects which had the highest and second highest ranks, and the IVU upgrading program, which was the highest ranked government housing program.

19. The second highest ranking group includes the housing options generated by the informal housing market. The extra-legal subdivision and squatter settlements tied in third highest rank. It should be clarified

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1/ The validity of the use of the average rank as a summary figure is indicated by the high degree of agreement between the different ranks. Kendal's co-efficient of Corcordance (W) has a value of 0.8019 indicating a high degree of agreement between the different ranks.

that the study deliberately included one of the more stable squatter settlements as the intention was to evaluate the effectiveness of this option under relatively favorable circumstances. The tenement houses(mesones) have a much lower ranking than the other two types of housing. The reasons for this lower ranking are not entirely clear, but as the meson is located on prime urban land in the city center, it is much more affected by changing land values. This greater sensitivity to the assumptions made about the value of land, means the rates of return are more difficult to estimate precisely.

20. Another point of interest is the different response of the basic core unit and the serviced lot to the social evaluation. When the two projects are compared in terms of economic efficiency the difference is relatively small with the core unit having a slightly higher rate of return (33 percent compared with 28 percent). When, however, a distribution weight of 1 is used, the difference becomes much greater (42% compared with 28%). This supports initial findings in other countries that poorer families prefer a higher level of construction whereas the slightly richer families prefer to receive only a serviced sites so that they have more flexibility to build according to their own preference.

21. Tables 3 and 4 summarize the main findings of the evaluation of private costs and benefits. The analysis was conducted for all 8 owner-occupied housing options, but not for mesones (tenements). Table 3 compares the results of public and private evaluation of Net Present Value, Net Present Value divided by costs and the Internal Rate of Return. In all cases it can be seen that private costs are lower and with one exception the Internal Rate of Return is higher. This suggests that all projects permit occupiers to enjoy some measure of direct or indirect

subsidy. In the case of public programs this is a direct subsidy, whilst in the case of illegal subdivisions and squatter settlements this takes the form of families not having to pay the full economic costs for certain services (often water). Although all projects enjoy some measures of subsidy, this is much greater for the public programs.

22. The effect of public program subsidies can be seen in Table 4 which presents the ranking of projects from the public and private standpoint. It can be seen that in the private analysis the ranking of public housing programs increases considerably. This is a reflection of the fact that families in public programs are not paying the full economic cost. As most public programs are only accessible to families in the upper half of the income distribution these subsidy policies have the effect of producing a negative bias in terms of distribution of housing benefits to the urban poor.

23. An additional analysis was made for the extra-legal subdivision to determine the impact on private benefit-cost ratios of providing loans on the same terms as those received by FSDVM participants. The effect would be quite dramatic as the private IRR would increase from 14% to 35% and both NPV and NPV/Cost would be more than quadruple.

Policy Implications

24. Care must be taken in the interpretation of the findings as the study is based on the analysis of specific projects, some of which may not be the most cost effective examples of the option, and because many of the important variables are subject to considerable measurement error. At the same time the consistency of the findings over a number of independent indicators suggests the relative magnitudes are indicative of important

differences between the projects studied. Within this context a number of interesting policy implications are suggested.

25. Both upgrading and sites and services are potentially effective ways of making housing accessible to the urban poor. On all of the efficiency and social indicators these two projects are consistently ranked higher than traditional housing programs. The fact that the higher rankings hold for both efficiency and social analysis suggest that these are cost-effective ways to provide shelter for the poorest 50 per cent of the urban population. 1/

26. Both extra-legal subdivisions and squatter settlements have relatively high rankings, suggesting that the informal housing market is able to provide, with no financial or technical assistance, housing for the urban poor which ranks higher than most traditional programs. The analysis also shows that simply by offering financial terms similar to those provided to FSDVM the private benefits would double or on some indicators quadruple. This suggests this type of project might be

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1/ A similar conclusion was reached in a later study of another FSDVM project in Santa Ana, in which it was estimated that by moving from the informal sector to the FSDVM project, participants increased their utility by about 20%. See John Quigley "The distributional consequences of stylized housing programs". Urban and Regional Report No. 80-18. Urban and Regional Economics Division. The World Bank. 1980.

interesting to consider for support by national or international organizations. The project has the additional advantage that a large number of households could be reached relatively easily and quickly and without the need to establish a very complicated organizational structure.

27. The relative rankings for tenement houses are in most cases much lower, due mainly to the high cost of land and the income transfers to the high income tenement owners. The proximity to places of work and the fact that most of the buildings are structurally sound, makes this another attractive option if a satisfactory approach to the cost of land can be found. The FSDVM has already produced promising results with a pilot upgrading project for one meson which was converted into a condominium.[1/]

28. Some interesting policy issues arise from the different social evaluations of the FSDVM basic core unit and serviced lot. Although the two models have similar efficiency levels, the higher income level of families choosing the serviced site, lowers considerably the social rate of return for this option. This suggests that in an overall shelter strategy, the serviced site should perhaps be targetted to a slightly higher income group than the core unit.

29. A more general policy issue arises from the comparison of public and private benefits. Public housing programs contain considerable subsidy elements thus making them more attractive to consumers in terms of private net benefits, than is merited by the efficiency net benefits. The

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1/ This project is described in Bamberger, Gonzalez Polio and Sae-Hau "Evaluation of Sites and Services Projects: The Evidence from El Salvador." World Bank Staff Working Paper. No. 549 1982.

distortions are made worse by the fact that many of the most highly subsidized programs are mainly occupied by higher income groups so that the subsidies contribute to a more regressive distribution of benefits. This suggests that current housing subsidy policies should be reviewed so as to either reduce the subsidy element or to distribute it more equitably among different income groups.

30. Finally the findings of this study suggest that this method of Economic Analysis can be a useful policy tool, particularly if private analysis is included together with the more traditional approaches. It is believed that similar studies would be useful to urban policy makers in many countries who are seeking ways to make housing accessible to the urban poor.

Table 1: COMPARISON OF LOW-INCOME HOUSING OPTIONS IN SAN SALVADOR USING DIFFERENT ECONOMIC ANALYSIS INDICATORS

	RATE OF RETURN			NET PRESENT VALUE	
	Economic R/R	Social R/R N=0.5	Social R/R n=1.0	NPV(Colones)	NPV/DTC 1/
Programs based on Upgrading or Progressive Development.					
FSDVM Basic Unit	33	26	42	4065	1.2016
FSDVM Serviced Plot	28	22	28	2329	0.7269
IVU Upgrading	18	15	15	1078	0.2640
Informal Housing					
Extra-legal Subdivision	22	24	22	1788	0.3509
Squatter Settlement	20	29	53	373	0.2972
Tenement	12	12	32	30	0.0141
Traditional Government Housing					
IVU - Multifamily Apartments	11	6.3	13	-1828	-.1304
IVU - Single Family Units	9	7	18	-606	-.0720
Fondo Social - Single Family Unit	13	12	20	452	0.0641

1/ Net Present Value divided by discounted total cost.
This adjusts for differences in total investment.

Table 2: RANK ORDERING OF LOW-INCOME HOUSING OPTIONS IN SAN SALVADOR. COMPARISON OF DIFFERENT ECONOMIC ANALYSIS INDICATORS

(9 = Highest value; 1 = Lowest value)

	RATE OF RETURN			NET PRESENT VALUE		AVERAGE RANK ON ALL INDICATORS
	Economic R/R	Social R/R n=0.5	Social R/R n-1.0	NPV	NPV/DTC 1/	
Programs based on Upgrading or Progressive Development						
FSDVM Basic Unit	9	7	8	9	9	9
FSDVM Serviced Unit	8	6	6	8	8	8
IVU Upgrading	5	5	2	5	6	5
Informal Housing						
Extra-legal Subdivision	7	8	5	7	7	7
Squatter Settlement	6	9	9	6	4	7
Tenement	3	4	7	3	3	3
Traditional Government Housing						
IVU-Multifamily Apartment	2	1	1	1	1	1
IVU-Single Family Units	1	2	3	2	2	2
Fondo Social-Single Family Unit	4	4	4	4	5	4

1/ Net Present Value divided by discounted total cost. This adjusts for differences in total investment.

Table 3: A COMPARISON OF HOUSING OPTIONS IN TERMS OF PUBLIC AND PRIVATE COSTS, NPV AND IRR

PROJECT	PUBLIC COSTS AND BENEFITS				PRIVATE COSTS AND BENEFITS						
	Cost*	NPV**	NPV/COST	IRR	COST*	NPV**		NPV/COST		IRR	
	Colones	Colones		%	Colones	Colones				%	
FSDVM Basic core	3383	4065	1.2016	33	2976	5368	(5157)	1.8038	(1.73)	129	(94)
FSDVM-Serviced lot	3204	2329	.7269	28	2617	3635		1.389		45	
IVU-Single family	8414	-606	-.0720	11	7085	4061		.5731		35	
IVU-Appartments	14021	-1828	-.1304	9	8537	5254		.6154		54	
FSV-Single family	7046	452	.0641	13	7007	4655		.6643		90	
IVU-Squatter upgrading	4083	1078	.2640	18	3760	1857		.4939		25	
Colonia ilegal	5096	1788	.3509	22	5223	713		.1369		14	
Tugurio	1255	373	.2972	20	1227	639		.5208		26	

Notes: Meson (tenements) not included in the comparison between public and private costs and benefits
* Costs discounted at 12%
** Net present value (discounted at 12%) of Net Benefits

Two different estimates are made for private benefit/cost ratios in the FSDVM Basic Core Unit project. The first estimate (a) make maximum assumptions about imputed rent during the first two years, whilst the second (b) makes minimum assumptions about imputed rent. See Section 1 of Annex 2 for a more detailed explanation.

Table 4: COMPARATIVE INDICATORS OF PUBLIC AND PRIVATE COSTS AND BENEFITS FOR EACH HOUSING OPTION
(PB=Public: PT=Private)

	COST (PB/PT)	NPV (PT/PB)	IRR (PT-PB)	COMPARISON OF RANK ORDERING (8=highest)			
				NPV/COST		IRR	
				Public	Private	Public	Private
Programs based on upgrading or progressive development.							
			%				
FSDVM Basic Unit	1.14	1.32	+61	8	8	8	8
FSDVM Serviced Plot	1.22	1.12	+17	7	7	7	5
IVU Upgrading	1.09	1.72	+7	4	2	4	2
Informal housing							
Extra-legal subdivision	.98	.40	-8	6	1	6	1
Squatter settlement	1.02	1.71	+6	5	3	5	3
Traditional government housing							
IVU - Multifamily	1.64	2.88	+45	1	5	1	6
IVU - Single family	1.19	6.70	+24	2	4	2	4
FSV Single family	1.08	10.3	+77	3	6	3	7

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Chapter 1: Housing Policies in El Salvador and the Shelter Options Accessible to Low-Income Families in San Salvador.

1. Public policies with regard to urban land, services and housing 1/

1.01 Public housing policies have traditionally focussed on the provision of a relatively small number of high cost units whose access was largely restricted to families in the upper 40 per cent of the income distribution or who were employed in the formal sector of the economy. From 1960 to 1970 an average of 2,600 new housing units were produced annually in urban areas whilst an estimated 10,000 new households were formed every year. It was estimated that in 1972, 55 per cent of the urban housing stock needed improvement or replacement, and in 1975 that 69 per cent of urban households lacked individual water supply and 62 per cent lacked sewerage connections.

1.02 Since 1950 three major public housing programs have been established. The first of these agencies was the Instituto de Vivienda Urbana (IVU) established in 1950. During the 1960's it launched a large-scale program of conventional mass-produced single family units and multi-family apartment buildings mainly directed to the middle income groups. By 1978 IVU had constructed more than 23,000 units with direct financing from the central government. Over the past few years IVU has faced a series of organizational problems which have slowed its rate of

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1/ Much of the information for this section was taken from Bamberger, Sae-Hua and Gonzalez-Polio "Evaluation of the First El Salvador Sites and Services Project." Chapter 1.

growth. At various times it has experimented with low-cost self-help housing projects, either through sites and services or squatter upgrading but, many of them have been short-lived and have not been integrated into its normal operating activities. It has proved difficult to integrate these projects into normal operations and they have not yet represented a significant proportion of total house production. One of these squatter upgrading projects was included in the present study.

1.03 The second government agency, the Financiera Nacional de Vivienda (FNV) was established in 1965 under the auspices of the Alliance for Progress as a means for channeling private savings into housing construction, through the establishment of savings and loan associations. By 1978 the FNV had financed 26,600 units at an average unit cost in 1978 of $20,000. The houses constructed have been mainly located in the Metropolitan area and are accessible only to families in the top thirty per cent of the income distribution. Most of the cosstruction has been of single-family units although recently a number of condominium apartments have been financed.

1.04 The third agency, established in 1973 is the Fondo Social para la Vivienda (Social Housing Fund). The FSV is financed mainly through a payroll tax and was established as an extension of the Social Security System. The program only covers household heads employed in the formal sector. By 1978 over 5,000 units had been constructed, but although many of the families paying the payroll tax had incomes below $280 per month, most of the units being financed cost between $4000 and $6000 and were only accessible to families in the top 30 or 40 per cent of the income distribution. Although the FSV has begun to experiment with variable

interest rates, which potentially provides a way to make housing accessible to lower-income families, in fact there is a tendency for the average cost of units financed to increase and for the program to become less accessible to the poorer sectors who are theoretically covered by the program.

1.05 The policy of only constructing public housing for middle and upper income groups is aggravated by a lack of a clearly defined land-use policy. Land is very scarce and hence expensive in El Salvador, and as there is no policy of price control or reserving land for low-income housing, the effect has been to make it extremely difficult to obtain land at a price affordable to poorer families.

2. The main types of shelter provided through the informal housing market

1.06 The previous section showed that access to public housing programs has essentially been restricted to families in the top 40 per cent of the urban income distribution. An inevitable consequence of this has been, as in most other developing countries, that most low-income families live in shelter provided through "the informal housing market." By "informal" is meant types of housing which either contravene one or more laws or regulations or which at best are tolerated by public authorities but not actively assisted. In this section we will describe the main types of informal housing in San Salvador. It is important to remember that by no means all families living in "informal" or even low-income housing are poor. Given the general housing shortage and lack of access to urban land, many middle-income families also occupy these same types of informal housing. The point is often made that some of the wealthiest residential areas of the city are also "illegal" in that they

also infringe certain planning regulations. From the point of view of housing research and policy the economic heterogeneity of many supposedly low-income areas proves to be a complex and intriguing issue as on the one hand it makes it more difficult to ensure the benefits of a project reach the low-income families for which it is intended, whilst on the other the interest of higher income families in these areas means that poorer families can potentially generate extra income from subletting or selling their properties.

1.07 It was estimated that the population of the metropolitan area of San Salvador in 1977 was 788,320 and that 54 percent lived in housing which was defined as inadequate. Table 5 shows that five types of inadequate housing were identified of which the most important was the rented rooms (mesones) followed by illegal subdivisions.

1.08 In comparison with other Latin American countries, an extremely low-proportion of families live free on land which has been invaded. The squatter settlements (tugurios) house only 8.6% of families with inadequate housing and less than 5 per cent of all families in the metropolitan area. In fact, even in the tugurios, a significant proportion of families are paying rent to the owner of the land which has been invaded so that the proportion who are living free is even lower. This contrasts very dramatically with the situation in many Latin American cities (for example Caracas, Lima, Rio, Recife, Mexico City) where a quarter or more of the total urban population may be living on invaded land and paying no rent.

Table 5: ESTIMATED POPULATION AND NUMBER OF FAMILIES LIVING IN RENTED ROOMS, SQUATTER SETTLEMENTS, ILLEGAL SUBDIVISIONS, TEMPORARY CAMPS AND DETERIORATED HOUSES, SAN SALVADOR, 1977

Type of Housing	Population		Families		Family Size	Source
	No.	%	No.	%		
Inadequate Housing	425716	54	92797	55	4.8	
Rented rooms (mesones)	184910	23.4	48660	28.9	3.8	(1) Ministerio de Planificacion
Illegal subdivision	161606	20.5	27672	16.4	5.8	(2) FSDVM
Squatter settlements	38000	4.8	8064	4.8	4.7	(3) EDURES
Camps	20300	2.6	4229	2.5	4.8	(4) EDURES
Deteriorated housing	20900	2.6	4354	2.6	4.8	(5) EDURES
Adequate Housing	362604	46	75542	44.8	4.8	(1) Ministerio de Planificacion
TOTAL	788320	100	168521	100		

Note: All figures were projected to 1977 by the authors.

Source: (1)"La Situacion de Vivienda. 1971-75," Seccion de Investigaciones Muestrales. Ministerio de Planificacion, Cuadro No. 2, 1975.
(2) "La Vivienda Popular en El Salvador," FSDVM, 1976.
(3) "Rehabilitacion de Asentamentos Marginales," Informe Inicial, Fase 1, Pag. 3, EDURES, Noviembre 1976.
(4) EDURES op. cit., Based on Informe de OMCOM, 1976.
(5) EDURES op. cit., Based on "Encuesta de Mano de Obra," PREALC, 1974.

1.09 The reason for the marked difference in the case of San Salvador (and most other Salvadorean cities) is that land is very scarce and hence very little can be considered as "marginal". This has meant that other than small areas which are in ravines or are otherwise topographically difficult to develop, even the poorest families have been forced to pay for their accomodation.

1.10 The five types of informal settlements can be described as follows:

Mesones (rented rooms) - the meson normally consists of between 5 and 50 rooms built round one or more central patios. Water supply and sanitary services are communal. Traditionally the mesones were converted middle-class houses but now new mesones are starting to be built. The majority of older mesones are located close to the center of the city and it would appear that people are prepared to pay a higher rent because of the location. In many cases the meson is the place of employment and it is typical for there to be more expensive rooms facing onto the street, thus permitting a small store or service to be installed. With the expansion of the city new mesones are now being built on the edges of the city. 1/

1.11 In the majority of cases a family will rent a single room and there is an average of 2.8 persons per room. In 1977, the average monthly rent was estimated to be US$12, but there is a wide variation and approximately 20 per cent pay less than US$8 whilst at the other extreme

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1/ In theory it is illegal to construct new mesones but the law has not proved effective.

the top 20 per cent pay more than US$16. In about 80 per cent of the cases, the cost of water and light is included in the rent. In the case of water, most tenants consider this to be a disadvantage rather than a benefit because the owner restricts the water supply often to two hours a day and families would prefer to have the opportunity to pay more for a better service.

1.12 Mesones vary greatly in quality and price, ranging from well built brick rooms with neatly kept patios and sanitary areas, to rooms constructed of mud and straw, where water enters for only two hours a day and where 10 or more families share one badly maintained pit-latrine. The quality of mesones tends to decline because the law theoretically forbids reconstruction or repair of mesones, and because many of the owners are seeking a maximum short-run profit and see no reason to invest in improvements. 1/

1.13 Most of the mesones are located in the central areas of the city and in recent years programs of urban renewal have resulted in a large number being demolished, and many others have been destroyed in a large number of mysterious fires in which mesones and small stores have vanished. As a consequence, rents have been rising vertiginously and cases were found in the study where rents had doubled over a 3-month period. The study also revealed cases in which owners were deliberately locking the toilets or reducing the water supply to force families to leave so that the rent could be raised to the newly entering tenant. 2/

1/ Many owners plan to sell the land when prices rise or to convert into middle-class apartments.

2/ The law prohibits increasing the rent to an existing tenant.

1.14 The lack of government control over prices or quality combined with lack of alternative housing options has meant that the meson represents an important economic market producing an estimated gross annual rental income of approximately US$7.5 million in the metropolitan area.

1.15 Illegal Subdivision (colonia ilegal) - The illegal subdivision is a situation in which the owner of a piece of land subdivides it for sale without having obtained planning permission. Almost invariably the land is sold without any services or preparation of the site (other than a minimal access road). As planning permission has not been obtained, it is usually difficult and often impossible for the families to obtain the basic services, particularly water. The normal method of sale of the land is through "renting with promise of sale." Under this system, the family pays monthly installments, usually over a period of 5 to 7 years, and on the completion of the final installment the land is purchased. If the family defaults on a payment, the seller can consider the payments to that point as a simple rental agreement and the tenant may lose all purchase rights. This method of sale is illegal but it tends to be the purchaser rather than the seller who suffers from the illegality and there are many cases in which the purchaser never obtains ownership. The illegality of the sales procedure also means that there is no regulation or control of prices or interest charges and in most cases the purchaser has no idea how much interest he is paying.

1.16 It is important to appreciate that the illegal subdivision is not just a form of low-cost housing and that many middle-class and even upper-class housing developments can be classified as illegal.

1.17 The studies in colonias ilegales revealed that in most of the new colonias on the outskirts of the city (for example in the Apopa region where the FSDVM is constructing its new projects), a significant number of mesones are being built and that many of the houses are also being built for rent. This is important because it has traditionally been thought that in the colonia ilegal familes constructed almost exclusively for their own use but in fact the colonia may prove to be one of the major forms of rental market in the future.

1.18 Squatter Settlements (tugurios) - Compared with other countries San Salvador has no large tugurios (squatter settlements) and probably none has more than 1,000 families and the great majority house less than 100 or even 50 families. Due to topographical conditions and the high demand for land, almost none of the tugurios are on flat land, and many are in ravines, along former railway routes or on relatively steep hills. In most cases, the life of the tugurio is relatively short although there are several cases of well established communities where families have been living there for 10 or more years and where there is relatively secure tenure. Approximately 15 to 20 per cent of the tugurios are on private land and in many cases occupants are paying rent.

1.19 In the insecure tugurios there is usually no water supply or sanitary services. In the more established tugurios, water has usually been introduced either by the government or by private initiative. In one of the communities studied, the water had in fact been installed by one of the tenants who then resold to the other families at a considerable profit. In the larger tugurios government programs have introduced latrines, often on a communal basis.

Currently less than five percent of the population of San Salvador live in tugurios and it is likely that with the programs of urban renewal this proportion will fall. In most cases when a tugurios is removed, the residents are offered some type of access to a government housing program, often based on self-help, but at the present time we do not have any information on the proportion of families who are in fact relocated to one of these programs.

1.20 Temporary Camps - These camps were provided by the government for the victims of flooding and other emergencies. They are gradually being removed.

1.21 Deteriorated Housing - The estimates here are inevitably not very precise and as in any other city, the figures are constantly changing as older areas of the city are pulled down for renwal.

1.22 Neither of these latter two types of housing were included in the present study.

3. Housing types produced by the FSDVM 1/

1.23 The objective of the FSDVM is to provide housing accessible to families too poor to be able to obtain housing through existing public or private programs. As a central policy is to require complete cost-recovery to ensure the replicability of the projects, it has been accepted that in practice the projects will not be accessible to about the poorest 15 per cent of the urban population.

1/ A more detailed description of the FSDVM programs is given in Bamberger, Sae-Hua and Gonzalez-Polio "Evaluation of the first El Salvador Sites and Services Project" Chapter 2 op. cit.

1.24 Although some projects have been as small as 100 units, the typical FSDVM project provides between 500 and 2000 housing units. Usually all units are single family and single floor, but recently there has been some experimentation with 2 floor units and with conversion of tenements into condominium ownership.

1.25 FSDVM's normal method of operation is to divide the project into lots of 75 to 100 square meters, all serviced with individual water and sewage connections. Costs are minimized by reducing the area of vehicular roads and by exploiting natural topographical gradients to reduce the cost of earthworks and drainage. Participating families are required to work together in mutual help groups at weekends to construct walls, roof etc. to a level where the house, although not complete, is considered to be habitable. Families can then complete the construction at their own pace and using materials and designs of their own choosing. Loans are provided for the purchase of additional building materials but families will normally have to provide additional financing to complete the house.

1.26 The use of mutual help construction is important as it eliminates the necessity for a 10 per cent down-payment and thus makes the houses more accessible to poorer families.

1.27 Although the majority of plots in a project will be sold through the mutual help system, there may also be some plots sold directly to families who can complete the construction on their own. The present study includes both "basic units" where the family obtains, at the end of the mutual help a habitable unit, and "serviced plots" where the family receives the plot with water and sewage connections but no contruction.

1.28 Houses are purchased through fixed monthly payments over a 20 year period at 6% interest. Houses cannot be resold during the first five years. This provision is included to protect families from selling out before they have had time to understand the worth of their property.

4. The accessibility of public and private housing to the low income families in San Salvador

1.29 Table 6 estimates the accessibility of each of the main types of formal and informal housing to low-income families. The estimates are based on the simplifying assumption that a household will not spend more than 25% of total household income on housing. 1/ Average monthly costs were calculated for each type of housing and an income distribution curve was computed (Figs. 1 & 2). It was assumed on the basis of the above assumptions that a family could afford a particular type of housing as long as their total family income was at least 4 times greater than the required housing payment. Table 6 indicates the lowest income percentile to which each type of housing is affordable. It can be seen that none of the public housing programs which existed in 1977 (the year in which the estimates were made) were affordable to families below the 48th income percentile. In fact most public housing was only accessible to the top 40 per cent of families.

1/ Although this assumption seems to be valid for renters (see Douglas Keare and Emmanual Jimenez "Affordability, Income and Housing Consumption", lowest income owners appear willing to spend up to 40% of their incomes on housing (see Bamberger, Sae-Hua and Gonzalez Polio Chapter 6).

Table 6: ACCESSIBILITY OF FORMAL AND INFORMAL HOUSING TO THE URBAN POOR, SAN SALVADOR 1977

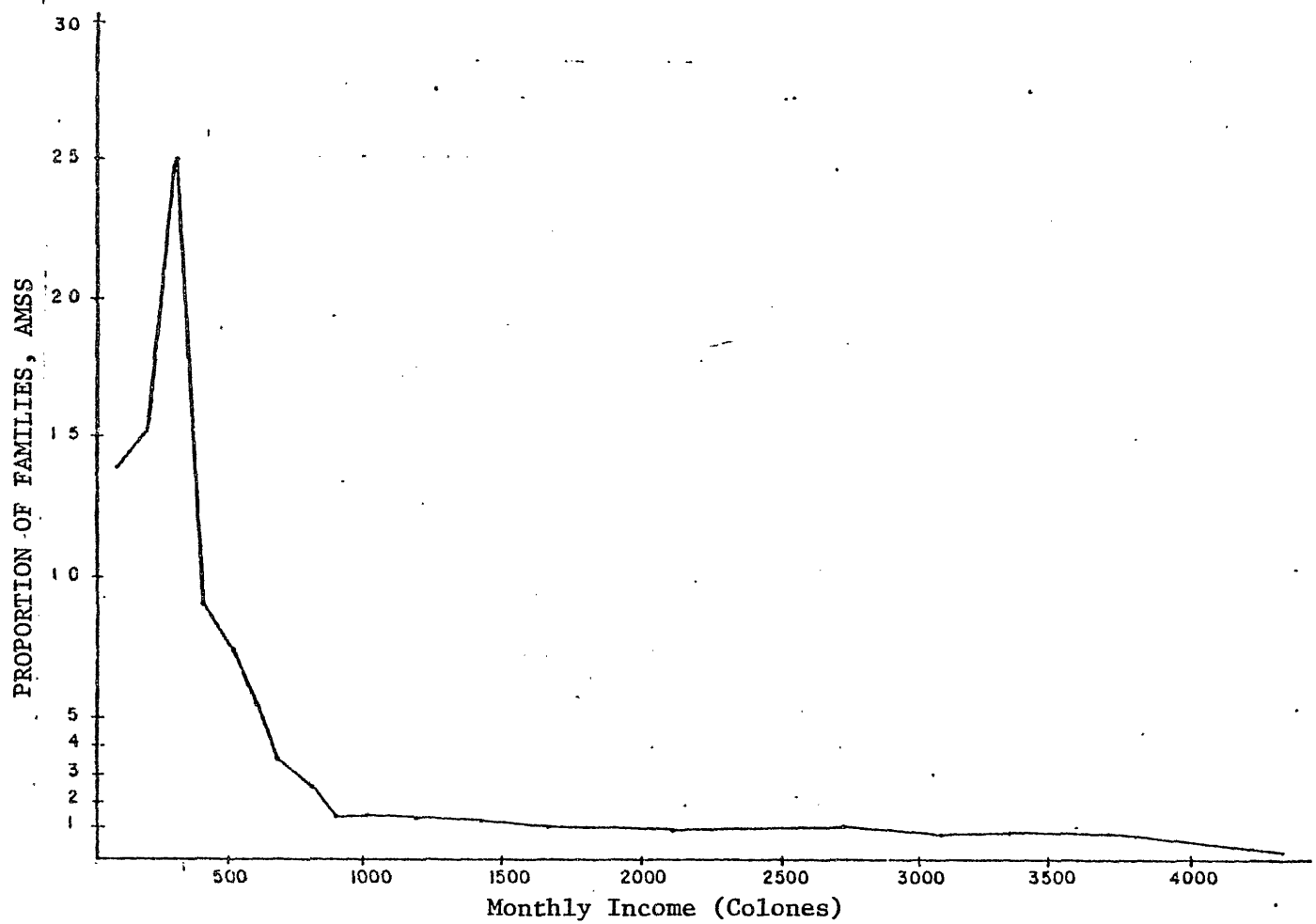
Institution	Type of housing	Lowest percentile who can afford this type of housing
Invasion of public or private land	Squatter settlement (tugurios)	Free (accessible to all income groups)
Private landlord	Tenements (mesones) poorest quality	6th income percentile
Private developer	Extra legal subdivision (poorest quality)	10th " "
FSDVM	Basic Core Unit	24th " "
Private landlord	Tenements - adequate quality	24th " "
Public-IVU	Marginal housing in squatter areas (discontinued)	27th " "
Private developer	Extra legal subdivisions (adequate quality)	42nd " "
Public - FSV	Normal program 1975-78	48th " "
Public - IVU	2 bedrooms	52nd " "
Public - IVU	4 bedrooms	Above 60th
Public - IVU	Appartments	Above 60th
Public - FSV	Normal program 1978-82	Above 60th
Public - FNV	Single family houses	Above 70th

Note: FSDVM = Salvadorean low-cost housing foundation
IVU = Institute for Urban Housing
FSV = Social Housing Fund
FMV = National Housing Finance Fund.

Source: Jim Richard and Michael Bamberger "Economic evaluation of sites and services programs and their accessibility to low-income groups in El Salvador" Table 2.15. FSDVM Report Series on the Evaluation Program, No. 16 July 1977.

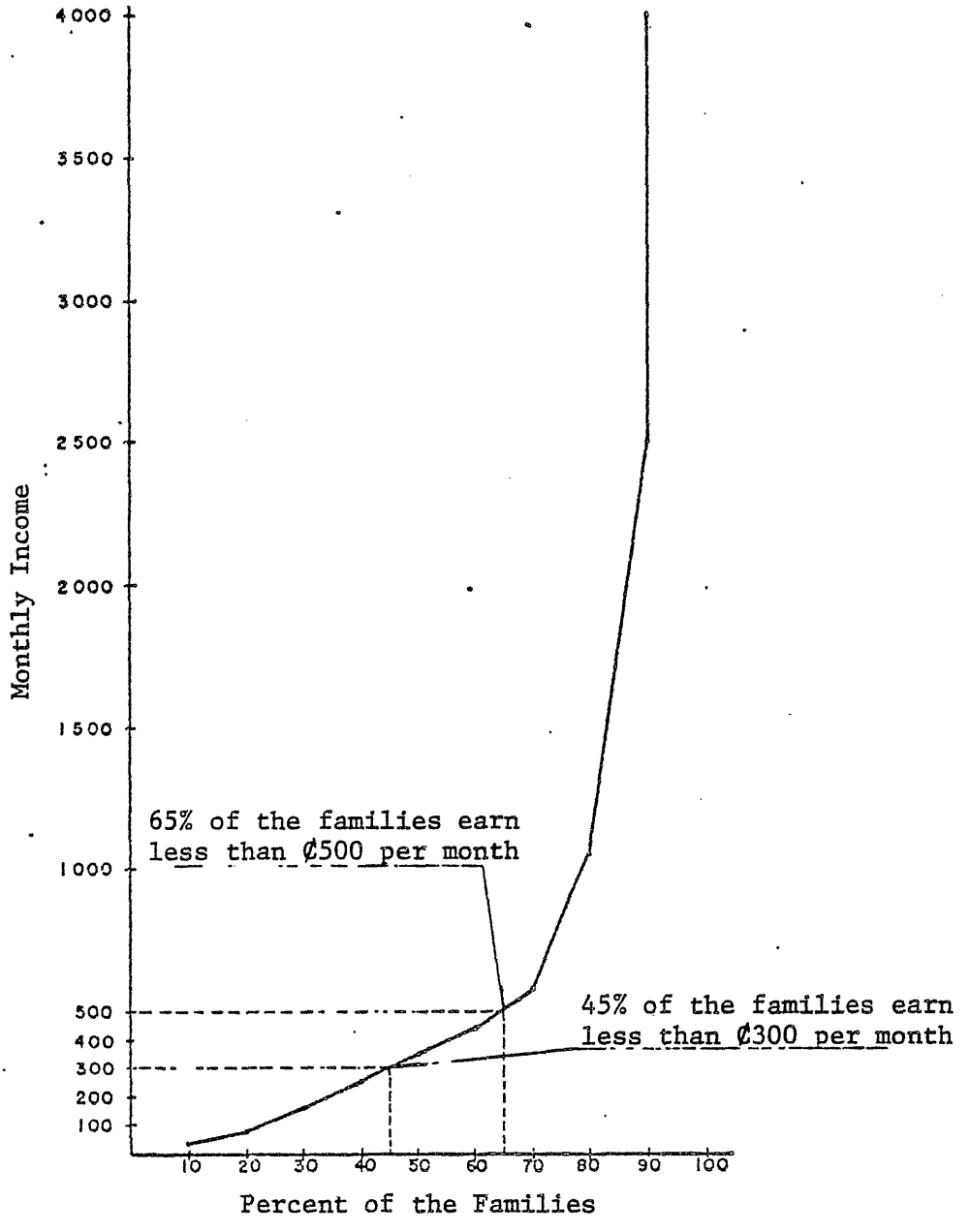
1.30 The very poorest families are restricted to poor quality rented rooms, squatter settlements and extra-legal subdivisions. The FSDVM projects are accessible down to about the 25th income percentile (although a few families are found in the second income decile) which is about the same level as for better quality tenement houses. These figures on project accessibility will become important in later sections when we consider the distribution of project benefits by the income level of beneficiaries.

Figure 1: DISTRIBUTION OF MONTHLY FAMILY INCOMES IN SAN SALVADOR, 1976



Source: Projections for 1976 by FSDVM on the basis of data from PREALC, Situacion y Perspectivas del Empleo en El Salvador 1975.

Figure 2: CUMULATIVE FREQUENCY DISTRIBUTION OF FAMILY INCOMES IN SAN SALVADOR, 1976



Source: PREALC, Situacion y Perspectivas del Empleo en El Salvador 1975.
Graph constructed by FSDVM.

CHAPTER 2 - METHODOLOGY

Section 1 - The Estimation of Efficiency and Social Parameters

2.01 The methodology for the estimation of Efficiency and Social parameters follows closely the Squire-Van der Tak methodology. A more detailed description of the estimating procedures is given in Annex 1 and the purpose of this section is simply to provide a brief overview.

Efficiency parameters

2.02 The estimation of efficiency parameters is considered as a first stage of the analysis in which no consideration is given either to the characteristics of the groups receiving the benefits, nor to the use which is made of national resources. The main objective of the efficiency analysis is to compare the net benefits of each project to the nation by converting all costs and benefits to border prices. This involves the estimation and adjustment for all price distortions produced through subsidies, indirect of direct taxes and other contraints on the operation of a free market so as to be able to estimate the true economic, as opposed to financial cost, of each project to the nation. The main elements of the calculation are summarized below.

Conversion factors for consumption

2.03 The purpose of the conversion factors is to estimate the real value to the economy of foregone consumption. This is done by converting market prices to border prices by adjusting for import and export taxes. A number of simplifying assumptions were made, such as the assumption that all export goods are exported, to permit the use of the Squire-Van der Tak simple conversion factor. 1/ Separate conversion factors were used for consumption of imported goods by high and low income groups as the import

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1/ Squire-Van der Tak, Equation 3 page 59

tax rates are different. The cut-off point between high and low income groups was taken at C700 per month ($280) household income so as to be consistent with other similar studies in El Salvador. This also approximates the upper income limit for participation in FSDVM projects.

2.04 For non-tradables such as land, a simplifed Standard Conversion Factor was used.

Conversion factor for capital goods

2.05 Separate estimates were made for construction (labor + materials + other) and for other traded capital goods. The conversion factors for construction and other capital goods were then weighted by their respective shares of total investment to obtain the Conversion Factor for Capital Goods.

Shadow wage rate (SWR)

2.06. In its simplest form the Shadow Wage Rate reflects the opportunity cost to the economy (foregone production) of using labor in the construction of housing. The higher the unemployment rate, the lower the real cost of withdrawing labor to work on house construction. Separate SWR were estimated for skilled and unskilled labor as quite different assumptions are involved in each case.

2.07. For skilled labor an unemployment rate of 10% was assumed so that the opportunity cost for skilled labor is 0.9 of the average skilled wage rate. It was further assumed that skilled labor is withdrawn equally from all sectors of the economy so that the Standard Conversion Factor is used to estimate the true cost to the economy. Thus the SWR for skilled labor = 0.87.

2.08. For unskilled labor an unemployment rate of 35% is assumed. It was further assumed that all unskilled labor is withdrawn from rural areas so that the opportunity cost is represented by the foregone agricultural output. The SWR for unskilled labor is estimated to be 0.66

2.09 The proportions of skilled and unskilled labor used in house construction were estimated to be in the ratio 2:1 so that the SWR for labor was a weighted average of the SWR for skilled and unskilled labor.

Marginal productivity of capital

2.10. This is defined as the net return on a marginal unit of public investment at border prices. This had to be estimated using the macro-economic approach suggested by Squire-Van der Tak as information did not exist to use the more detailed micro-economic approach. 1/ The method used may over-estimate the marginal productivity of capital as only an approximate method could be used to take out the part of the increase in GDP which is due to increased labor productivity.

2. Social parameters

2.11. The purpose of the social parameters is to permit an evaluation of the contribution of the project to achieving the distributional objectives of the government. Every government has an explicit or implicit welfare function which guides its policy planning and two of the main determinants of this are policies relating to the trade-off between present consumption and future growth and the distribution of economic benefits between different income groups. The social analysis begins with a definition of the distributional objectives of the public sector (based on a review of policy statements and inferences about implicit

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1/ Squire-Van der Tak p. 110

objectives). Weights are then developed to reflect these objectives and are applied to project benefits.

Estimating the values of government distribution preferences

2.12. Although the government states income redistribution as a policy goal there is no indication that this is a very high priority, and as a consequence values of n= .5 and n= 1, both relatively low, were used.

2.13. The Consumption Rate of Interest (CRI) reflects the discount rate for future benefits. Where government policy is growth oriented the discount rate should be low, but it will be correspondingly higher where policy is oriented towards increasing present consumption. Moderate CRI's of 6% with low priority on income distribution (n= 0.5) and 7% with higher priority on distribution (n=1) were used. This reflects the fact that the government indicates its interest in growth but at the same time has as an objective a steady increase in consumption.

Distribution Weights (d)

2.14. The distribution weight (d) indicates the value which should be attached to benefits accruing to different income groups when the two values of n are used. An average consumption level was estimated as the reference point for the calculation (C 820 per capita in 1976). Five income strata were then defined to correspond approximately to the target group of the main types of housing projects. Weights for each income group were then calculated for values of n of 0.5 and 1.0. For households below the average consumption level the value of d will be greater than 1.0 whereas for families above this level it will be less than 1.0. The range of weights is of course greater with n = 1 indicating that a higher priority is placed on ensuring redistribution of benefits to lower income groups.

Critical Consumption Level (CCL) and the value of public income (v)

2.15. The Critical Consumption Level (CCL) is the level of consumption at which the government is indifferent between public and private uses of an additional unit of income. Below this level the government would put higher priority on private consumption. The CCL can be estimated directly (see paragraphs 32 to 35 of Annex 1) but a number of independent consistency checks (minimum daily wage, minimum income for tax exemption etc.) were also used to ensure that the estimated values were realistic.

2.16. The values of v, the value of public income were estimated by both the simple and the complex formulae proposed by Squire-Van der Tak. [1/] It was decided to use the results of the simpler estimating procedure as the assumptions on which they were based seemed more plausible. This procedure gave a value of v=2 when n=0.5 and v=1.8 when n=0.

2.17. Using these values of v the CCL was estimated to be C 235 per capita per annum with n=0.5 and C 488 per annum with n = 1.0. It can be seen that the assumption about n has a significant impact on what is assumed to be the minimum acceptable level of consumption.

Distribution weights (w)

2.18. Distribution weights were computed for each of the 5 income groups and were applied to the net increases in consumption arising from the different housing projects. These weights combine the different values placed on consumption accruing to different income groups and the different values placed on income accruing to government and private individuals and different income levels.

Social Shadow Wage Rates (SSWR)

2.19. Social Shadow Wage Rates (SSWR) take into account the effects of increased employment on consumption as well as the opportunity cost of the foregone production. The distribution weights also take into account which income groups receive the extra consumption.

2.20. For skilled labor, where only a 10% unemployment rate is assumed, the additional employment has a relatively small effect on increased consumption. The SSWR is 0.914 for n=0.5 and 0.915 for n=1 indicating that due to the small change in consumption the SSWR is not responsive to changes in n.

2.21. For unskilled labor the impact on consumption is greater due to the fact that an unemployment rate of 35% was assumed. For n=0.5 the SSWR is 0.78 which is considerably higher than the efficiency SWR of 0.66 reflecting the social cost of the extra consumption. However, with n=1 the SSWR drops to 0.615 indicating the higher value placed on the increased consumption of the lowest income groups.

2.22. A global SSWR was estimated as the weighted average of the skilled and unskilled rates, giving values of 0.868 for n=0.5 and 0.807 for n=1.

2.23. SSWR's were also estimated for the mutual help and self-help construction used by the FSDVM and some other programs. For skilled labor the same SSWR was used. It was assumed that given the high unemployment levels among unskilled workers the shadow value of the beneficiaries own labor was zero, which meant that any reduction in output would be compensated for by hiring other unemployed labor.

The Accounting Rate of Interest (ARI)

2.24. This is the discount rate for evaluating the fall in the value of the numeraire over time. The estimated values, ranging from a low of 7% with n=0.5 to a high of 8.3% with n=1, were not very different from the Consumption Rate of Interest.

Section 2: Methodology for Efficiency Analysis

2.25 Costs and benefits were calculated in two separate steps [1/] where the first one included the efficiency costs and benefits reflecting the real economic costs of the housing option considered and the second one reflected the social costs and benefits related to income transfers (both within the private sector and between the public and private sectors) and to changes in consumption and savings resulting from the "project".

2.26 The efficiency analysis takes into account the costs and benefits to the economy as a whole, as opposed to the costs and benefits to consumers and producers. Since we use the numeraire chosen by Squire-van der Tak, (uncommitted public income at border prices expressed in domestic currency), conversion factors have to be calculated which reflect any difference between financial and economic costs and benefits in terms of that numeraire.

2.27 The first step of the efficiency analysis is the use of the conversion factors and parameters, calculated as explained in paragraphs 2.03 to 2.05. For most cost items the elimination of interest payments and indirect taxes, which do not constitute a use of resources and therefore have no border vaue, is the only adjustment made. However, for land and labor there is a clear divergence between financial and economic

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1/ In some cases a third step was used when estimates of costs and benefits were made from the point of view of the individual family.

cost which has to be accounted for. Shadow prices for labor were calculated as explained in paragraphs 2.06 to 2.09 above.

2.28. Land was shadow-priced assuming that the eventual effect of the housing projects considered would take place in the periphery of the urban area, thus displacing land from agricultural uses. The opportunity cost of land would then be the annual loss in crop production, border-priced using the conversion factor for agricultural output. Although the economic value of land is a function of location, the asumption made here is justifiable in that virtually all new low-income housing projects are located in the periphery and it made the comparison of the results easier regarding policy recommendations. If the optimal location for a project was to be decided, the market value of land would play an important role as a proxy for the opportunity cost, but here we are more concerned with other aspects of the projects reflecting the comparative advantage of housing options in characteristics other than location. In the case of the mesones, however, given that their central location makes them compete with other (mainly commercial and higher income housing) uses, the assumption is more questionable even on empirical grounds, and for this reason the estimated market value of the land is used for the evaluation of the mesones. For sensitivity purposes, however, the analysis is also performed using market values of land for all the options, and the results are presented in Tables 14 through 17.

2.29 The value of the lost agricultural production was calculated as the loss of average net yield per hectare for the main crops in the vicinity of the AMSS. The cost of land calculated in this way is an annual cost, whereas when the market value of land is taken it is a one time cost that occurs in the first year of the project life.

2.30 Two different elements are included as benefits in the efficiency analysis. The first one includes the market rent of the project houses inputed by surveys and by comparison with similar dwellings in the market. The rent rather than the imputed market value of the house was used to estimate benefits because the latter is likely to reflect the present value of the future benefits of the dwelling discounted at the owners' discount rate, which does not necessarily coincide with the public discount rate.

2.31 In a later study in two interior cities (Santa Ana and Sonsonate) an evaluation was made of the validity of owners estimates of sales value and imputed market rent. Rent and market value were compared with cost of construction and other indicators and the resulting ratios appeared consistent with findings from other countries. 1/

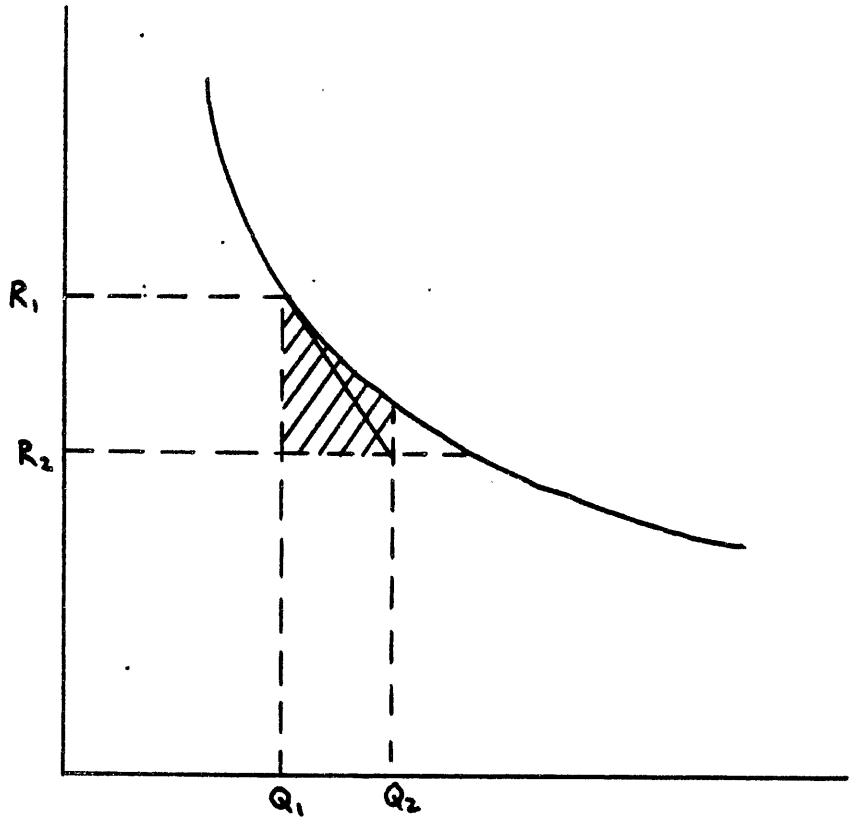
2.32 A second component of the benefits is the increase in the consumer's surplus of the beneficiaries. This results from the fact that the price that beneficiaries of all formal sector projects are charged for their new houses is below market rents, as a result of lower interest rates and other subsidies (explicit or implicit).

2.33 This increase in consumer's surplus would be the shaded area in Fig 3, where DD represents the individual household housing demand curve, R_1 is the market clearing rent, R_2 is the rent actually charged, Q_1 is the amount of housing consumed before the project and Q_2 the amount consumed after the project. 2/

1/ Bamberger, Sae-Hua and Gonzalez-Polio "Evaluation of the First El Salvador Sites and Services Project". Chapter 4.

2/ Since project housing is "rationed", it is possible that the amount of housing supplied to any individual is below his desired consumption at that price, which is why in the graph A does not fall on the demand curve.

Fig 3 The Estimation of Consumer Surplus



2.34 It is difficult to quantify this additional benefit, particularly because housing is not a homogeneous good but a bundle of different characteristics whose separate values are hard to assess. However, an attempt was made here using a triangle approximation to estimate the consumer's surplus (which in fact underestimates the benefits). The part of consumer's surplus generated by the project not reflected in the benefit valued at market rent would be:

$$\Delta CS = 1/2\ (r_1 - r_2)\ (Q_2 - Q_1) \qquad (1)$$

where r_1 is the market rent imputed on the houses of the project and r_2 is the rent paid by the beneficiaries. Since the houses of the projects studied are not rented but sold to the beneficiaries, r_2 is calculated as an equivalent rent using the formula:

$$r_2 = \frac{H_1}{1+i_1} \times \frac{i_1}{1-(1+i_1)^{-m}} - \frac{H_2}{1+i_2} \times \frac{i_2}{1-(1+i_2)^{-m}} \qquad (2)$$

where H_1 = Amount charged by the institutions when selling the house.

H_2 = Additional cost to the family (materials and/or labor for the mutual self-help stage.

i_1 = Interest rate charged by the institution.

i_2 = Discount rate of family consumption (taken as equivalent to the opportunity cost of capital in border prices).

m = life of the project.

Q_2 is taken as 1 while Q_1 (the amount of housing consumed before the project) is calculated as:

$$Q_1 = \frac{r_o}{r_1} \qquad (3)$$

where r_o is the market rent paid for the previous dwelling and r_1 is the market rent inputed on the project houses.

By doing this we are defining the amount of housing consumed as proportional to the market value of the housing unit.

2.35 The net efficiency benefits can be summarized in the following equation:

$$E = B_i \left[r_1 + 1/2\ (r_1 - r_2)\frac{(1-r_o)}{r_1}\right] - \sum B_j . C_j \qquad (4)$$

Where E = net efficiency benefit

r_1 = imputed market rent of project dwelling

r_2 = equivalent rent paid by beneficiaries (Equation 2)

r_o = market rent of the beneficiaries' previous dwelling (taken as proxy for their housing consumption).

B_i = conversion factor for the consumption of beneficiary i

B_j = conversion factor for the jth cost item.

C_j = cost of the jth component of the housing.

Section 3: Methodology for the Social Evaluation

2.36 The efficiency evaluation does not take into account the benefits or costs arising from the project as a result of its effect on income distribution. Squire-Van der Tak evaluate the distributional impact of the project by assessing the changes in consumption resulting from it and weighting those changes with a distribution weight ($w_i = d_i/v$) calculated according to the income level of the people affected. The formula used by Squire-Van der Tak for the social evaluation is NSB = E - C ($B_i - d_i/v$), where E is the net efficiency benefits, C is the increase in consumption accruing to the private sector, B_i is the conversion factor (s) for the consumption of the beneficiaries, d_i is the distribution weight for income group i and v is the value of public income (and in our case, of private savings also).

2.37 Our approach is the same, although the data are presented in a slightly different way, because the changes in consumption arising from the use of labor have been added to the efficiency costs, thus yielding social conversion factors different from the efficiency conversion factors which were used to convert the cost elements to give the social costs. Labor is the only cost item for which a social conversion factor (the social shadow wage rate) was calculated, following the method explained in paragraphs 2.06 through 2.09.

2.38 The following equation was used to calculate the net effect of changes in consumption arising from the project:

$$SNB = (B_E - C_S) - \Sigma I_i (B_i - W_i) \qquad (5)$$

where B_E is the efficiency benefits;

C_S is the social costs;

I_i is the change in consumption accruing to income group i;

B_i is the conversion factor for the consumption of income group i; and

w_i is the distribution weight for the consumption of income group i (or di/v, where d_i is the income distribution weight and v is the value of public income).

2.39 The social costs, C_s are presented in a separate table, while the social benefits are presented in a second table including the following elements:

a) The efficiency benefits, B_E

b) I_i: the increase in consumption accruing to the beneficiaries of the project, calculated as:

$$I_i = IR + CS - (AP + SH + M), \qquad (6)$$

where IR is the imputed market rent of the project housing;

CS is the additional consumer's surplus generated by the project;

AP is the annual payment to the institution;

SH is the additional costs to the family resulting from the self-help stage; and

M is the maintenance cost paid by the beneficiaries.

2.40 The conversion factor for consumption B_i is either B_e (0.94) or B_w (0.89), according to the income level of the beneficiaries.

2.41 The distribution weight, W_i. calculated as di/v, is computed for a discrete change from the original per capita consumption of the beneficiaries, C_1, to the consumption after the project: $C_2 = C_1 + I_1/m$. m is the average size of the household; v is the value of public income, 2 for n = 0.5 and 1.8 when n = 1.

2.42 In the calculations it is assumed that all additional benefits (either increased income or reduced expenditures) are consumed if the beneficiaries fall within the low-income consumption group (those with monthly income below C600 in 1976 colones), which should be close to actual fact. When beneficiaries fall within the high-income group a certain proportion of the additional income is assumed to be saved. Savings are valued as much as public income, and the fact that private savings might lead to additional consumption in the future, is disregarded; thus underestimating the social cost of the increase in the income of the rich. However, none of the projects are likely to have a big impact on savings and the effect of savings on future consumption can be neglected without seriously affecting the accuracy of the evaluation.

2.43 $-I_2$, is the social value of the change in low-income housing market rent as a result of the additional supply created by the project. This effect would only take place if the assumption is made that the low-income housing market rent adjusts significantly to changes in the housing stock. The assumption seems to be close to reality given the market conditions prevailing in San Salvador. For instance, rents have been particularly sensitive to the decrease in low-income housing stock caused by the recent destruction by fire of a number of mesones in the city center.

2.44 If a decrease in market rent is assumed to occur there will be a decrease in the rents paid by low-income tenants to relatively well-off landlords. In the efficiency analysis there is no effect, since the tenants' gain is considered as valuable as the landlords' loss and changes in consumer's and producer's surplus cancel each other out. In the social

analysis the case is different and the consumption of low income tenants is assigned a higher weight than that of landlords, and therefore the effect has to be taken into account.

2.45 There is very little empirical evidence on which an estimation of this effect can be based. This is further complicated by the fact that there might not be a single homogeneous market for housing but different sub-markets and in this case the effects of changes in the stock of one market would have little impact on the others. However, an attempt was made to estimate the social effect because it is considered important and the evaluation would otherwise be incomplete. A single low-income housing market is postulated, including only the informal housing options. The formal market low income housing projects are assumed to have an impact because their beneficiaries vacate their previous dwellings in the informal market:

2.46 I_2 is calculated as:

$$I_2 = \frac{X\,(P_2 - P_1)Q}{N} \qquad (7)$$

where P_1 = market rent before the project.

P_2 = market rent after the project;

N = number of housing units built by the project;

Q = stock of low income dwellings;

X = proportion of low-income dwelling rented.

In order to gauge the net social effect, I_2 has to be multiplied by $[(B_T-W_T)-(1-S)\cdot(B_L-W_L)]$ where s is the landlords' marginal propensity to save, B_T and B_L the conversion factors for the consumption of tenants and landlors and w_T and w_L the corresponding distribution weights, calculated for marginal changes in consumption of

the income groups affected. The social value of the change in rents per new unit is:

$$- \frac{X\ (P_2-P_1)\ Q}{N}\ (B_T - W_T) - \frac{X\ (1-S)(P_2-P_1)Q}{N}\ (B_L-W_L) \qquad (8)$$

2.47 To calculate the change in rent (P_2-P_1) it is necessary to know the elasticity of rents to changes in the housing stock. Population is growing at about 6% per year in the AMSS, of which at least 2.5% is accounted for by migration; since it is reasonable to expected that most immigrants will belong to low-income groups the average annual increase in potential demand for low-income housing can be set at 7.5 per cent. Low-income rents have been increasing at about 4% in real terms in recent years.

2.48 Information in the study "La Vivienda Popular en El Salvador" and in the FSDVM's Apopa Demand Study indicates that the number of families living in low-income houses in the AMSS was about 110,000 in 1977 and the deficit was about 15,000. The housing stock could be estimated at about 95,300 units (see below). Using the population and housing growth rates mentioned above, there was a relative decrease in the low-income housing stock of about 2.6%. The value of the elasticity would then be the ratio of the percentage increase in the rent to the percentage decrease in stock or 1.5.

2.49 In order to estimate the housing stock it was assumed that two different markets exist, the informal and the formal low-income housing markets, and that the effect of the formal institutions' housing projects are passed on to the informal market via the number of vacancies left behind by the beneficiaries. The housing stock, Q, is calculated by

indexing the three main options in the informal market (rooms in mesones, colonies ilegales and tugurios) according to the average rents paid per unit. 1/ According to a study by the FSDVM average rent per unit in 1977 was C34.4 per month in mesones, C29.3 in colonias and C9 in tugurios. If the meson is assigned a value of 1, the colonias would have a value 29.3/34.6 = 0.85 and the tugurio of 9/34.6 = 0.26. The total housing stock expressed in numbers of meson units would be $Q = R_i \times n_i$ where R_i is the value of the index for housing option i, and n_i is the number of units of option i. The value of Q thus estimated is 95,287 in 1977, using data of the Apopa Study by the FSDVM.

2.50 The new market rent after the project can be estimated as $P_2 = P_1 (1 - E. Q/Q)$ where Q is the without-project stock of low-income housing in the market. The total social effect of the income transfer resulting from the changes in market rent brought about by the project can now be estimated as:

$$\frac{-(P_2-P_1)XQ}{N} (B_T-W_T) - \frac{(P_2-P_1)(1-S)XQ}{N} (B_L-W_L) \qquad (9)$$

which can be rewritten as:

$$- \frac{XEP_1 \Delta Q}{N} (B_T-W_T) - \frac{XE(1-s)P_1\Delta Q}{N} (B_1-W_1) \qquad (10)$$

Since: $P_2-P_1 = EP_1 \frac{\Delta Q}{Q}$

1/ It is assumed that rent reflects the amount of housing received "Q", so that a family which pays twice as much rent is receiving twice as much housing. Q is a combination of both quality and quantity factors. A number of theoretical approaches exist to the factors which determine Q, the Hedonic Index Method for example. All the more sophisticated methods require more information and the theory is generally in its early stages; given the obvious constraints of our study a very simplistic approach is used here:

2.51 In the above equation X is the proportion of low-income housing rented, estimated at about 77% of the total stock according to data of the FSDVM (Apopa Study).

2.52 There is no information on s, the marginal propensity to save of the landlords, and a value of 20% is assumed in the light of the estimated value at the national level and of the data of the household budget survey. Landlords are assumed to belong to income group 5 (see table 28 in Annex 1), with a monthly household income of over C1000.

2.53 There are several problems concerning the estimation of the benefits of the different projects through imputed rents based on surveys and on the market value of similar houses. The first is that there are some effects not reflected in market values either because they affect third parties (external effects) or because the beneficiaries do not perceive them as direct benefits (or costs). This includes the effect of the projects on health (both internal and external) and on productivity.

2.54 On the other hand (and this affects particularly the projects of the FSDVM) the (internal and external) social, economic and possibly political benefits which might result from the projects, particularly through mutual help schemes in terms of improved neighborhood relationships, increased productivity, etc, are not quantified and are therefore excluded from the evaluation. These benefits are to some extent economic, in that they provide a way of improving work skills of participants, but also the FSDVM is hoping to achieve a higher level of community development and political awareness resulting in an overall increase in welfare.

2.55 A further problem related to the imputed values is the small size of the sample used for establishing the market rents. Although the

results obtained seemed to be consistent with rental values for other types of housing and were cross-checked with information from previous studies, the method is obviously subject to a margin of error. The way in which this methodology is used to estimate the costs and benefits of each of the alternatives studied is discussed in the following section.

Section 4 Estimating private costs and benefits

2.56 Cost-benefit analysis normally estimates the public costs and benefits produced by each project option. The way in which this traditional methodology was applied in the present study was described in the previous two sections of this chapter. A limitation of the traditional approach is that it does not explain consumer choice behaviour. If, as usually happens, there are market price distortions the housing options might offer considerably different net benefit ratios to the consumer than those accruing to the nation. Under these circumstances it might be rational for the consumer to maximize his utility by purchasing an option which has a much lower net benefit to the nation. The greater the price distortions the greater the inefficiencies which are likely to occur in resource allocation. An example of these distortions was cited by Ricard and Bamberger in an earlier study in one of the interior Salvadorean cities. It was shown that due to political and other pressures a family in an extra-legal subdivision could expect to obtain piped water at a price significantly below the economic cost (which was often very high due to the dispersed and unplanned nature of many of these communities). Thus whilst the FSDVM project produced a higher public net benefit, it was often more rational for the consumer to invest in the extra-legal subdivision.

2.57 Using the same data base and assumptions as for the public analysis, estimates were made of all costs and benefits actually incurred by households in each year. Atlhough in most cases the households had to pay for the same cost components, the amount actually paid often differed considerably from the public costs. There were several reasons for these differences. First, many projects, particularly government housing, contained considerable direct subsidies. Second, conversion factors are not used and third most projects provided at least partial financing so that households were able to pay back the costs over a period of years, usually at a subsidized interest rates whereas in the public analysis the full value of costs is computed in the year in which the costs occurs.

2.58 In terms of benefits it was again assumed that imputed rent is a good estimator of benefits. As for public benefit analysis, the value of the consumer surplus was also included. In addition the family is also purchasing an asset which has a market value which should also be considered as a benefit. The market value was assumed to be 100 times the monthly rent at the end of the 30 year period and was included as a lump-sum benefit to be obtained in year 30. In fact, as this lump-sum had to be discounted over 30 years it has a very small impact on net benefits. Conversion factors was not applied to benefits.

2.59 The computational methods for estimating NPV, IRR etc. were identical to those used in the previous sections and are explained for each project in Annex 2.

2.60 Private analysis was conducted for all options except the meson. In the case of the meson both benefits and costs would be equated with monthly rent so that analysis would be meaningless.

2.61 For the extra-legal subdivision an additional analysis was conducted to evaluate the impact on net benefits of providing equivalent financial terms to those offered to FSDVM participants. This was done by estimating the Present Value of all costs incurred by the household. It is then a simple matter to calculate the annual payments if a 20 year loan is offered at 6% interest. Several other assumptions were made about the effects which the loan might have on the speed of completing the construction and hence of raising estimated benefits during the first two or three years. The estimating procedures are explained in Annex 2.

Section 5 Sample design and sources of information on costs and benefits of each housing option.

2.62 The sample was designed to include all major types of housing options potentially available to the poorest 50 per cent of the population of San Salvador. The following 9 housing options were scheduled:

Formal housing programs

1. Instituto de Vivienda Urbana (IVU) - Multi-family dwellings.
2. IVU - Single family dwellings.
3. Fondo Social para La Vivienda (FSV) - Single family dwellings

Progressive development and upgrading

4. IVU - Squatter upgrading
5. Fundacion Salvadorena de Desarrollo y Vivienda Minima (FSDVM) - Basic unit
6. FSDVM - Serviced lot.

Informal market

7. Tenement housing (mesones)
8. Illegal subdivisions (colonias ilegales)
9. Squatter settlements (tugurios).

2.63 The sample was designed to select a representative example of each of these options. The examples used are composits based on a combination of 4 main sources:

a. Cost data provided by the agencies (for options 1 thru 6)

b. Sample surveys of the popular housing market conducted by the FSDVM [1/] (for options 7 thru 9).

c. Interviews with owners or developers (options 7 thru 9) [2/]

d. Interviews with occupants (all options).

2.64 The sampling procedures are summarized in Table 7. In reviewing the logic of the design it is important to appreciate that the procedures were intended to generate typical cost patterns rather than a strictly random sample.

1/ Two surveys were available: "La Vivienda Popular en El Salvador" which included a sample of 450 families in the informal housing market of San Salvador in 1975.
A study of the potential demand for the FSDVM project in Apopa (North of San Salvador) which included a sample of 750 families in popular housing in San Salvador 1977.

2/ The FSDVM placed an advertisement in the press in 1977 indicating their interest in purchasing tenement houses in San Salvador. An analysis was made of cost and profitability data provided by about 50 offerers. Although the information must be treated with caution, considerable consistency was found in the estimated rates of return.

Table 7: SAMPLE DESIGN FOR THE SELECTION OF LOW-INCOME HOUSING OPTIONS

Market Sector	Agency	Type of Unit	Secondary Sources	Primary Sample
Formal	IVU	Mult-family	IVU cost data	10 families
	IVU	Single family	IVU cost data	10 families
	FSV	Single family	FSV cost data and socio-economic data on occupants	10 families
Progressive development and upgrading	IVU	Single family	IVU cost data	10 families
	FSDVM	Basic unit	FSDVM cost data	10 families
	FSDVM	Serviced lot	FSDVM cost data	10 families
Informal market	Private	Tenement(meson)	1. sample of 150 families in 1975 2. sample of 450 families in 1977	30 families 50 owners
	Private	Illegal sub-division (colonia ilegal)	1. sample of 150 families in 1975 2. sample of 200 families in 1977.	30 families 5 owners
	Private	Squatter settlements (tugurio)	1. sample of 150 families in 1975 2. sample of 100 families in 1977.	30 families 2 owners

CHAPTER 3 - THE RESULTS OF THE EVALUATION

3.01 In reviewing the results it is important to keep in mind the limitations of the data and therefore not to place too great emphasis on the absolute values produced by the analysis, but rather to concentrate on the relative magnitudes. Some o the limitations mentioned in the text are the following:

a. The projects studied are not necessarily the least-cost options of each type of housing and it is possible that a more efficient example may exist for some type of projects.

b. Specific projects were studied in specific locations and it is difficult to know how much the results could be affected by these circumstances.

c. The use of imputed rent presents a margin of error for the projects which are outside the normal operation of the housing market. This is particularly true for the FSDVM projects, the tugurios and to some extent the illegal subdivisions and mesones.

3.02 The different methods of comparative analysis are presented and then in a final section the overall implications of the results are discussed.

Efficiency Analysis

3.03 In this analysis no consideration is given to distributional considerations (i.e. which income group receives the benefits). The discount rate used in this analysis is the opportunity cost of capital, estimated at 12%. The results of this analysis are presented in Table 20.

Table 8: COMPARISON OF PROJECTS IN TERMS OF EFFICIENCY ANALYSIS

Housing Alternative	NPV	Total Cost*	RR(%)	NPV / Total Cost	-20% Additional Consumer Surplus NPV	-20% Additional Consumer Surplus RR(%)	No Additional Consumer Surplus NPV	No Additional Consumer Surplus RR(%)
Upgrading and Sites and Services								
FSDVM Basic Unit	4065	3383	33	1.2016	3895	32	3218	29
FSDVM Serviced Lot	2329	3204	28	0.7269	2185	27	1605	23
IVU Rehabilitation	1078	4083	18	0.2640	1007	18	724	16
Traditional Housing								
IVU Multifamily Units	-1828	14023	9	-0.1304	-1992	9	-2684	8
IVU ED-2	-606	8414	11	-0.0720	-703	11	-1087	10
FSV Single Family Unit	452	7046	13	0.0641	364	13	15	12
Informal Market								
Subdivision	[illegible]	5096	22	0.3509	1746	22	1779	21
Tenement	[illegible]	2127	12	0.0141	-	-	-	-
Squatter Settlement	373	1255	20	0.2972	-	-	-	-

* = Discounted at 12%.

Note: For the purpose of comparing or ranking projects, it is more appropriate to use NPV/Total cost rather than to directly compare NPV's as the latter can be misleading given the considerable differences in the total cost of different projects.

3.04 When the Internal Rate of Return (IRR) is calculated it is found that the range varies between a maximum of 33% (FSDVM Basic Unit) and a minimum of 9% (IVU multi-family units). It can be seen that the projects with the highest rates of return are those using the principle of progressive development (Table 8). The FSDVM projects rank highest, followed by the informal market's progressive development projects (colonias ilegales and tugurios). The highest ranking government project is also found to be the IVU rehabilitation of squatter areas which again uses pogressive development.

3.05 When Net Present Value (NPV) is used it is found that all but the two traditional IVU Projects have a positive value (meaning their rate of return is above the discount rate of 12%).

3.06 A third indicator is obtained by dividing NPV by total cost (discounted at 12%). This adjusts NPV for differences in the size of the initial investment. It can be seen from Table 12 that this only has a minor effect on the rank ordering of the projects.

3.07 Table 8 also compares the total (discounted) cost of each alternative. The public sector programs are the most expensive and there is some suggestion of an inverse relationship between cost and rate of return.[1/]

3.08 Table 8 also indicates the effect of reducing by 20% or completely eliminating the consumer surplus. It can be seen that when

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1/ This is not in fact statistically significant and the value of Spearman's Rank Correlation coefficient is only 0.55 whereas the critical value is 0.6 at the 0.05 level of significance.

consumer surplus is completely eliminated this only produces a significant reduction in the Rate of Return for the two FSDVM projects (IRR falls from 33% to 29% and from 28% to 23%), and does not change the relative ordering of the projects.

Social Analysis

3.09 In the Social Analysis two additional factors are taken into consideration, the first refers to the use of distribution weights to evaluate which income groups obtain the benefits and the second examines the possible effects on rents of the production of additional housing units.

3.10 As explained earlier two different values of the utility function (n) are considered. The effect of using a value of (n) equal to 0.5 is given in Table 9 whilst the results for n=1 are given in Table 10.

3.11 The second factor is the possible reduction in rent to other low-income families produced by an increase in the housing stock.

3.12 When n=0.5 there is in general a slight decline in Rates of Return (the average rate for all projects falls from 18.4 to 17.0). The IVU apartments and the two FSDVM projects experience moderate reductions whilst the rate for tugurios increases (Table 11).

3.13 When n=1.0 the changes are more dramatic. A general increase in the IRR occurs with the average increasing from 18.4 for efficiency analysis to 27 in the present case. The largest changes are the following.

Project	Efficiency RR	N=1.0RR
Tugurio	20%	53%
Meson	12%	32%
FSDVM Basic Unit	33%	42%
IVU Single Family	9%	18%
FSV	13%	20%

Table 9: COMPARISON OF PROJECTS FOR SOCIAL ANALYSIS WHEN n=0.5

				No Additional Consumer Surplus		No Change in Market Rent		-20% Change in Additional CS		-20% Change in Market Rents	
		PV	RR	PV	RR	PV	RR	PV	RR	PV	RR
FSDVM	Basic Unit	4200	26	3996	22	3872	24	4180	25	4315	25
	Serviced Lot	2900	22	1732	17	2480	21	2593	21	2744	22
IVU	Multifamily Unit	-1600	6.3	-2803	4	-3117	4	-1841	6	-1904	6
IVU	ED - 2	-513	7	-795	6	-1698	5	-653	7	-749	7
IVU	Turgurio Rehabilitation	1203	15	692	12	-	-	1102	15	-	-
FSV	Single Family Unit	2047	12	-57	8	609	10	1924	12	1765	11
Informal Market	Colonia	2741	24	2452	22	1775	19	2683	24	2545	23
	Meson	494	12	-	-	-373	5	-	-	320	11
	Tugurio	1094	29	-	-	613	20	-	-	1120	28

Discount Rate (APS) = 8.3

Table 10: COMPARISON OF PROJECTS FOR SOCIAL ANALYSIS WHEN n = 1.0

			No Additional Consumer Surplus		No Change in Market Rent		-20% Change in Additional Consumer Surplus		-20% Change in Market Rent	
	PV	RR	PV	RR	PV	RR	PV	RR	PV	RR
FSDVM Basic Unit	+10295	42	9172	39	7886	34	10211	41	9954	40
Serviced Lot	-2350	28	2980	23	2350	20	3902	27	3776	27
Multifamily Unit	+4531	13	3264	12	-2600	4	4278	13	3105	11
IVU ED - 2	-6437	18	5696	17	-1353	5	6289	18	4879	16
Rehabilitated Tugurio	+1965	15	1430	13	-	-	1858	15	-	-
FSV Single Family Unit	+8169	20	7488	20	755	9	8033	20	6687	18
Colonia	+5906	22	5602	21	1346	11	5845	22	4994	20
Informal Meson	368	12	-	-	-426	3	-	-	2857	27
Market Tugurio	+4361	53			759	16		-	3641	46

Table 11: COMPARISON OF RATES OF RETURN AND RANK ORDER OF PROJECTS FOR EFFICIENCY ANALYSIS AND SOCIAL ANALYSIS WITH N = 0.5 and N = 1.0

	Rates of Return			Rank Order for Rates of Return		
		Social			Social	
	Efficiency	N = 0.5	N = 1.0	Efficiency	N = 0.5	N = 1.0
Formal Housing						
IVU Multifamily	11	6.3	13	2	1	1
IVU Single Family	9	7	18	1	2	3
FSV	13	12	20	4	4	4
Upgrading and Progressive Development						
FSDVM - Basic Unit	33	26	42	9	8	8
FSDVM - Serviced Lot	28	22	28	8	6	6
IVU - Rehabilitation	18	15	15	5	5	2
Informal Housing						
Meson	12	12	32	3	4	7
Colonia Ilegal	22	24	22	7	7	5
Tugurio	20	29	53	6	9	9
Average	18.4	17	27			

Table 12: RANKING OF PROJECTS FOR EFFICIENCY ANALYSIS ON THE BASIS OF INTERNAL RATE OF RETURN AND NET PRESENT VALUE DIVIDED BY TOTAL COST
(9=Highest, 1 = Lowest)

Ranking	R/R	Rank	NPV/TC	Rank	NPV	Rank
FSDVM Basic Unit	33	9	1.2016	9	4065	9
" Serviced Lot	28	8	0.7269	8	2329	8
" Colonia	22	7	0.3509	7	1788	7
" Tugurio	20	6	0.2972	6	373	4
IVU Rehabilitation	18	5	0.2640	5	1078	6
FSV	13	4	0.0641	4	452	5
Meson	12	3	0.0141	3	30	3
ED-2	11	2	-0.0720	2	-606	2
Multi-family	9	1	-0.1304	1	-1828	1

The increases indicate that these projects are reaching the lowest income groups and are producing a redistribution of benefits from higher to lower income groups.

3.14 It is interesting to examine some of the projects where this increase does not occur with social analysis. The FSDVM serviced lot is fairly close to the Basic unit on efficiency analysis but falls far behind on the social analysis (28% compared with 42% when n=1.0). The reason is that the income of families who select a serviced lot appears to be higher, so that the project is not producing a redistribution of benefits to the poorest groups. 1/ The same is true of the colonia ilegal where again the families have a somewhat higher average income.

3.15 The figures for maximum impact assume that families benefit from consumer surplus and also that the increase in housing stock will reduce rents for all low-income families. An examination of Table 13 shows that the assumptions about changes in rent are more critical and that the effects are also greater for n=1. Whilst the removal of consumer surplus reduces RR by an average of 7 percentage points (when n=1), the elimination of benefits from lower rents reduces RR by an average of 13.5 percentage points. The reason for this is that in a situation of housing scarcity rent is probably very sensitive to changes in housing supply 2/. The redistributive impact is therefore quite significant and results in high social benefits when the present social methodology is used.

1/ Similar results have been found in other countries where the Bank Monitoring and Evaluation program is being conducted and this will be discussed in the final section of this report.

2/ This was observed during the course of data collection for the study. A large number of rented rooms were being demolished in the center of the city and very considerable rent increases occurred over very short periods.

Table 13: SUMMARY OF RATES OF RETURN FOR SOCIAL ANALYSIS WITH N = 0.5 AND N = 1.0 AND WHEN CONSUMER SURPLUS AND REDUCTION OF RENTS ARE EXCLUDED
(1 = Lowest Rank: 7 or 8 = Highest)

	Maximum Impact Including Consumer Surplus and Reduced Rents				No Additional Consumer Surplus				No Change in Rents			
	N=0.5	Rank Order	N=1.0	Rank Order	N=0.5	Rank Order	N=1.0	Rank Order	N=0.5	Rank Order	N=1.0	Rank Order
FSDVM - Basic Unit	26	8	42	8	22	7	39	7	24	8	34	8
FSDVM - Serviced Lot	22	6	28	5	17	5	23	6	21	7	20	7
IVU Multi-family	6.3	1	13	1	4	1	12	1	4	1	4	2
IVU Single Family	7	2	18	3	6	2	17	3	5	3	5	3
IVU Rehabilitation	15	5	15	2	12	4	13	2	-	-	-	-
FSV Single Family	12	4	30	6	8	3	20	4	10	4	9	4
Colonia Ilegal	24	7	22	4	22	7	21	5	19	5	11	5
Meson	12	4	32	7	-	-	-	-	5	3	3	1
Tugurio	29	9	53	9	-	-	-	-	20	6	16	6
Average	17		27		13		20		13.5		12.7	

3.16 The social analysis demonstrates clearly that projects based on progressive development are the most effective in reaching the lower income groups. This conclusion refers to both formal upgrading programs (particularly the FSDVM) and the informal tugurios and colonias ilegales. In fact it can be seen that in many of the estimations the social rate of return is higher for the colonia ilegal and the tugurio than for the FSDVM projects. This emphasizes the point that even the cost-conscious FSDVM projects are not able to reach down to the very poorest households and that a housing strategy designed to reach the poorest urban groups must include programs for upgrading existing low-income settlements as well as the provision of new units.

The effect of using market value as the economic cost of land.

3.17 All of the estimations presented so far in this study have been made with the assumption that the economic cost of land is equal to the agricultural value of the land. This approach was justified arguing that most of the projects, with the exception of the meson, are developed on the outskirts of the city and it is therefore reasonable to assume they are competing principally with an alternative agricultural use. Whilst there are good reasons for using this approach, a sensitivity analysis was made to examine the effect of assuming that the economic cost of land is equal to its market value. The results of the analysis for estimates based on efficiency analysis and on social analysis with n=0.5 and n=1.0 are given in Table 14. The results of this analysis are compared with the estimates obtained using the agricultural value of land (Table 15).

TABLE 14: SUMMARY OF NPV'S AND RATES OF RETURN WHEN MARKET VALUE IS TAKEN AS THE ECONOMIC COST OF LAND

		Efficiency Analyis		Social Analysis N=0.5		Social Analysis n = 1	
		NPV	RoR	NPV	RoR	NPV	RoR
FSDVM	Basic Unit	3706	28	4182	22	11009	37
	Serviced Lot	1994	22	2457	18	3770	21
IVU	Multi-family	-1744	9	-1103	6	7190	13
IVU	Single Family	-2146	8	-2005	5	4593	14
FSV	Single Family	-3764	5	-1721	6	4409	12
	Illegal Settlement	-2268	7	-1275	6	1888	10
	Meson	-609	8	-117	8	3050	22
	IVU Rehabilitated						
	Tugurio	1078	18	1203	15	1965	15
	Tugurio	373	20	1094	29	4361	53

Table 15: COMPARISON OF NPV'S FOR EFFICIENCY ANALYSIS AND SOCIAL ANALYSIS WITH N = 0.5 AND N = 1.0 WHEN MARKET VALUE IS TAKEN AS THE ECONOMIC COST OF LAND AND WHEN AGRICULTURAL VALUE IS TAKEN AS THE ECONOMIC COST OF LAND

		Efficiency Analyis			Social Analyis N=0.5			Social Analysis N=1		
		Market Value	Agricultural Value C	% Change 1/	Market Value	Agricultural Value Cs	% Change	Market Value	Agricultural Value Cs	% Change
FSDVN	Basic Unit	3706	4065	-8.8	4182	4200	-0.4	11009	10295	+6.9
FSDVM	Serviced Lot	1994	2329	-14.4	2457	2900	-15.28	3770	-2350	+260.4
IVU	Multi-family	-1744	-1828	+4.6	-1103	-1600	+31.0	7190	4531	+58.6
IVU	Single Family	-2146	-606	-254.1	-2005	-513	-290.8	4953	-6437	+176.9
FSV	Single Family	-3764	452	-932.7	-1721	2047	-184.0	4409	8169	-46.0
Illegal Settlement		-2268	1788	-226.8	-1275	2741	-146.5	1888	5906	-68.0
Meson		-609	1674	-136.4	-117	494	-123.7	3050	368	+728.0
Average Change				-224.0			-104.2			+159.5

3.18 The results are somewhat difficult to interpret but they show clearly the importance of the assumptions used with respect to land values in the interpretation of net benefits. For the efficiency analysis the benefits are substantially lower when the market value of land is used and an average decrease of 224% is observed in comparison with the benefits estimated when agricultural value of land is used. For social analysis with n=0.5 the same pattern is observed but in this case the decrease is relatively smaller.

3.19 To understand the effect of market values on the relative order of projects, Table 16 indicates the rank order of projects for different types of estimates when market values are used. Although there are some variations the rank order remains substantially unchanged whichever estimate is used. The greatest variations occur in the ranking of the meson which varies between second and sixth position in the ranking.

3.20 When an average of all rankings is calculated using market values and when this is compared with the average ranking using agricultural values (Table 17) the order of projects again remains virtually unchanged. The only differences are that the colonia ilegal falls in position when market values are used and the IVU multi-family dwelling rises.

TABLE 16: RANKING OF PROJECTS ON NPV AND RATE OF RETURN FOR EFFICIENCY AND SOCIAL ANALYSIS WHEN MARKET VALUE OF LAND IS TAKEN AS THE ECONOMIC COST

(1 = Lowest rank: 7 = Highest)

	PRESENT VALUE Rank Order			RATE OF RETURN Rank Order		
	Efficiency Analysis	n = 0.5	n = 1.0	Efficiency Analysis	n = 0.5	n =1.0
FSDVM Basic Unit	7	7	7	7	7	7
FSDVM Serviced Lot	6	6	3	6	6	5
IVU Multi-Family	4	4	6	5	4	3
IVU Single Family	3	1	5	3	1	4
FSV Single Family	1	2	4	1	3	2
Colonia Illegal	2	3	1	2	2	1
Meson	5	5	2	4	5	6

TABLE 17: COMPARISON OF AVERAGE RANKING ON ALL METHODS OF ESTIMATION WHEN COST OF LAND IS EQUATED WITH MARKET VALUE AND WITH AGRICULTURAL VALUE
(1 = Lowest rank: 7 = Highest)

	Average of all Rankings	
	Cost of Land Equal to Market Value	Cost of Land Equal to Agricultural Value
FSDVM Basic Unit	7	7
FSDVM Serviced Lot	6	6
IVU Multi-Family Unit	4	1
IVU Single Family Unit	3	2
FSV	2	3
Colonia Ilegal	1	5
Meson	5	4

Private costs and benefits

3.21 Up to this point we have discussed the costs and benefits of each housing option from the point of view of the nation. However, the individual makes his decision on the basis of his perception of the net benefits he will obtain from a project. Except where a market operates perfectly, it is likely that the costs and benefits to the individual will be different from those to the nation. If this is the case then individuals will make decisions which are not the most efficient in terms of national resources. The purpose of this section is to present estimates of private costs and benefits and to compare them with the public costs and benefits of each project.

3.22 Table 18 presents calculations of Cost, NPV, NPV/Cost and IRR for each option in terms of public and private costs and benefits. The only option not included in the private analysis is the meson (tenement) as the present methods of estimation would make both costs and benefits equal to monthly rent which would make the analysis meaningless.

3.23 It can be observed that in all cases except the colonia ilegal, costs are lower for the family than for the nation. In the case of public programs this is because costs are spread over a period of years and thus discounted (usually at a subsidized interest rate). In most cases there are also direct subsidy elements. There is also a small subsidy element in squatter areas as some public services are often provided at below cost. With the exception of the extra-legal subdivision the NPV also is higher for private benefits. Given the higher NPV and lower costs in the private calculations it is not surprising that the IRR is also higher for private benefits.

Table 18 - A COMPARISON OF HOUSING OPTIONS IN TERMS OF PUBLIC AND PRIVATE COSTS, NPV and IRR

PROJECT	PUBLIC COSTS AND BENEFITS				PRIVATE COSTS AND BENEFITS					
	Cost*	NPV**	NPV/COST	IRR	Cost*	NPV**		NPV/COST	IRR	
	C	C		%	C	C			%	
FSDVM - Basic core	3383	4065	1.2016	33	2976	5368	(5157)	1.8038 (1.73)	129	(94)
FSDVM - Serviced lot	3204	2329	.7269	28	2617	3635		1.389	45	
IVU - Single family	8414	-606	-.0720	11	7085	4061		.5731	35	
IVU - Appartments	14021	-1828	-.1304	9	8537	5254		.6154	54	
FSV - Single family	7046	452	.0641	13	7007	4655		.6643	90	
IVU - Squatter upgrading	4083	1078	.2640	18	3760	1857		.4939	25	
Colonia ilegal	5096	1788	.3509	22	5223	713		.1369	14	
Tugurio	1255	373	.2972	20	1227	639		.5208	26	

Notes: Meson (tenements) not included in the comparison between public and private costs and benefits

* - Costs discounted at 12%

**- Net present value (discounted at 12%) of Net Benefits

Two different estimates are made for private benefit/cost ratios in the FSDVM Basic Core Unit project. The first estimates (a) make maximum assumptions about imputed rent during the first two years, whilst the second (b) makes minimum estimates about imputed rent. See Section 1 of Annex 2 for a more detailed explanation.

3.24 Table 19 shows the difference between public and private net benefit indicators in both absolute and relative terms. The first 3 columns present indicators of the absolute changes. It can be seen that there is virtually no change for informal housing but that for both FSDVM and public housing programs almost all of the private benefit indicators are higher. There is some indication that the benefit increases are higher for public housing that for FSDVM programs but the pattern is not very consistent. However, when rank orderings are compared it can be seen that the private benefits of the public housing programs are much higher, compared with FSDVM and the informal housing than they were for public benefits estimation. This suggests that because of relative price distortions consumers will have an incentive to purchase more public housing (relative to FSDVM and informal programs) than would be justified on efficiency grounds.

3.25 Although the FSDVM provides lower subsidies than public housing, the FSDVM programs do still include a significant subsidy element, the effects of which can be seen when the FSDVM is compared with the colonia ilegal. Both projects offer similar, though by no means identical, housing packages. However, the FSDVM loan covers land and a substantial part of construction and is repayable over a 20 year period at 6% interest, whereas the colonia household only receives financing for the land and must repay over a 10 year period or less at an interest rate of about 10%. Table 20 compares the private benefit/cost indicators for the colonia under present financial arrangements and under the assumption that the same financial conditions are given as those currently received by FSDVM beneficiaries (i.e. 20 year loans, covering most construction costs

Table 19: COMPARATIVE INDICATORS OF PUBLIC AND PRIVATE COSTS AND BENEFITS FOR EACH HOUSING OPTION
(PB = Public: PT = Private)

	COST (PB/PT)	NPV (PT/PB)	IRR (PT-PB)	COMPARISON OF RANK ORDERING (8=highest)			
				NPV/COST		IRR	
				Public	Private	Public	Private
Programs based on upgrading or progressive development							
FSDVM Basic Unit	1.14	1.32	+61	8	8	8	8
FSDVM Serviced Plot	1.22	1.12	+17	7	7	7	5
IVU Upgrading	1.09	1.72	+7	4	2	4	2
Informal housing							
Extra-legal subdivision	.98	.40	-8	6	1	6	1
Squatter settlement	1.02	1.71	+6	5	3	5	3
Traditional government housing							
IVU - Multifamily	1.64	2.88	+45	1	5	1	6
IVU Single family	1.19	6.70	+24	2	4	2	4
FSV Single family	1.08	10.3	+77	3	6	3	7

TABLE 20: EFFECT ON BENEFIT/COST RATIO FOR COLONIA ILEGAL OF DIFFERENT FINANCIAL ARRANGEMENTS WITH 20 YEAR LOANS AT 6% AND 12% PRIVATE ANALYSIS

Interest rate	Benefit/cost indicator	Number of years to complete house construction: 1 year	3 years
6%	IRR	35.25	32.25
	NPV	C 2968	C 2564
	NPV/COST	0.76	0.76
12%	IRR	20.95	19.65
	NPV	C 1548	C 1414
	NPV/COST	0.33	0.31
Present terms (10% interest repayable over 10 years)	IRR		14
	NPV		C 713
	NPV/COST		0.1365

Note: In the previous analysis it was assumed that it would take about 3 years to complete the construction of the house. However, if complete financing can be obtained it might be possible for the family to complete the construction in one year and hence to increase the benefit flow in the early years. For this reason the table compares the effect on the indicators of assuming completion in one or three years.

and with 6% interest). It can be seen that IRR would increase from 14% under present financing to 35% if FSDVM terms were offered. Similarly the NPV and the NPV/Cost ratios would quadruple.

3.26 With these financial arrangements the colonia, which presently has the lowest private IRR would move up to fourth position. The point of this analysis is to show that from the private point of view the type of financial arrangements which are offered is one of the main contributors to the net benefits offered by different programs.

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Conclusions and Recommendations

3.27 Before presenting conclusions it is necessary to emphasize again the limitations of the analysis. The results should not be considered as an evaluation of the organizations but rather as a comparison of alternative strategies for the provision of housing for low-income groups.

3.28 The clearest and most important result refers to the considerably higher rates of return for projects which use principles of progressive development and self-help. Both of the FSDVM projects, which use these principles, are among the housing options with the highest rates of return. This is true for both efficiency and social analysis. The tugurio and illegal subdivision also have high RR.

3.29 This finding is consistent for both efficiency and social analysis and for the sub-analyses with different assumptions about consumer surplus and rent. The conclusion would seem to be that the use of self-help (or mutual help) labor, combined with progressive development, seems both an efficient and a socially equitable way to provide housing for the urban poor.

3.30 It is also significant that for every type of analysis, at least two of the four options with the highest RR are provided by the informal sector of the market. From the distributive point of view the squatter settlement has the highest RR and as its cost is less than half of any other option (with the possible exception of the meson), it is able to reach families with lower incomes than any other option. The illegal subdivision, with its potential for permitting a wide flexibility in building styles and costs, is also very high in all the evaluations. The

meson is usually high but its position fluctuates much more, depending on the assumptions which are made about effects on rent.

3.31 The results of the analysis are, however, different when an analysis of private costs and benefits is conducted. From the private standpoint the public housing programs seem to become relatively more attractive in comparison with the informal housing options. The main reason for this is that public housing programs include considerable subsidies and long-term financing which reduces the real cost to the family. As public housing programs are mainly accessible to families in the top 50 or 40 per cent of the income distribution, these subsidies have a negative distributional effect on access to housing.

3.32 From the social point of view the above finding would suggest a need for a review of housing subsidy policies. In similar studies in other countries [1/] it has been found difficult to isolate the issue of housing subsidies from a more general discussion of employment benefits. In El Salvador, as in many other countries, many housing programs are financed through a payroll tax or their eligibility is restricted to heads of household employed in the formal sector of the economy. The results of this policy, including in El Salvador, is an implicit or even explicit, bias against families working in the informal sector. A review of housing subsidy policies would therefore have to consider both the value of providing housing as an employment incentive and the negative implications of making housing less accessible to the large numbers of families, mainly poor, who work in the informal sector.

1/ Hinh, Sanyal, Valverde and Bamberger "Housing Subsidies in the Public Sector in Zambia." Urban and Regional Report No. 81-6. The World Bank. July 1981.

3.33 The comparison of public and private housing benefits also indicates the potentially important role of housing finance in improving housing stock. The provision of housing finance to families building their own houses in subdivisions, or upgrading their houses in squatter settlements, would significantly reduce the cost to these families. From the nation's point of view, this would be an efficient policy given the high rate of return which the informal housing projects have from the national standpoint.

3.34 The implication of this finding would be to seek ways to stimulate the positive aspects of the informal sectors whilst controlling the potentially negative affects of unplanned growth. The following paragraphs suggest possible approaches to each of these three models.

3.35 The suggested approach to the squatter settlement is a program of upgrading in which basic water, sanitation, drainage and solid-waste disposal systems are introduced. Families would then be encouraged to improve their own houses through building material loans. This approach is already being developed by IVU and support has recently been obtained from IBRD under the Second Urban Loan. This is consistent with current IBRD thinking in which increasing priority is being given to squatter upgrading programs.

3.36 The illegal subdivision often shares many physical similarities with the tugurio. However, as densities are usually lower and as the land has an owner who is selling for profit, the policy implications are different. One of the most important recommendations concerns the need to change the legislation which limits the possibilities for orderly development of these communities. At present urban planning standards are

so high that it is difficult to legally develop communities accessible to low-income families. There is a need to lower development norms to a minimum consistent with health and orderly development, and then to ensure these standards are complied with. It would also be interesting to consider the possibility of providing building material credit programs to permit poorer families to build better houses. 1/

3.37 The results also indicate the potential of the tenement model (meson). This is the second cheapest and ranks high on the social analysis as it reaches low-income families. One of the disadvantages of most mesones is that their owners tend to seek short-term profits and have little incentive to invest in improvements. 2/ A potentially interesting option, which is already being tried on a small scale by the FSDVM is to convert the meson into a condominium and to upgrade through involving the residents in mutual help construction programs. A key issue relates to land values as most mesones are on prime urban land in the center of the city. This suggests that two models should be considered, the first to convert existing innter-city mesones to a condominium and the second to construct the meson-condominium model on the outskirts of the city. 3/

1/ An earlier cost-benefit study in an interior city of El Salvador showed that from the point of view of the purchaser one of the main reasons why the RR of the FSDVM project was higher than the colonia ilegal was because of the subsidized credit offered by the FSDVM. This substantially reduces the real cost to the family.

2/ Technically it is illegal to improve existing mesones.

3/ The FSDVM is already experimenting with the meson model in several of its projects.

3.38 The analysis shows that land values can substantially affect the cost of a project and the social benefits generated. Any housing policy concerned with providing access to low-income groups must also consider ways to reduce the incidence of high land values on project costs. Various organization in San Salvador are beginning to study the possibility of a land bank but as yet no coherent policy has been defined.

3.39 Reference was made earlier to the fact that serviced lots seem to be preferred by families with relatively high incomes. A similar phenomenon has been observed in other countries. The reason seems to be that better off families are able to mobilize financial resources to build their house according to their own design and therefore they prefer to receive only a serviced lot with no construction. On the other hand, poorer families have difficulties in generating resources for purchase of materials and hence often prefer to receive a more complete unit.

Evaluation of the methodology and suggestions for future research

3.40 Although the results of the cost-benefit analysis have produced some very interesting policy recommendations, the technique, like any other, has its limitations, and does not provide answers to all of the research questions in which policy makers are interested. In the present study the use of distribution weights proved to be particularly helpful as they provide a method of evaluating the potential accessibility of different housing projects to the low-income population. As projct accessibility is becoming a central issue in the evaluation of urban shelter programs, it is likely that these weights may have a number of important applications in future studies of this kind.

3.41 In this concluding section we discuss some of the limitations of the original methodology for the evaluation of urban shelter programs and consider the extent to which some of these problems can be resolved and the implications this has for future research and policy analysis.

3.42 The first problem is that cost-benefit analysis is designed to estimate which of a number of alternative projects would produce the highest marginal rate of return. In the present context the analysis would indicate which of the alternative types of housing should be selected if only one more project were to be built. In practice a large number of new houses must be provided and cost-benefit analysis cannot tell us how many of each type should be constructed. It is unlikely that the optimal solution would be to build only the type of house with the highest RR as many of the options use factors subject to increasing marginal cost (for example the supply of land with no alternative uses for the expansion of tugurios). It would be useful therefore to extend the analysis to permit more general estimates of the numbers of each type of housing which should be built.

3.43 A second problem is that the analysis compares projects in terms of their theoretical benefits to the nation but does not make a comparison in terms of their actual benefits to the potential consumer. From the policy point of view this is an important limitation as it proves difficult to evaluate the impact of price distortions and subsidies on consumer behaviour. This problem can be largely resolved through the estimation of private net benefits through computing the costs and benefits which actually accrue to the consumer. When private and public analyses are compared it can be seen that consumers have a strong incentive to purchase government housing which despite its low efficiency

rating is more attractive to the consumer because of the substantial subsidy element. The comparison of public and private net benefits is quite simple to do and greatly increases the value of the results to policy makers.

3.44 Another problem, closely related to the above, is that the traditional approach does not permit the evaluation of the impact of different financial terms available for the purchase of different types of housing. Once private net benefit analysis is included it becomes a simple matter to estimate the impact on net benefits of changing the financial terms. An example of the potential utility of this approach is the demonstration that the rate of return to the purchaser of the colonia ilegal is more than doubled if the same financial terms can be offered as those available in FSDVM and government projects.

3.45 A third problem relates to the estimation of benefits. Although it has proved possible to obtain very detailed information on project costs, there is a substantially greater error in the estimation of project benefits. In many of the projects being studied there was almost no information directly available on market rents as renting was either prohibited or controlled or the projects were too new for a rental market to have developed. Thus in many cases the only easily available indicator was the imputed market rent. Often this had to be based simply on asking families how much they believed they could rent or sell their dwelling for. There is clearly a substantial margin for error, either because families have an incentive to distort their estimates or because they really do not have a good idea of market values. The improvement of the estimates of imputed rent is a potentially important area for future research. A number of approaches are already being tested of which

the following are potentially the most interesting:

a) The owner's estimate of imputed rent is compared with estimates from other sources such as neighbors, building contractors, appraisers etc. 1/

b) Imputed rents are compared with imputed sale prices and with construction costs to try and obtain some consistency checks. 2/

c) Hedonic price analysis is used to estimate the value of each component of the housing package in typical low-income housing areas. These component weights are then applied to the project house to produce a theoretical market value of the project unit. 3/ This is perhaps the approach with the greatest potential value but is likely to require considerable theoretical and empirical work before it is easily usable.

3.46 A fourth problem relates to the appropriateness of using imputed rents as an indicator of benefits. It is assumed that in a well operating market buyers will bid up prices to a level where all perceived benefits are taken into account. If one project offers better health facilities,

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1/ See for example Manny Jimenez "The value of squatter housing in developing countries" for an application of this approach in the Philippines.

2/ See Bamberger, Gonzalez Polio and Sae-Hua "Evaluation of the First El Salvador Sites and Services Project".

3/ See John Quigley "The distributional consequences of stylized housing projects" for an application in El Salvador.

and if these are valued, the rent will be higher in this project than in a similar one which does not offer these additional health benefits. Leaving aside the important issue of how well the market is functioning, the question arises as to whether households will be aware of the potential benefits from better housing and whether this will be reflected in rents. Families who have been accustomed to poor water or sanitation may perhaps not appreciate all of the health benefits which can derive from improvements in these services and consequently the potential benefits may not be reflected in rents. If benefits of this kind are not taken into account there are likely to be significant underestimations of net benefits because all of the costs of the services are easily measurable but the benefits may be left out. At least two important research issues are suggested. The first is to determine whether it is in fact true that these types of benefits are not reflected in rents. If it appears they are not reflected then the second issue would be to develop methods for estimating the potential health benefits which might derive from housing projects.

3.47 A final set of issues relate to the estimation of land values. At various points in this paper we have referred to the question of how to estimate the value of the land on which projects are located. In high density countries such as El Salvador, land values can represent an important proportion of total project cost so that the imputed land values can have a big effect on the estimation of net benefits. A related question is the estimation of project impact on land values and rents. On the one hand increases in the housing stock should help lower rents (or stop them rising) whilst on the other hand the purchase of scarce land for housing might help to increase land values. The measurement issues involved in this type of discussion are very complex.

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ANNEX 1 ESTIMATION OF THE PARAMETERS 1/

Section 1: Efficiency parameters

1. Squire and Van der Tak 2/ suggest the estimation of the efficiency parameters as a first stage of the analysis where no consideration is given to the characteristics of the groups receiving the benefits, nor to the use made of the increase in resources available to the country. The main points included in the estimation of efficiency parameters are thus the conversion of costs and benefits into border prices, which requires the netting out of indirect taxes and subsidies, and of shadow prices reflecting the constraints existing on the economy and thus the economic (as opposed to financial) cost and benefits to the country.

Conversion factors for consumption

2. The general simple formula suggested by Squire and Van der Tak for estimating conversion factors is:

$$B = \frac{M + X}{m\,(1+t_m) + X(1-t_x)}$$

where M is the c.i.f. value of imports, X is the f.o.b. value of exports and tm and tx are the average tax on imports and exports, respectively. This formula assumes infinitely elastic export demand and import supply, negligible marginal changes in consumption of non-tradables and relative size of imports and exports reflected by the relative average propensity to spend on importables and exportables. A further simplification of the formula is achieved by assuming that all exportables are exported, and that income

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1/ The reader interested in a fuller discussion of the methodology is referred to Squire and Van der Tak (op. cit.)

2/ Squire and Van der Tak Equation 3 p. 59.

income elasticities of demand for import commodities are all unity. Then, if all exportables are exported the average propensity to consume exportables domestically is zero and the conversion factor becomes:

$$B = \frac{1}{1 + tm}$$

3. Different formulae where some of these simplifying assumptions are relaxed have been suggested including non-infinite import supply and export demand. 1/ The lack of adequate data for the estimation of elasticities led us to the use of the most simplified formula for the estimation of the conversion factors for consumption and for the standard conversion factor (SCF). The assumption of infinitely elastic demand for exports and supply of imports is probably realistic, given the small size of the country. The assumption that all exportables are exported is not far from reality in El Salvador, since domestic consumption of coffee, sugar and shrimps, which in 1977 accounted for 78 percent of total exports, is very small; the case is different with cotton, which constitutes about 10 percent of all exported commodities and is internally consumed for the textile industry (in turn a relatively important component of exportables). The assumption of a zero marginal propensity to consume textiles internally is clearly unrealistic, but the distortion this introduces in the estimation of the conversion factors can be assumed to be small, since exports of cotton constitute over 70 percent of the domestic production on average.

1/ Johannes Linn, World Bank Staff Working Paper no. 253, May 1977, pages 15-16).

4. The only information availble in relation to income elasticities was a Household Budget Survey carried out in 1976-77. 1/ This source was used for establishing two different conversion factors for consumption, one for low-income consumers and one for high income consumers. 2/ Alternative sources of information which could have led to more accurate calculation of the conversion factors were scarce and virtually useless for our purposes (for instance, the only Input-Output Table of the Salvadorean economy contains only 13 productive sectors, and the destination of the output of some of the sectors is not given).

5. The cut-off point for the differentiation between high and low income consumption was established at an income level of c700 per family per month. 3/ This is based on what is regarded as the income level of people in the so-called popular sector (sector popular), which are the target of the types of housing included in our study, and reaches about the 50-60th population percentile.

6. The figures used in the estimation of both conversion factors (B_l and B_h, for low and high income consumption respectively) are shown in Tables 21 and 22. The main consumption items were obtained from the household survey mentioned above. The corresponding average taxes on imports were drawn

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1/ Encuesta Nacional de Presupuestos Familiares, 1976-77. Unidad de Investigaciones Muestrales, San Salvador 1978.

2/ The reason for differentiating between low and high income consumption is that the composition of the consumption basket varies according to the income level of the people involved, and therefore the conversion factor should be different. For reasons of simplicity and suitability to the purposes of our study only two conversion factors for consumption were calculated, although when necessary additional ones could be established.

3/ 1 Colon = US$0.40.

from the National Statistical Abstract. 1/ For those items not included in any group, the SCF was used. This was also used for non-traded goods, rent payments and transport, since the latter consists mostly of transport services for which a specific factor would have been difficult to estimate.

7. Indirect taxes had to be estimated from indirect sources since no specific information exists in this regard. The average tax on consumption was estimated as the ratio of public revenues from the consumption of drinks, tobacco, sugar, flour and fuel to total household consumption; the estimated value was 0.05 or 5%. This estimate does not allow for heavier taxation on the consumption of the higher income people, but there is little evidence of a higher average propensity to consume taxed goods by them except for fuel, so 5% has then been used as an approximation.

8. Theoretically the conversion into border prices should take into account further considerations such as profit margins and transport costs. Due to the lack of information regarding these aspects they have not been considered in the study, but their relevance, particularly that of transport costs, should not affect the results significantly given the small size of the country.

9. The standard conversion factor (SCF) was calculated according to the formula

$$B = \frac{1}{1 + t_m}$$

where tm (0.07) equals the average import tax in the period 1971-75. The estimated value was 0.934. The two conversion factors for consumption were calculated on the basis of the same formula where tm represents the average tax on imports of the bundle of goods included in the consumption basket. The

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1/ Anuario Estadistico, 1976, Vol. 5.

Table 21: CONVERSION FACTOR FOR LOW-INCOME CONSUMPTION

	Total Monthly Expenditure (₵000 of 1976)	Percent	Import Tax
Foodstuff, drinks and tobacco	77367	53	0.03
Clothing and footware	11434	9	0.25
Rent payments	13250	10	0.07*
Fuel and electricity	10646	7	0.01
Furniture and household effects	7670	6	0.07
Taxes (indirect)	7241	5	0
Other	17220	12	0.07*
Total	144828	100	0.06

B_L = 0.940

* The standard conversion factor (SCF) is applied to convert this item. The average tax on imports, 7 percent, is used to calculate the SCF.

Table 22: CONVERSION FACTOR FOR HIGH-INCOME CONSUMPTION

	Total Monthly Expenditure (£000 of 1976)	Percent	Import Tax
Foodstuff, drink, tobacco	37392	34	0.09
Clothes and footwear	9385	9	0.25
Rent payments	11249	10	0.07*
Fuel and electricity	3747	3	0.01
Furniture and household effects	14166	13	0.15
Transport	10214	9	0.30
Tax	5447	5	0
Other	17360	16	0.07*
Total	108960	100	0.12
			B_h = 0.89

* The SCF is applied to convert this item. The average tax on imports, 7 percent, is used in the calculation of the SCF.

SCF is used to convert non-traded components and those items not specified. The average tax on imports of each bundle of goods is only an approximation, because the statistics are not sufficiently disaggregated to permit a precise definition in all cases of the consumers of any particular item. This fact is important because many imports by firms are tax exempted and it is not possible to distinguish between final and intermediate consumption. However, the results seem to be plausible in the Salvadorean economic context. The high values of the conversion factors reflect the fairly open character of the country's economic system and the absence of heavy indirect taxes, and the lower conversion factor for the consumption of higher income people accurately reflects their relatively higher propensity to consume imported goods. 1/

Conversion factor for capital goods

10. In the estimation of the factor converting the costs of capital goods to border prices, two main groups are distinguished, namely construction and traded capital goods. Construction accounts for about 40% of total investment in the country. A conversion factor was first calculated for the construction sector at the national level (that is, including all subsectors such as roads and highways, public construction, housing, industrial buildings, etc.). Using data from the Anuario Estadistico 1974 the share of each main construction material in total costs was calculated. The average tax on imports of construction materials was used to establish the conversion factor for traded building materials while the SCF was applied to non-traded materials. The conversion factor for labor is the shadow wage rate (SWR) calculated as explained below in para. 12. The share of each major input

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1/ In the absence of detailed information on taxes other than import duties we assumed that the share of taxes in total value of consumption was the same for both groups. If expensive goods were subject to heavier taxation the effect would rather lower the value of B_H relative to B_L.

(materials, skilled and unskilled labor and other inputs) in total costs was obtained from data in a 1975 survey by PREALC 1/, where no information was given as to the proportion represented by tools and equipment. The SCF was used for all the items labelled there as "other inputs", which presumably include indirect costs and land in addition to machinery. The actual figures are given in Tables 23 and 24. The CF for construction is then the weighted average of the conversion factors of the sectoral inputs, that is:

$$0.25 \times 0.80 + 0.45 \times 0.94 + 0.30 \times 0.934 = 0.903$$

11. The next step is the calculation of the CF for capital goods. The average tax on imports of these goods was 0.058 in 1976, and therefore the value of their CF is then 0.945. Since construction represents about 40% of investment, the CF for capital can be computed as the weighted average of both components, that is,

$$\text{CF for capital} = 0.60 \times 0.945 + 0.40 \times 0.903 = 0.928$$

The Shadow Wage Rate (SWR)

12. There are no good employment statistics upon which the calculation of a SWR can be confidently based. Our calculations have been based on the PREALC 1975 survey 2/ on the opinion of people familiar with the situation in the country and on an open unemployment survey carried out by the Direccion General de Estadistica y Censos in 1975. An open unemployment rate of 10% was estimated in the PREALC study for the San Salvador Metropolitan Area (Area Metropolitana de San Salvador, AMSS), and underemployment was estimated at about 22%. These figures, however, are likely to underestimate real unemployment, since anyone is considered as fully employed if they work over

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1/ PREALC: (Programa Regional de Empleo para America Latina y el Caribe) "Situacion Actual y Perspectivas de Empleo en El Salvador", 1975.

2/ PREALC. op. cit.

Table 23: STRUCTURE OF THE COSTS OF BUILDING MATERIALS

	Proportion	Import Tax 1/
Wood	8	0
Paint and enamel	2	0.3
Plywood	2	0
Cement	14	0.14
Bricks	4	0
Tiles	7	0.13
Asbestos-cement and non-metallic minerals	10	0.05
Glass	3	0.11
Iron bars	17	0.05
Iron plates	1	0.02
Iron pipes	1	0.01
Aluminium	3	0.01
Nails, etc.	1	0.12
Electrodes	1	0.11
Fuel and electricity	7	0.01
Miscellaneous non-traded	11	0.07*
Other	8	0.07*
Total	100	0.06

CF for buildings materials = 0.940

Source: Proportion: Anuario Estadistico, 1974

Import Tax: Anuario Estadistico, 1976

* The SCF is used for converting these items. The average tax on imports, 7 percent, is applied in the calculation of the SCF.

1/ There was conflicting information regarding other indirect taxes that were therefore left out of the calculation. Their consideration would have lowered somewhat the conversion factor, but the bias is not likely to be important.

Table 24: STRUCTURE OF CONSTRUCTION COSTS

	Percentage	CF
Labor	25	0.80
skilled	16	0.871
unskilled	9	0.66
Materials	45	0.94
Other	30	0.934
		CF for construction = 0.903

Source: Own calculations and PREALC: "Situacion actual y perspectivas de empleo en El Salvador", 1975.

28 weeks per year. These figures were checked and updated with the opinion of qualified people familiar with the country. A 10% unemployment rate was assumed for skilled labor, while 35% was used for unskilled labor. The efficiency shadow price for labor was calculated according to the formula $SWR_E = A \times m$, where m is the production lost through the use of labor in any specific project and A is the conversion factor for output. For skilled labor A is assumed to be a standard conversion factor for the output of all sectors, i.e., labor is assumed to be withdrawn from all sectors rather than from any particular sector. The value of the SCF (0.934) is therefore used in the calculation.

13. The average wage was taken as a proxy for marginal productivity. The loss in production was estimated to be 90% of the average wage for skilled labor. 1/ The efficiency SWR for skilled labor was thus calculated as A x 0.90 = 0.87.

14. For unskilled labor it is assumed that all labor is eventually withdrawn from the agricultural sector in rural areas. If the unemployment rate in the city is taken as constant the number of people who will migrate from the country to the city when an additional job is created can be approximated by the ratio $M = \frac{L}{E}$, where L is the total labor force in San Salvador Metropolitan Area (AMSS) and E is the total number of employed people. 2/ M was estimated using PREALC data as 1.11.

1/ It is assumed here that m, the loss in production arising from the employment of one man, is his marginal productivity times the unemployment rate. Therefore, it is arbitrarily assumed that the probability of employing somebody who was previously unemployed is proportional to the unemployment rate and evenly distributed. Although an arbitrary assumption, it was made here because it seemed to be close to reality.

2/ See Johannes Linn, op. cit.

15. The efficiency SWR for unskilled labor is then $SWR^{e}_{u} = \frac{A_a M}{W_u} M$, where A_a is the conversion factor for the agricultural output, m is the loss of output in rural areas arising from the additional employment in the AMSS and W is the average wage for unskilled people in rural areas, estimated at c2000 in 1976. m is the assumed loss in output approximately by the average wage in the agricultural sector, estimated at c1.600 times 0.65. 1/

A_a is calculated using the formula: $A_a = \frac{M_a + X_a}{M_a (1+t^a_m) X_a (1-t^a_x)}$ where M_a is the imports of inputs to the agricultural sector, X_a is the exports of agricultural goods and t^a_m and t^a_x are the average tax on imports and exports of inputs and output of agriculture respectively. M_a is only an approximation since it was calculated by adding up the main items of the CUCI nomenclature that could be reasonably assumed to be agricultural inputs (i.e. fertilizers, seeds, tractors). The same applies to X_a, assumed to correspond to exports of "foodstuff, drinks, tobacco" plus the exports of cotton and vegetable oil, since no specific data exist on imports of inputs and exports of output for the agricultural sector. The value A_a yielded by the formula is 1.14, reflecting the fact that the exports of agricultural products (specifically of coffee, the only taxed export) when weighted appropriately by $(1-t_x)$ are higher than the imported inputs weighted by $(1 + t_m)$. The efficiency shadow wage rate for unskilled labor (SWR_u) thus calculated is 0.66.

16. A factor not considered was the cost of foregone leisure. Assuming that individual preferences for leisure result in the government attributing a positive value to it, the exclusion is likely to result in an underestimation of the SWR since some disutility of marginal effort is bound to exist.

1/ The same assumption regarding the loss in production is made here as is the case of skilled labor. See footnote 1, page 97.

However, due to the lack of information on the cost of foregone leisure, it was left out of the calculation.17.

17. The proportion of the costs of skilled to unskilled labor was roughly estimated as a 2:1 relationship from data available for the construction sector in PREALC and from estimations by the Departmento de Operaciones of the FSDVM. The corresponding efficiency SWR is then SWR = 0.87 x 0.66 + 0.66 x 0.34 = 0.80. The formula used does not allow for any increase in the general level of salaries as a result of the increased demand for labor, that is, an infinitely elastic labor supply is assumed. If the case were different, other considerations should be included in the analysis, affecting particularly the social evaluation.

18. Given the difficulties involved in accurately estimating an SWR, we opted for the above estimation as the best available with the limited data available. Sensitivity analysis was conducted to evaluate the estimates.

Marginal productivity of capital

19. Two different approaches are suggested by Squire-Van der Tak to estimate the marginal productivity of capital, q, defined as the net return of a marginal unit of public investment at border prices. Here it was possible to follow only the macro-economic approach, given the lack of information on pre-tax profits of industries and on how firms are financed, which would be necessary to follow the micro-economic approach. To estimate q from the macro-economic point of view we start by calculating the ratio of increases in net national output to increases in capital. This is an overestimate of the marginal productivity of capital for at least two obvious reaons: it is an average rather than a marginal concept and it does not consider the increases in output arising from higher productivity of other factors. Squire-Van der Tak suggest a rough method to net out the effect of increased labor productivity, which consists of subtracting the rate of increase in the wage

bill to increases in net investment, taking the increase in the wage bill as a proxy for the incremental product of labor, and then subtracting this ratio from the ratio $\frac{\Delta O}{\Delta k}$. This is still likely to overestimate q because other factors such as land and technical progress are ignored. We followed this approach with the scarce information available, assuming that no increase in labor productivity occurred during the period considered (1970-76). 1/ The resulting value of q (25%) confirms what has been said about the overestimation of the marginal productivity of capital using this simple approach. Table 25 shows the data for the calculations.

20. The general GDP deflator was used to deflate output, and the price index implict in investment figures given in the national accounts was used to deflate depreciation. The average salary, ¢2300 per worker, was used as a proxy for marginal productivity of labor; it was calculated from data from the Encuesta Demografica y de Mano de Obra, and then converted into 1962 prices using the consumer's price index. Additional costs borne by employers such as social security payments and contribution to the housing fund (Fondo Social para la Vivenda, FSV) amount to approximately 10% of the salary. The contribution of employment to the increase in the output/capital ratio can then be estimated by multiplying the average salary (in 1962 colones) by the average employment/capital ratio (allowing for a 1-year gap in both cases). The value arrived at is 13%, which, when subtracted from the output/capital ratio yields a 24% for q; this has to be multiplied by the ratio of the of the conversion factor for output to the CF for capital goods giving a ratio of

$$q = (0.37-0.13) \times \frac{0.968}{0.927} = 25\%.$$

1/ If the marginal productivity of labor was lower in 1970 the corresponding value of q would be even higher.

Table 25: DATA FOR THE CALCULATION OF THE MARGINAL PRODUCTIVITY OF CAPITAL (q) 1/

Year	Output	Output	Capital	$\frac{\text{Output}}{\text{Capital}_{t-1}}$	Employment	$\frac{\text{Employment}}{\text{Capital}_{t-1}}$
1971	2377.9		229.9		26300	
1972	2512.3	134.4	217.0	0.58	27200	118.3
1973	2645.9	133.6	321.1	0.61	28100	129.0
1974	2812.6	166.7	429.7	0.52	29100	90.6
1975	2978.4	115.8	369.1	0.27	30200	70.3
1976	3085.1	156.7	386.5	0.42	32200	83.3
				0.37		93.4

1/ All monetary values expressed in millions of 1962 colones.

Source: Indicadores Economicos (Banco Central, El Salvador, 1977);

Bank estimates;

Economic Memorandum on El Salvador, World Bank, 1975.

21. The marginal interest rate on foreign loans could also be taken as a lower bound for q. World Bank data indicate that the average interest paid by the public sector in El Salvador on foreign loans by commercial banks was about 8.5%. This is an average, not a marginal, interest rate, and the marginal value would be above that rate. (In fact, the interest rate indicated above becomes negative in real terms when allowance is made for a 10 percent international rate of inflation throughout the period.) However, it might be taken for an indication of a clear overvaluation of the value of q obtained using the method outlined in para. 20.

22. The micro-economic approach, based on pre-tax profits on equity of firms (taking the financing structure of industry into account) could not be followed due to the lack of information, as mentioned above. Another basis for comparison is the economic rate of return of recent Bank financed projects, which ranges between 14% and 30%; the cut-off discount rate used in Bank projects is 11%. Other studies carried out in the country 1/ take 12% as the value of marginal productivity of capital, based on the opinion of country industrialists. For all these reasons we chose a value of 12% for our calculations.

Section 2: Social Parameters 2/

23. The value of n, the utility function parameter indicating the value which the government places on income redistribution is difficult to estimate

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1/ The evaluation of low-income housing rehabilitation projects by EDURES (Estudio de Desarrollo Urbano de El Salvador) implicitly assumes 12% as a reasonable cut-off point.

2/ What follows is the description of how we got the parameters used in the social evaluation as put forward by Squire-van der Tak. It is assumed that the reader is familiar with the methodology and definitions. For further details see SUT, pages 57-77.

exactly. The weight assigned by the government to consumption by different beneficiaries is assumed to be a function of the relative consumption and of this parameter, n. Since the value of the distribution weight is $d_i = \left[\frac{\bar{c}}{c_i}\right]^n$ where c is the average per capita consumption and c_i is the per capita consumption of income group i, a higher value of n indicates a stronger preference for redistribution. As no policy statements indicate directly this value it must be inferred from past government policies which indicate the value placed upon income redistribution, future consumption as against current consumption and pure time preference. The following indicators were used to infer the value of n.

Table 26: RATE OF RETURN ON RECENT BANK PROJECTS

3rd highway project	(1972)	+20%
6th power project	(1973)	17%
Telecom II	(1972)	18.6%
Hydroelectric Plant	(1975)	14%
Education	(1974)	30%
Urban development	(1977)	18%

Note: Since these projects were appraised using the traditional approach, the ROR's shown above are not strictly comparable to our method. However, they are given here just as an indication of order of magnitude.

-Progressivity in the income tax structure can be taken as an indicator that the utility function parameter, n, has a value greater than 0. 1/ The tax rate varies between 2.85% for the £5,000-7,000 income bracket and 60% on all income above £250,000. Although considerations other than redistribution of income are reflected in this progressive structure it is reasonable to assume that a higher weight is given to the consumption of the poor.

-Increasing the income of the less favored class is commonly stated as a goal in official documents such as the 1972-77 and 1978-82 development plans where the objective of increasing the consumption of the poor is explicitly stated. However, this commitment towards redistribution of income is not too strong, as reflected in the fact that the purchasing power of minimum salaries has not increased significantly and in some cases has actually deteriorated (no increases have taken place since April 1976 in the general agricultural minimum wage, for instance). 2/

-The "selective consumption tax", an indirect tax on certain non-basic goods, can also be taken as an indication of the desire of the government to tax the well-off more heavily as a means for redistribution.

For all the above reasons it was decided to take a value for n in the 0.5 - 1 range and both values have been used in the calculations.

24. The Consumption Rate of Interest (CRI) is a parameter used to discount future consumption. This reflects the fact that the government values future consumption less than present consumption simply because it

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1/ A deeper analysis of the tax system and its incidence might have led to different conclusions. Here we accept the tax structure at its face value.

2/ After this paper was drafted an increase in minimum wage took place in June 1978.

occurs in the future on one hand, and the lower utility of additional consumption in the future as a result of the growth in total consumption over time on the other. CRI is defined as:

$$CRI = ng + P$$

where: g = average annual increase in per capita consumption

n = elasticity of marginal utility with respect to consumption

P = rate of pure time preference

It is difficult to establish the value of this parameter. Squire and Van der Tak suggest the value of P should not be higher than 5 percent on the grounds that the government is supposed to care for consumption of future as well as of current generations. It is not evident how strong the commitment towards these future human beings is in fact, and the lack of appropriate measures to cope with some future related problems such as population growth, resources depletion, etc., suggest that the commitment to the future might be weaker versus higher current consumption than many think it should be.

-El Salvador is a growth-conscious economy, as reflected in the 1978-82 National Economic Development Plan, where a targeted annual average increase of 7% in GDP is stated, as compared to an average increase of 5.6% in the period 1970-76. At the same time, an increase in consumption of around 7% is targeted. On these grounds, together with the mild interest on redistribution present in government policies, a value for the CRI of 6% when n = 0.5 and 7% when n = 1 has been assumed. This would imply a value of P = 4.75 in the former case and 4.25 in the latter case.

g, the growth rate of per capita consumption was calculated using data in Table 27.

Table 27: GROWTH RATE OF PER CAPITA CONSUMPTION (g)

	Consumption (million of 1962 ₡)	Population (thousand)	Consumption p.c.	Rate of growth
1970	2149.8	3533.6	608	
1971	2130.4	3555.6	627	3.1
1972	2331.8	3667.9	636	1.4
1973	2513.2	3771.3	666	4.7
1974	2566.5	3886.8	660	-1.0
1975	2612.8	4005.4	652	-1.0
1976	2939.8	4183.6	702	7.7

Average rate of growth in per capita consumption = 2.5

Source: Bank estimates from Central Bank data and Indicadores Economicos, July 1977.

The distribution weights (di)

25. The purpose of using distribution weights is to assign a higher value to the net increases in consumption accruing to people with lower incomes.

26. In order to establish the weights the average level of consumption is taken as the measuring rod and defined as unity. The income distribution weights will then be above or below unity depending on whether the level of consumption of the particular income group considered is below or above the average level of consumption. Their specific value is related to the utility function parameter, n, through the formula

$$d_i = \left[\frac{\bar{c}}{c_i}\right]^n$$

where $\bar{c}$ is the average annual per capita consumption of income group i.

27. The information for our calculations was obtained from a national household budget survey carried out in 1976-77. The values used correspond with the income level of beneficiaries of the different housing options included in our analysis. Although the income brackets do not coincide exactly, if inflation is taken into account, it can be reasonably assumed that they correspond roughly to the income level of the beneficiaries. Five income groups were defined, and the values for the distribution weights were calculated for both values of n, 0.5 and 1. The per capita consumption in El Salvador in 1976 was calculated from data obtained from CONAPLAN's publication "Indicadores Economicos and is ¢919.

28. The value of per capita consumption for the country is likely to be an overestimate of real per capita consumption in the AMSS because of the difference in prices existing between rural and urban areas, which is particularly large between the capital city and the rest of the country. Although no data were available to quantify the difference, in the light of the different minimum wages established for the AMSS and the rest of the

country and of a study on differences in poverty 1/ in Peru, it was assumed that real consumption is 30% lower in the AMSS. The corresponding figure for average consumption in this second case was calculated on the ground that 40% of total private consumption occurs in the AMSS, so that total consumption is decreased by 12% (or 0.40 x 0.30). The resulting value for average per capita consumption was thus calculated at ¢820 in 1976.

29. In Table 28 households have been classified in five groups according to their monthly income. The column labelled as "Country" shows the value of the average annual per capita consumption of households in each income group in colones; the AMSS column shows the average annual per capita consumption in the San Salvador Metropolitan Area, calculated, as explained above, by assuming that due to price differentials real consumption is 30% higher at the national level than in the AMSS.

30. The values of di, calculated using the formula $di = \left[\frac{C}{C_i}\right]^n$

are given in Table 29.

The figures in brackets show the value of the distribution weights when no allowance is made for the difference in prices in rural and urban areas. The values not in brackets allow for differences in price levels and are the ones used in the evaluation.

Summary Distribution Measures

31. The purpose of the SDM is to provide a weight for those benefits where the beneficiaries are difficult to trace. In this case the assumption is made that any increase in total consumption is distributed among the population in the same way as current consumption (and therefore that there is a neutral effect on the distribution of consumption). The formula used by Squire/Van der Tak is based on the assumption that consumption is distributed

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1/ See V. Thomas's World Bank Working Paper no. 273.

Table 28: CLASSIFICATION OF FAMILIES BY MONTHLY INCOME

Income Group	Household Monthly Income (in 1976 ₵)	Average Annual per Capita Consumption	
		Country	AMSS
1	₵20	256	197
2	₵201-400	470	362
3	₵401-700	745	573
4	₵701-1000	1600	1230
5	Over ₵1000	3800	2923

Table 29: CALCULATION OF VALUES FOR DISTRIBUTION WEIGHTS (d_i)

$c = (919) - 820$

Income Bracket (Monthly Income)	di n = 0.5		di n = 1	
Up to ₵200	(1.9)	2.0	(3.6)	4.2
201 - 400	(1.4)	1.5	(2.0)	2.3
401 - 700	(1.1)	1.2	(1.2)	1.4
701 - 1000	(0.4)	0.8	(0.6)	0.7
1000+	(0.3)	0.5	(0.2)	0.3

Note: The values in parentheses correspond to the d_i calculated when no adjustment is made for price differentials between urban and rural areas.

according to the Pareto Function 1/ with a cumulative distribution function whose parameter is related to the Gini coefficient of income distribution. The formula used is

$$D = \frac{6^{*}\ (6-1)^{\ 1-n}}{6\ (B-6-1)}$$

where 6 is the Pareto function parameter, related to the Gini coefficient, G, through the formula

$$6 = \frac{1+G}{2G}$$

The household budget survey mentioned above estimates the value of the Gini coefficient of income distribution as 0.39. This is the value which has been used for our purposes. 1/ The corresponding values of D are then 0.92 when n = 0.5 and 1 when n = 1.

The Critical Consumption Level (CCL) 2/

32. So far the explicit assumption has been made that marginal consumption is valued differently depending on the current consumption level of the individuals whose consumption possibilities is increased. It has also been implicitly assumed that the value of public income, v, shows a premium over the value of private consumption; these assumptions imply that there is a certain level of consumption at which any increase in consumption accruing to individuals in the corresponding income bracket is given the same value as public income. This is the critical consumption level and its definition implies that:

$$CCL = \frac{\bar{C}}{(BV)^{-n}}\ , \text{ since } V = d^{*}\ \frac{1}{P} = \left[\frac{\bar{C}}{C^{*}}\right]^{n} \cdot \frac{1}{B}$$

where: $C^{*} = CCL$

1/ The PREALC study estimates a value of .65 but it was decided to use the government figures for consistency.

2/ See Squire and Van der Tak, op. cit., pages 106-108.

The value obtained from the above equation would indicate the CCL implicit in the selected values for n and v. It is possible to cross-check this value with independent estimates of the CCL. In our case the following independent criteria were used:

33. -The average annual per capita consumption of people living in households with family income of less than ¢100 per month is about ¢200. This figure can be taken as a low estimate of the CCL, reflecting a policy of stronger preference for growth, as is the case when n = 0.5 and the CRI = 6.

34. From data in the household budget survey, it can be estimated that the annual per capita income of the first population decile is about ¢186. It can be reasonably assumed that this is a lower limit for the CCL even in the case of a relatively low commitment towards income distribution, since in a developing country where average consumption is low the government is bound to value the consumption of at least the lowest 10% of the income distribution as much as its own income.

35. -The minimum legal daily wage prevailing in the country in 1976 was ¢5.9 in rural areas (including food allowance, holidays and weekends). Considering that the average number of people employed per household was 1.9 in 1975 1/ and that the average size of low-income households was 6.6 members according to the budget survey, and assuming an average 180 days worked per annum, the annual per capita consumption affordable by people living in households getting the minimum wage would be about ¢300 per capita and year.

36. -People with gross annual income below ¢5000 are exempted from income tax. Considering again 1.9 as the average number of employed per household and the national average of 5.4 members per family, income-tax payers are those above the 80th population percentile. The corresponding

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1/ PREALC: Situacion actual y perspectivas de empleo en El Salvador, 1975.

level, assuming a 20% marginal propensity to save, would be about £1400, a figure which seems unreasonably high. 1/ There are several reasons explaining the excessively high CCL derived from this approach. One reason could be that income level is not the only consideration for tax exemption, but there are other objectives reflected in the fiscal policy of a country, that encourage effective demand, cost-effectiveness of tax collection, etc.

The Value of Public income, v.

37. Squire/Van der Tak suggest two different formulas for estimating the value of public income. The first one assumes $v = \frac{q - sq}{i - sq} \cdot \frac{1}{B}$, where q is the marginal productivity of public investments, s is the marginal propensity to invest out of q, i is the consumption rate of interest and B is the conversion factor for marginal increases in consumption at the average level of consumption. The formula assumes that all the parameters involved remain constant over time, that consumption derived from public investment accrues to people at the average level of consumption and that public savings, public consumption and private savings are equally valued. This is likely to overestimate v because the difference between q and i is likely to decrease over time, 2/ which implies that current investment should be valued less. The second formula assumes that there is no reinvestment (s = 0) and will yield a lower value provided v is greater than 1 and that the implied constancy of q and i does not impart a greater upward bias on v than the downward bias introduced by assuming no re-investment.

1/ The tax on selected consumption goods is applied on non-basic commodities some of which are nonetheless consumed by people with incomes far below those of the 80th percentile, thus making the £1400 figure consistent as the value of the CCL.

2/ Squire/Van der Tak, op. cit., p. 105

38. We used both formulae for the calculation of v. The values obtained are:

a) simple case, where $v = \frac{q}{i} \cdot \frac{1}{B}$

$v = 2$ when $n = 0.5$ and

$v = 1.8$ when $n = 1$

The corresponding values for the critical consumption level, that is, the level of consumption at which public income and private consumption are equally valued, would be (in 1976) colones:

¢235 for n = 0.5 and ¢488 for n = 1

b) complex case (assuming reinvestment

The value of s, 24%, was calculated subtracting from unity the average ratio of the increases in private consumption to increases in GDP over the 1970-76 period (Table 30). The values of v using this formula were 3.1 for n = 0.5 and 2.4 for n = 1 and the corresponding values of the CCL would be ¢198 and ¢366, respectively.

39. Given the assumptions involved in the calculation of v using the complex formula, particularly the constancy of q and i over time, we have taken the values yielded by the first formula as reflecting more appropriately the value of public income and therefore v = 2 and v = 1.8 have been used for our calculations in cases 1 and 2, respectively.

40. For the reasons explained in para. 32 to 34 it was assumed that the values of public income derived from the simple formula and resulting in corresponding values for the CCL of ¢235 and ¢488 per capita and year adequately reflect government policies in El Salvador and have been accepted for the purpose of our study. The CCL derived in the first case (when n = 0.5) falls between the 10th and 20th population percentile, while the

Table 30: ESTIMATING V: THE COMPLEX CASE

(1962 Million ¢)	GDP	GDP (t+1-t)	Private Cons.	Private Cons.	C/ GDP
1970	2393.6	137.1	1893.3	100.5	0.73
71	2508.8	133.9	1993.8	60.4	0.45
72	2645.9	178.6	2054.2	147.4	0.82
73	2779.8	124.0	2203.6	65.3	0.53
74	2958.4	133.2	2268.9	29.9	0.22
75	3082.4	159.1	2298.8	293.2	1.84
76	3215.6		2592		
			s = 24%		0.764 (avg.)

Source: Calculations based on data from the Banco Central de Reserva, El Salvador.

consumption of about 40% of the population would fall below the CCL derived in the second case, when n = 1 and a greater weight is therefore assigned to consumption by the lowest income groups.

The distribution weights w

41. The distribution weights to be applied to net increases in consumption arising from the different housing alternative summarize the joint effects of the facts that consumption accruing to different individuals is valued differently (as reflected by the use of the consumption distribution weights, di) and that income in the hands of the government is valued differently than private consumption. The formula yielding the distribution weights is $W_i = \frac{di}{v}$ and the resulting values are given in Table 31:

Table 31: VALUES OF THE DISTRIBUTION WEIGHTS

	n=0.5	n=1
w_1	1.0	2.3
w_2	0.8	1.3
w_3	0.6	0.8
w_4	0.4	0.4
w_5	0.3	0.2

Social Shadow Wage Rate

42. In the calculation of the efficiency shadow wage rate the effects of increased consumption were not considered since they do not affect the evaluation when distributional effects are ignored. For the social evaluation, however, these effects must be taken into account since changes in consumption might represent a social cost or benefit according to the particular income group affected.

43. Different SWR's have been considered for the purpose of our study, in order to reflect the social cost of the loss in production caused by the use of manpower to carry out construction through self-help, mutual help and contractors.

The Social Shadow Wage Rate for Skilled Labor (SWR^S):

44. Using data of the "ENCUESTA DEMOGRAFICA Y DE MANO DE OBRA" an average salary of ¢4000 and ¢2000 per year was estimated for skilled and unskilled labor, respectively. For skilled labor an unemployment rate of 10% was assumed. All new jobs generated are then assumed to result in a loss of production equal to 0.90 times the average salary for skilled labor, 1/ the latter being taken as a proxy for marginal productivity. The increase in consumption resulting from the salary acruing to a person filling a new job would be 10% of the salary. Per capita annual consumption is calculated under the assumption that the average number of workers per family is 1.9 of which only one is skilled. The original level of per capita consumption, assuming 10% unemployment is ¢954. The increase in consumption (assuming all income is consumed) is ¢400 per family, (or $80 per capita). The distribution

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1/ See para. 35 and footnote 1, in page 20.

weights to be applied to this non-marginal increase in consumption are calculated through the formula:

$$d = \bar{C}^{-n} (C_2^{1-n} - C_1^{1-n}) \text{ For } n \neq 1, \text{ and}$$

$$d = \frac{\bar{C} (\log_e C_2 - \log_e C_1)}{(C_2 - C_1)} \text{ for } n = 1$$

(Squire - Van der Tak p. 127)

and the corresponding values are:

$$d = 0.94 \text{ for } n = 0.5 \text{ and } d = 0.82 \text{ for } n = 1.$$

The social SWR for skilled labor is then calculated as:

$$SWR_s = \frac{Am + (w-m)(B - \frac{d}{v})}{W}$$

and equals 0.914 for n = 0.5 and 0.915 for n = 1.

The lack of sensitivity of the shadow price of skilled labor to the value of the distribution parameter n is due to the relatively small increase in consumption resulting from the employment of skilled labor given the high employment level already existing.

The Social SWR for Unskilled Labor, SWR_u^s

45. The changes in consumption arising from the employment of unskilled labor are calculated including its effect on rural-urban migration. Due to the existing unemployment and underemployment, the output foregone per new job created is assumed to be 65 percent of the marginal productivity. As in the efficiency shadow wage rate for unskilled labor, the final effect of new employment is assumed to take place in the agricultural sector in rural areas. The average wage in agriculture is taken as a proxy for marginal productivity, and the output foregone per new job is taken as 65% of that figure. The increase in consumption arising per new job is

$\Delta C = (W_1 - 0.65 \times W_o \times M)$ where W_1 is the wage corresponding to the new

job in the urban area, w_o is the average wage corresponding to the old job (agricultural laborer) and M is the number of migrants to the urban area per new job created.

In our case W_1 is taken as the average wage for unskilled labor in urban areas (¢2000) [1/], W_o is approximated by the average wage in the agricultural sector and M is 1.11 as in the efficiency case.

$$\Delta c \text{ per job} = (2000 - 0.65 \times 1.11 \times 1600) = 1154.$$

46. Some of this increment will accrue to unemployed or underemployed people in the rural areas:

$$\Delta C_1 = (1 - 0.65) \times M \times w = 0.35 \times 1.11 \times 1600 = ¢622,$$

47. The immigrants will also get an increase in consumption equal to the difference between their new level of consumption, y_c, (assumed to be the average consumption of the three lowest-income urban population deciles) and y_a, their previous consumption level (taken as the average per capita consumption of families with per capita incomes below the average income of the three lowest population deciles in urban areas, or ¢633 per capita, assuming that only people with incomes lower than that will migrate).

This increase in consumption would be, per new job

$M(Y_c - Y_a)$, where Y_c = ¢439 and Y_a = ¢323.

¢2 = 1.11 (439 - 323) = ¢129

48. The difference between the total increase in consumption (¢1154) and C_1 and C_2 is ¢403 and is assumed to benefit urban residents (through their additional employment less the consumption of the migrants, assumed to be financed by the urban population).

$$\Delta C_3 = \Delta C - \Delta C_1 - \Delta C_2 = ¢\ 1154$$

1/ The figure used in the evaluation of projects should be the actual wage paid to the worker employed by the project. In our housing projects the figure would be approximated by the average wage for unskilled labor in the construction sector, actually very close to ¢2000.

49. The distribution weights used are, respectively,

d_1 = marginally evaluated at Y_a

d_2 = calculated for a discrete increase in consumption from Y_a to Y_c

d_3 = marginally evaluated at ₡833, the average level of consumption of the people from urban families with incomes below the ₡3800 (estimated to be the income of unskilled laborers' families).

50. The SWR^s is then calculated using the formula:

$$SWR_u^s = \frac{AW_1 + \Delta C_1\left[B - \frac{d_1}{V}\right] + \Delta C_2\left[B - \frac{d_2}{V}\right] + \Delta C_3\left[B - \frac{d_3}{V}\right]}{W_1}$$

where W is the nominal wage (₡2000).

51. The values estimated for the di's and the SWR are summarized below:

	n = 0.5	n = 1
d_1	1.6	2.5
d_2	1.5	2.1
d_3	1.1	1.3
SWR^s_u	0.780	0.615

52. When n = 0.5, the social SWR for unskilled labor is higher than the efficiency rate because the increases in consumption accrue to income groups above the critical consumption level and therefore involve additional social costs. For n = 1, however, the increase in consumption of both migrants and the three lowest income deciles in the AMSS has a positive weight which more than offsets the social cost of increased consumption by urban dwellers. The global SWR^s for skilled and unskilled labor is then, using the same 2:1 proportion as in the efficiency case, 0.868 for n = 0.868 for n = 0.5 and 0.807 for n = 1.

The SWR for Mutual- and Self-Help:

53. For the purposes of our project analysis, two additional SWR's are estimated to account for the special labor arrangements used in some of the housing projects under study, namely mutual help and self-help. The data used in the calculation are taken partially from the project of El Pepeto and partially from an earlier FSDVM study in Sonsonate. The cost of mutual help included beneficiary's labor plus supervision and community organizers. The cost of the beneficiaries' labor (estimated to be 44% of total mutual help labor cost) was assumed to be zero, even though the beneficiaries stated that on the average they had to sacrifice ¢117 of weekend income to participate in mutual help. The reason for this is that it is assumed that, due to high levels of unemployment, other low-income families will obtain additional work. Supervision and community work are shadow priced at the SWR for skilled labor, since they are employed full-time.

54. The social conversion factor for mutual help (SWR^s_m) accounts for changes in consumption arising from the mutual help scheme. The social shadow wage rate for skilled labor (supervisors and social promoters) is assumed to be the same as the general SWR^s_s calculated for skilled labor, and the same CF of 0.914 and 0.915 for n = 0.5 and n = 1, respectively, is thus used. As for the participation of project beneficiaries, no consumption changes are assumed to take place due to the explanation given in the previous paragraph. 1/ The resulting conversion factors are SWR^s_m = 0.51 for n = 0.5 and 0.52 for n = 1.

1/ The fact that no increases in consumption as a direct result of the use of cheaper methods such as mutual and self-help as opposed to traditional methods does not mean that there are no changes in the consumption possibilities of the beneficiaries, but this effect is accounted for when netting out the stream of the actual costs incurred by the private sector from the benefit stream.

55. Self-help labor is assumed to have no social cost and is shadow-priced at 0. This may be a somewhat extreme hypothesis because, although no actual direct loss in income (production) is likely to result from the labor input on construction carried out at off-work hours or by unemployed members of the household, there might be indirect effects to the extent that unemployed beneficiaries might defer their search for employment or that friction exists in making up for the output foregone by people with working hours not clearly defined (as is the case in most informal sector jobs). However, it is likely that these effects will be negligible and they have in fact been neglected in the analysis. The social cost of foregone leisure is also disregarded. As to the proportion that self-help represents in the total labor costs of the self-help stage, the scanty evidence available (from surveys carried out in colonias ilegales) shows that it is only about 25% (about 4% of the total construction costs).

The accounting rate of interest, ARI

56. Squire-Van der Tak suggest the following equation for the estimation of the accounting rate of interest.

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

The equation only expresses the accounting rate of interest as the sum of the rate of reinvestment out of q and the rate of consumption generation (in terms of the numeraire). It should be considered as a lower estimate of the ARI, while, the marginal productivity of capital, q, might be considered as a maximum estimate.

The value of ARI is in our case

	n	
q	0.5	1
9	7.0	7.4
12	7.8	8.3

57. The values are not very far from those of the CRI, but still they indicate that the value of v might fall over time. The NPV calculated under

the assumption implicit in our calculations that v is time independent will always be equal to or below the net present value calculated under the assumption that v is declining over time. The NPV's calculated are thus conservative, in the sense that they might be higher if the possibility of a fall in the value of v over time had been included in the calculations.

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ANNEX 2: ESTIMATION OF COSTS AND BENEFITS FOR EACH OF THE HOUSING OPTIONS STUDIED

1. This annex presents a detailed explanation of the way in which costs and benefits were estimated for each of the 9 housing options studied. The explanation covers both the estimation of public and private costs and benefits. The tables used in the calculations have been included to permit the interested reader to work through the estimation procedures or to evaluate the effect of changes in any of the assumptions.

2. The methodology is presented in greater detail for the first option, the FSDVM Basic Core Unit in El Pepeto, so as to demonstrate the way in which the estimating procedures explained in Annex 1, were applied.

3. The costs and benefits of each project were estimated completely separately. Information was normally obtained from 3 sources. Information on production costs was obtained from the producer. In the case of government and FSDVM projects this information was relatively straightforward to obtain, although often time-consuming. In the case of the informal market, individual owners had to be located and interviewed. Many of them were suspicious or did not have easy access to the data, and in several cases a replacement was used to ensure more complete information.

4. The second information source was interviews conducted with a small sample of families living in the project. Normally a sample of 10 families was taken. For families who purchased a complete house, the interview was limited to questions on monthly housing expenditure and monthly income. For families who built all or part of their house, the interview was much longer and included information on costs of materials and labor.

5. The third information source was secondary data, most of which came from other studies conducted as part of the monitoring and evaluation program.

1 Estimating Costs and Benefits for the Basic Core Unit in the FSDVM El Pepeto Project

6. In evaluating the FSDVM projects it is important to understand that the process of housing construction is considered as a means for producing a wide range of changes in the social and economic conditions of the family (development of group structures, raising the level of political awareness, increased access to urban services, etc.). Many of what the FSDVM considers to be the major benefits the project is intended to produce are not being measured by the present study so that the estimated net benefits used in this report may underestimate the benefits perceived by the participating families.

7. Three or possibly four distinct stages can be identified in the process of urbanization and construction of the house: (1) Installation of infrastructure by a contractor: (2) Construction of a core unit through a process of mutual help in which families work together in groups on weekends over a six to nine month period. This stage is obligatory and has two functions, the first is to obviate the necessity for a downpayment on the house, and the second is to lay the foundations of the community organization required to achieve the social goals of the FSDVM. (3) Self-help by the families to complete the necessary work to make the house habitable. In fact a large number of families preferred to continue working together in groups during this stage. (4) Progressive development in which the family continues to improve the house after they have occupied it.

8. The monthly payments which a family makes to the FSDVM cover the cost of the land and all costs incurred during stages (1) and (2) of the construction (with the exception of the imputed cost of the labor contributed by the family during stage (2)). In most projects the family can choose between two or more options where the main difference relates to the stage of construction of the dwelling. At one extreme the serviced lot may include

only water and sanitary connections with no construction, whilst at the other the house may be partially constructed.

9. El Pepeto is one of the FSDVM projects included in the first IBRD loan for urban development in El Salvador. The project is located in Soyapango in the East of the capital and close to the international airport. The project was planned to have 534 single-family dwellings of which about half are basic units (unidad basica).

10. The average plot size is approximately $75m^2$ and the basic unit has an asbestos roof, wooden door frames and windows and a concrete floor. The structural walls are of brick whilst the interior partitions and the rear wall are constructed by the family with the materials of their choice through self-help schemes. The project included a construction loan component to provide financial aid for the self-help stage of up to ₡860 (US$344) per family. Construction was carried out in 1974 and 1975 for the contractor and mutual-help stages. By June 1978 the self-help stage had not yet been finished by all families and the actual period for completion depends on the affordability of costs by families. For the purposes of our study, however, it was assumed that dwellings were first occupied in 1976, and self-help completed during 1976 and 1977. At the time of the interview families were asked how much more they planned to invest (see Table 32). Two estimates were made of the total cost of the house: (1) the amount invested up to June 1978 (the time of the study); (2) the previous total plus estimated outstanding expenses. The former was used for the analysis presented in this report. From the interviews it was learned that water was not connected until after July 1977. Benefits have been adjusted accordingly to reflect the period when the service was actually employed.

11. The costs of design and development were assumed to be incurred in 1974. The costs of development include both the connection-charge paid to the

water and sewerage company (ANDA) and the cost of the works carried out. The charge was taken as a proxy for the cost of connecting the additional population to water and sewerage, since no information existed as to what the real cost was 1/; although the cost is likely to be significantly higher than the actual charge, the effect might not be too significant since not all the water consumed after the connections represents additional consumption (resulting in higher long-run marginal costs for ANDA), as the project beneficiaries were already consuming water, either from public stand-pipes or from private vendors.

12. The general conversion factor for construction was used to convert development costs, since information on these was not sufficiently detailed to allow the calculation of a specific factor. Construction by contractor and mutual help were assumed to occur in 1975. The breakdown of the contractor costs were as follows:

Materials	27%
Skilled labor	41%
Unskilled labor	22%
Other	10%

13. Mutual help took place on Saturday afternoons and Sundays at times when wage earners would normally be free. The proportional breakdown of mutual help costs was as follows:

Materials	31%
Skilled labor	36%
Unskilled labor	23%
Other	10%

1/ The same applies to the other housing options analyzed.

14. Skilled labor includes supervision and costs of social action (promocion social). The social promotors have two main tasks during mutual help, the organization of the construction activities and training people in the techniques of working in groups. Even though work times were chosen to minimize potential loss of income it was found that in fact a substantial proportion of participating families did lose income due to their participation in mutual help (amounting to an average of 32% of the value imputed to the work conducted through mutual help). Despite this fact the opportunity cost of unskilled labor to the economy was assumed to be zero due to the fact that other people previously unemployed or under-employed could fill the positions left vacant. As a consequence of this reasoning a zero conversion factor was used for unskilled labor.

15. Self-help took place in 1976 and 1977. The SWR for the country is used to estimate the cost of hired labor (which is assumed to be skilled whilst family labor was assumed to be unskilled). No information exists on the division of self-help labor between materials and skilled and unskilled labor but on the basis of data collected in the illegal subdivisions it was assumed that costs during the self-help stage could be broken down as follows:

Materials	60%
Skilled labor	22%
Unskilled labor	18% (self-help)

16. The conversion factors used were calculated by applying the corresponding factor $\frac{1}{(1+t_i)}$ to different elements and weighting by the proportion by each cost over total costs.

17. Maintenance costs were estimated at 4% per year of total construction costs throughout the life of the project. The project life is considered to be infinite although 30 years is used as the cut-off point in the calculations. Monthly electricity, water and garbage collection costs were

not included because, since they would be paid by tenants, the corresponding benefits are excluded from the imputed rent, and therefore only connection and meter costs are included in the cost side. The conversion factor for self help is applied to maintenance costs, assuming that repairs will be carried out mainly by families.

18. The benefits include the two elements explained in paras. 2.30 to 2.35 above. The imputed market rent of the unidad basica at the level of completion shown at the time of the survey was ₡1400 per year in 1978 (or ₡930 in 1974 colones).

19. The second element, (additional consumer's surplus), is calculated using equations (1) to (3) in para. 2.34. The equivalent rent charged to the beneficiaries, calculated as in equation (2) is ₡573.

FSDVM estimates indicate that about 60% of project beneficiaries lived previously in mesones, 5% were tenants in colonias and 35% came from tugurios and other low-income options such as campamentos. The previous housing consumption is calculated as the weighted average of the rent of the previous dwellings, that is, r = ₡215 per year (in 1974 colones). To express this amount in units of basic dwelling, we use equation (3), yielding Q = 0.23.

The consumer's surplus generated per unit is now calculated using equation (1), yielding a value of ₡137 per unit and year.

20. The average income of the beneficiaries is ₡310 per month, which when converted to 1976 prices is ₡260 and therefore the conversion factor for the consumption of the beneficiaries is that of low-income consumption (B = 0.94). Efficiency costs and benefits are shown in Table 32 and 33.

21. For the social evaluation we followed the procedure outlined in para. 2.36 and onwards. The social costs are calculated by applying the social SWR to labor costs. The social benefits include the efficiency benefits,

calculated as above, plus the net social effect of the increase in consumption accruing to the project beneficiaries, and the net social effect of the change in the low-income housing market clearing rent.

22. The increase in consumption, I_1, is calculated by equation (6) given in paragraph 89 which is as follows:

$$I_1 = IR + CS - (AP+SH+M)$$

The values were estimated as follows:

IR (imputed rent) = ¢930

CS (consumer surplus) = ¢137 (see para. 85)

AP (annual payment to FSDVM) = ¢280 in 1975 but decreased annually in real terms

M (cost of maintenance) = ¢93 per year

SH (cost of self help and mutual help) are included but the ¢860 for cost of materials during self help is not included because they were financed by a subcomponent of the World Bank loan and do not reduce consumption

The distribution weight applied to this component is a discrete distribution weight, using the formula,

$$d_i = \frac{C^{-n} (C_2^{1-n} - C_2^{1-n})}{(1-n)(C_2-C_1)} \text{ For } n \neq 1 \text{ and}$$

$$d_i = \frac{C (\log_e C_2 - \log_e C_1)}{C_2 - C_1}$$

where $\bar{C}$ is the average consumption in the country and C_2 and C_1 the after-project and pre-project per capital consumption levels.

C_1 is estimated by assuming an average family size of six members. The original per capita consumption level is then the average income per month divided by six. C_2 is the increase in consumption also in per capital terms. The income distribution weights are $W_1 = \frac{d_i}{2}$ For n = 0.5 and $\frac{d_i}{1.8}$ For n = 1.

23. The third component of the social evaluation is the change in market rents arising from the project. The social effect is calculated using equation (10) in para. 2.50:

$$- \frac{(P_2 - P_1) \text{ X } Q}{N} (B_T - W_T) - \frac{(P_2 - P_1)(1-s) \text{ X } Q}{N} (B_L - W_L)$$

social effect of change in rents =

$$- \frac{XEP_1 - \quad Q}{N} \quad (B_T - W_T) - \frac{XE\ (1-3)P_i \quad Q}{N} (B_L - W_L)$$

where -P is the average annual market rent per <u>meson</u> unit, or ¢295 (in 1974 colones) ·

Q is calculated on the basis of the beneficiaries' former dwellings. 60 percent of the beneficiaries lived previously in <u>mesones</u>, 5 percent in illegal settlements and 35 percent in <u>tugurios</u>. The 534 dwellings left behind by the beneficiaries, when converted into <u>meson</u> units amount to 175.

N is the number of new dwellings, 534

X is the proportion of houses rented, estimated as 0.77

E is the elasticity of market rent to changes in supply, equal to 1.5

B_L and B_T are the conversion factors for the consumption of low-income people (tenants) and high income people (landlords in our case), 0.94 and 0.89 respectively.

W_T and W_L are the income distribution weights applied, calculated as explained below.

24. The distribution weight used for tenants is marginally calculated at ₡613, the average annual per capita consumption (in colones of 1974) of families in mesones, colonias and tugurios according to the study la Vivienda Popular; w_T = 0.68 for n = 0.5 and 1.36 for n = 1, while the income distribution weight for landlord consumption is w_5 in table 29. The net effect is then a net social benefit of ₡54 per year for n = 0.5 and ₡239 for n = 1.

The estimation of private costs and benefits

25. Private costs and benefits are those directly affecting the family which is owner-occupier or renter. Both costs and benefits are included in the year in which they are experienced by the family and hence in most cases are spread over a longer period than was the case for public costs and benefits.

26. Five private costs were identified:

a) Monthly payments to the FSDVM. As these are fixed their real value declines over time.

b) Maintenance costs. These are assumed to be the same as for public costs (except that no conversion factor is used).

c) The family is assumed to invest a total of ₡ 1149 in self-help completion of the house. ₡ 860 of this is covered by a loan from the FSDVM which is paid back over a 5 year period (and whose real value declines each year). The remaining ₡ 289 is assumed to be repaid in the first year.

d) Installation of water meter at a cost of ₡ 95.

e) Opportunity cost of mutual help labor. On the basis of a study of mutual help in the FSDVM Sonsonate project 1/ it is assumed that the opportunity cost of own-labor is equivalent to 32% of the value of own-labor imputed by the FSDVM. 2/ This has a value of ₡ 117.

27. The estimated costs for the period 1975 to 2004 are given in Table A. The Net Present Value of the costs (NPV) is calculated by discounting all costs at 12% p.a. giving an NPV of ₡ 2976.

28. Three types of private benefits were identified:

a) Imputed rent. This was imputed in the same way as in the estimation of public benefits. The owner-occupier was asked to indicate how much it would be necessary to pay to rent a house similar to this in another part of the city. 3/ The benefit-cost indicators are very sensitive to the assumptions which are made about the imputed rental value of the house during the process of upgrading. Two assumptions were made. The first, a high assumption assumed that the imputed rent during the first year would be 66% of the rent for the completed

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1/ "Evaluation of mutual help in Sonsonate" Urban and Regional Economics Report No. 2.

2/ The FSDVM considers mutual help labor to have a value equivalent to 10% of the purchase cost of the house. Mutual help replaces the normal downpayment which families are required to make on a house purchase.

3/ The question was asked in this way as it was not permitted to sublet at this time in the project.

house and in the second year would be 83%. The second, a low assumption, assumed that the imputed rent during the first year would be 50% of the imputed rent for the completed house and in the second year would be 75%. The estimated benefit-cost ratios are given in Table 37 with both of these assumptions.

b) Consumer surplus. This was estimated in the same way as for public benefits.

c) Sales price of the house. The sale price of the house in year 30 (2004) was assumed to be 100 times the imputed monthly rent in year 30. This value of ₵ 7750 was assumed to be a lump-sum benefit to be obtained in 2004. In fact, as the sum has to be discounted over 30 years, it has very little effect on total benefits.

29. Estimated benefits and net benefits (total benefits - total costs) for each year during the period 1975 to 2004 are given in Table 37. Using these figures it was found that the estimates with low and high assumptions for imputed rent in the first two years are: Internal Rate of Return (IRR) 129% (high) and 94% (low); Net Present Value (NPV) ₵ 5368 (high) and C5157 (low); and Net Present Value divided by total discounted costs 1.8038 (high) and 1.73 (low).

Table 32: CALCULATION OF EFFICIENCY COSTS OF UNIDAD BASIC (BASIC DWELLING) OF EL PEPETO PROJECT

Efficiency Costs:

Year	Item	1974₡	Conversion Factor	Efficiency Cost
1974	Land	11	1.14	12.9
	Design	86	0.871	74.9
	Development	689	0.903	622.0
				709.8
1975	Construction by Contractor	897	0.85	762
	of which			
	M = 27%		0.94	
	SL = 41%		0.87	
	UL = 22%		0.66	
	O = 10%		0.934	
	Construction by Mutual Help	280	0.56	157
	of which			
	M = 31%		0.94	
	SL = 36%		0.48	
	UL = 23%		0	
	O = 10%		0.934	
	Land	11	1.14	13
				932
1976	Construction by Self Help	574	0.76	436
	of which			
	M = 60%		0.97	
	SL = 22%		0.80	
	SH = 18%		0	
	Land	11	1.14	13
				449
1977	Construction by Self Help	575	0.76	436
	Water Meter	95	0.934	89
	Land	11	1.14	13
				538
1978 - 2003 per year	Maintenance	93	0.76	73
	Land	11	1.14	13
				86

M = Materials; SL = Skilled Labor; UL = Unskilled Labor; O = Other; SH = Self Help.

Table 33: CALCULATION OF EFFICIENCY BENEFITS FOR THE UNIDAD BASICA

Efficiency Benefits:

Year	Item	1974¢	CF	Total Benefit
1974	Imputed Rent	0		
	Consumer's Surplus	0		
1975	IR	0		
	CS	0		
1976	IR	620	0.94	583
	CS	66	0.94	62
				645
1977	IR	775	0.94	728
	CS	86	0.94	81
				809
1978 - 2003 per year	IR	930	0.94	874
	CS	137	0.94	129
				1003

Table 34: CALCULATION OF SOCIAL COSTS OF THE UNIDAD BASICA

Social Costs:	Item	1974¢	Conversion Factor		Social Costs	
			n=0.5	n=1	n=0.5	
n=1						
1974	Land	11	1.14		13	13
	Design	86	0.914	0.915	79	79
	Development	689	0.92	0.90	634	624
					726	716
1975	Cons. by Contractor	897	0.893	0.857	801	769
	Cons. by Mutual Help	280	0.69	0.70	193	192
	Land	11	1.14	1.14	13	13
					1007	1008
1976	Self Help	574	0.87	0.86	499	494
	Land	11	1.14		13	13
					512	507
1977	Self Help	574	0.87	0.86	499	494
	Land	11	1.14		13	13
	Water Meter	95	0.934		89	89
					601	596
1978 - 2003	Land	11	1.14		13	13
	Maintenance	93	0.87	0.86	81	80
					94	93

Table 35: THE CALCULATION OF SOCIAL BENEFITS OF THE UNIDAD BASICA

1. Efficiency benefits as in Table 33.

2. Net Effect of Increase in Consumption Accruing to the Beneficiaries:

Year	Annual Payment	Self Help and Maintenance	Consumption		Total Effect	
			Absolute	Per Capita	n=0.5	n = 1
1974-75	0	-177	-117	-19.5	-26	-54
1976	268	126	226	38	-61	70
1977	239	201	421	70	-122	99
1978	216	93	758	126	-247	98
1979	205	93	769	128	-251	97
1980	192	93	782	130	-256	96
1981	180	93	794	132	-261	95
1982	168	93	806	134	-266	93
1983	157	93	817	136	-271	94
1984	147	93	827	138	-276	91
1985	137	93	837	140	-281	89
1986	92	93	882	147	-298	84
1987	86	93	883	148	-301	83
1988	80	93	884	149	-303	82
1989	75	93	899	150	-306	81
1990	70	93	904	151	-308	80
1991	65	93	909	152	-311	79
1992	61	93	913	152	-311	79
1993	57	93	917	153	-313	78
1994	53	93	921	154	-316	78
1995	50	93	924	154	-316	78
1996-2003	47	93	927	155	-319	77

3. Net Effect of Changes in Market Rent:

	Net Effect	
	N=0.5	n=1
1974-75	0	0
1976-2003	+54	239

Table 36: FSDVM; El Pepeto Private Efficiency Costs

Year	Payments to FSDVM	Self-Help Construction	Mainte-nance	Water Meter	Earnings Lost (Mutal Help)	Total Cost
1975	0	0			117	117
1976	268	504				772
1977	239	191		95		525
1978	216	172	93			481
1979	205	160	93			458
1980	192	149	93			434
	180		93			273
	168		93			261
	157		93			250
	147		93			240
1985	137		93			230
	92		93			185
	86		93			179
	80		93			173
	75		93			168
1990	70		93			163
	65		93			158
	61		93			154
	57		93			150
	53		93			146
1995	50		93			143
			93			93
			93			93
			93			93
			93			93
2000			93			93
			93			93
			93			93
			93			93
2004			93			93

NPV of Costs = £2976
(Discounted at 12%)

Table 37: El Pepeto Private Efficiency Benefits and Net Benefits

Year	Rent	Consumer Surplus	Sale Value	Total Benefits	Total Costs	Net Benefits
1975	-	-		0	117	-117
1976	620 (465)	66(55)		686 (520)	772	-86 (-252)
1977	775 (700)	86 (82)		861 (782)	525	336 (257)
1978	930	137		1067	481	586
1979	930	137		1067	458	609
1980	930	137		1067	434	633
	930	137		1067	273	794
	930	137		1067	261	806
	930	137		1067	250	817
	930	137		1067	240	827
1985	930	137		1067	230	837
	930	137		1067	185	882
	930	137		1067	179	888
	930	137		1067	173	894
	930	137		1067	168	899
1990	930	137		1067	163	904
	930	137		1067	158	909
	930	137		1067	154	913
	930	137		1067	150	917
	930	137		1067	146	921
1995	930	137		1067	143	924
	930	137		1067	93	974
	930	137		1067	93	974
	930	137		1067	93	974
	930	137		1067	93	974
2000	930	137		1067	93	974
	930	137		1067	93	974
	930	137		1067	93	974
	930	137		1067	93	974
2004	930	137	7750	8817	93	8724

Note: For houses built through progressive development the benefit-cost ratios are very sensitive to the assumptions about the imputed rent during the period of upgrading. We have used two alternative assumptions: a high assumption where imputed rent is assumed to be 66% of final value during the first year and 83% during the second year. The figures for the low assumption are given in parenthesis in the tables. The estimated rates with the different assumptions are as follows:

	High assumption	Low assumption
IRR	129%	94%
NPV	5368	5157
NPV/Total cost	1.8038	1.73

2. CALCULATION OF COSTS AND BENEFITS FOR SERVICED LOTS IN THE FSDVM SAN JOSE DEL PINO PROJECT

30. The San Jose del Pino project consisted of 516 housing units in Santa Tecla, a surburb of the AMSS, by the FSDVM; 194 units were serviced lots, the remainder consisting of completed and semi-completed houses. The serviced lots, which are the ones analyzed now, consisted of a plot of land connected to water and sewerage with an individual sanitary unit. As in the case of the basic unit the dwellings were completed by the families, the self-help stage obviously involving more labor in this case.

31. The information on the part of the project carried out by FSDVM was supplied by the Fundacion's finance Department while the costs of the self-help stage were obtained through interviews with the families. The project started in 1972, with major costs being incurred during 1973-77 and with benefits increasing proportionally to the investments carried out in each year. Maintenance costs were estimated as 4% year of the construction costs.

32. The efficiency benefits include the imputed market rent (¢696), plus the additional consumer's surplus accruing to the project beneficiaries. The net benefit is estimated using equation 4 (para 2.35). The equivalent rent paid is ¢318, calculated with equations 1 to 3 (para 2.34). There was no information on the previous dwellings of the beneficiaries, and it was assumed that their housing consumption was similar to that of El Pepeto beneficiaries, r_o thus being taken as ¢215. The consumer's surplus, calculated as in equation 1 is then ¢213 per year.

The estimation of private costs and benefits

33. Only four cost categories were identified as there was no material loan program and no connection cost for water meters. The costs, which are presented in Table 42, are the following:

a) Monthly payments to the FSDVM. As these are fixed their real value declines.

b) Maintenance costs. Same as for public costs.

c) £1891 of self-help construction costs which are distributed over a 3 year period.

d) £250 of mutual help labor.

34. The three types of benefits, imputed rent, consumer surplus and sale value, are given in Table 43.

Table 38: SERVICED LOT: CALCULATION OF EFFICIENCY COSTS

Efficiency Costs				
Year	Item	1974c	Conversion Factor	Total
1972	Land	8	1.14	9
1973	Land	8	1.14	9
	Development	364	0.903	329
	Sanitary Unit	179	0.89	159
	Administrative Costs	33	0.934	31
	Mutual Help	125	0	0
				528
1974	Land	8	1.14	9
	Development	364	0.903	329
	Sanitary Unit	179	0.89	159
	Administrative Costs	33	0.934	31
	Mutual Help	125	0	0
				528
1975	Land	8	1.14	9
	Self-help	602	0.803	483
	M = 61%		0.945	492
	SL = 26%		0.87	
	SH = 13%		0	
1976	Land	8	1.14	9
	Selp-help	602	0.803	483
				492
1977	Land	8	1.14	9
	Selp-help	687	0.803	552
				561
1978-2001	Maintenance) per	88	0.803	71
	Land) year	8	1.14	9
				80

Table 39: SERVICED LOT: CACULATION OF EFFICIENCY BENEFITS

Year	Item	1974 c	CF	Total
1972-74	Imputed Rent	0	0.94	0
	Consumer's Surplus	0	0.94	0
1975	Imputed Rent	360	0.94	338
	Consumer's Surplus	68	0.94	64
				402
1976	Imputed Rent	504	0.94	474
	Consumer's Surplus	95	0.94	89
				563
1977	Imputed Rent	624	0.94	587
	Consumer's Surplus	117	0.94	110
				697
1978-2001	Imputed Rent	696	0.94	654
	Consumer's Surplus	131	0.94	123
				777

Table 40: SERVICED LOT: CALCULATION OF SOCIAL COSTS

Year	Item	1974 c	CF		Total	
			n=0.5	n=1	n=0.5	n=1
1972	Land	8	1.14	1.14	9	9
					9	9
1973-1974	Land	8	1.14	1.14	9	9
	Development	364	0.92	0.90	335	328
	Sanitary Unit	179	0.91	0.87	163	156
	Administrative Costs	33	0.934	0.934	31	31
	Mutual Help	125	0.51	0.52	64	66
					602	590
1975-76	Land	8	1.14	1.14	9	9
	Self Help	602	0.81	0.82	482	493
					491	502
1977	Land	8	1.14	1.14	9	9
	Self Help	687	0.81	0.82	482	653
					565	572
1978-2001 per year	Land	8	1.14	1.14	9	9
	Maintenance	88	0.81	0.82	71	72
					80	81

Table 41: SERVICED LOTS: CALCULATION OF SOCIAL BENEFITS

A = Efficiency Benefits

B = Increase in consumption and consumer's surplus

		Consumption		Total Effect	
1972-73	Payment	Absolute	Per Capita	n=0.5	n = 1
1974	72	-72	-15	42	25
1975	65	-240	-40	110	61
1976	57	-60	-10	28	17
1977	51	3	1	-3	-2
1978	45	703	116	-358	-266
1979	40	708	117	-361	-269
1980	36	712	117	-361	-269
1981	34	714	118	-364	-272
1982	32	716	118	-364	-272
1983	30	720	118	-364	-272
1984	28	722	119	-368	-275
1985	26	724	119	-368	-275
1986	24	725	119	-368	-275
1987	23	726	119	-371	-277
1988	21	727	120	-371	-277
1989	20	728	120	-371	-277
1990	19	729	120	-371	-277
1991	17	731	120	-371	-277
1992	16	732	121	-374	-280
1993	15	733	121	-374	-280
1994-2001	0	739	123	-381	-286

C = Social effect of change in market rent.

	n = 0.5	n = 1
1976-2007	c38	193

Table 42: FSDVM Serviced lot Private Efficiency Costs

Year	Payment to FSDVM	Maintenance	Self-Help Construction	Mutual Help Labor	Total Cost
1974	72			250	322
1975	65		602		667
1976	57		602		659
1977	51		687		738
1978	45	88			133
1979	40	88			128
1980	36	88			124
1981	34	88			122
1982	32	88			120
	30	88			118
	28	88			116
	26	88			114
	24	88			112
1987	23	88			111
	21	88			109
	20	88			108
	19	88			107
	17	88			105
1992	16	88			104
	15	88			103
	0	88			88
	0	88			88
	0	88			88
1997	0	88			88
	0	88			88
	0	88			88
	0	88			88
	0	88			88
2002	0	88			88
2003	0	88			88

Present value of costs
(Discounted at 12%) = c2617

Table 43: Serviced lot: Private Efficiency Benefits and Net Benefits

Year	Rent	Consumer Surplus	Sale Value	Total Benefits	Total Costs	Net Benefits
1974	0	0		0	322	-322
1975	360	68		428	667	-239
1976	504	95		599	659	-239
1977	624	117		741	738	+3
1978	696	131		827	133	+694
1979	696	131		827	128	699
1980	696	131		827	124	703
1981	696	131		827	122	705
1982	696	131		827	120	707
	696	131		827	118	709
	696	131		827	116	711
	696	131		827	114	713
	696	131		827	112	715
1987	696	131		827	111	716
	696	131		827	109	718
	696	131		827	108	719
	696	131		827	107	720
	696	131		827	105	722
1992	696	131		827	104	723
	696	131		827	103	724
	696	131		827	88	739
	696	131		827	88	739
	696	131		827	88	739
1997	696	131		827	88	739
	696	131		827	88	739
	696	131		827	88	739
	696	131		827	88	739
	696	131		827	88	739
2002	696	131		827	88	739
2003	696	131	5800	6627	88	6539

NPV of Benefits = c3635
NPV/Total Cost = 1.3890
IRR = 45%

3. CALCULATION OF COSTS AND BENEFITS FOR MULTI-FAMILY UNITS IN THE IVU AMATEPEC PROJECT

35. The Instituto de Vivienda Urbana carries out housing projects intended to alleviate the shortage of low-income housing, mostly in the AMSS. Some of these projects are carried out directly by IVU, but recently many projects have been given to private contractors.

36. In order to make the project dwellings affordable to low-income people, costs to the beneficiaries are kept low and the houses are subsidized at times. Payment is made through a down payment of 10% of the cost of the house plus a fixed monthly charge for twenty years. The interest rate charged, 7% per year, is significantly below the normal market interest rate for housing loans, which is about 10.5%.

37. The third phase of the Amatepec Project, which is the one analyzed here, involved the construction of 30 M-8, or apartment buildings with eight housing units each in Soyapango (AMSS) in 1977. The total number of dwellings built was 240. Information on costs was provided by IVU, while the imputed rent was estimated in the usual way, that is, through interviews and by comparing to similar housing in the market.

38. The costs and benefits were calculated, along with the relevant conversion factors, in the same way as those of the FSDVM's options. It is assumed that land was purchased in 1976 and that all the investment took place in 1977. Maintenance costs are calculated as 3% of building costs, 1% below those of the FSDVM's projects to allow for the better overall quality of the Amatepec housing as compared to that of the FSDVM's projects.

39. Imputed rents were the basis for the calculation of the project benefits. An average rent of ¢1350 (in 1974 colones) was imputed from the surveys carried out by the FSDVM. The conversion factor for high income

consumption is used because the average income of the beneficiaries is estimated at ¢650 per month (in 1976 colones).

40. The increase in the consumer's surplus was more difficult to estimate in this case because no information existed on the former dwellings of the beneficiaries. However, on the basis of the households budget survey it is estimated that the proportion of housing expenditure for the ¢600-900 monthly income bracket is about 10% of their income, that is, ¢615 per year (in 1974 colones). If the project dwelling is then taken as the measuring unit, the previous housing consumption was about 0.50. The equivalent rent charged for the dwelling is ¢825 per year (in 1974 colones). The increase in consumer's surplus is thus:

41. The social evaluation includes the efficiency benefits, the social value of the increase in consumption and the value of the changes in market rents.

42. The increase in consumption arising from the project housing is calculated as the difference between the imputed rent and the cost to the beneficiaries; the latter includes a down payment of 10% of the value of the house (calculated by IVU as ¢15000 in 1977) plus the payment to IVU and the maintenance costs. It is assumed that only half of the down payment is financed by reducing consumption, the rest being borrowed and re-paid in the two following years. The social value of this increase in consumption is shown in Table 47.

43. The change in market rent is calculated by assuming that the dwellings vacated by the project beneficiaries in the informal market are of better quality than those left behind by FSDVM's beneficiaries, given their higher income level. If their previous housing consumption as estimated in para. 2.33 is used, each dwelling should be assigned a value of 2.08 in terms of <u>meson</u> units. The total increase in the low-income housing stock would be

500. The social value can be then calculated using equation (10), resulting in a net social benefit of ₤150 for n = 0.5 and ₤670 for n = 1.

Private costs and benefits

44. Three types of costs were identified (see Table 48):

a) 10% deposit paid in the first year

b) Fixed monthly payments to IVU over a period of 20 years. The real value of the payments decreases over time.

c) Maintenance, which is considered to be a fixed sum (in real terms)

45. Table 49 presents the 3 types of benefits estimated for each housing option (imputed rent, consumer surplus and sale value).

Table 44: AMATEPEC EVALUATION - Efficiency Costs

Year	Item	1974 c	Conversion Factor	Total
1976	Land	22	1.14	25
1977	Land	22	1.14	25
	Development	2497	0.903	2255
	Construction	7070	0.885	6257
M = 67%			0.966	
SL = 25%			0.800	
UL = 13%			0.66	
	Water Meter	102	0.934	95
	Indirect Costs	2147	0.934	2005
				10638
1978	Land	22	1.14	25
	Maintenance	250	0.903	225
				250
2005	Land	22	1.14	25
	Maintenance	250	0.903	225
				250

Table 45: AMATEPEC EVALUATION - Efficiency Benefits

Year	Item	1974 c	Conversion Factor	Total
1976	Imputed Rent	0	0.89	0
	Consumer's Surplus	0	0.89	0
1977	IR	0	0.89	0
	CS	0	0.89	0
1978	IR	1350	0.89	1201
	CS	132	0.89	119
				1320
2005	IR	1350	0.89	1201
	CS	132	0.89	119
				1320

Table 46: AMATEPEC - SOCIAL COSTS

Year	Item	1974 c		Conversion Factor n = 0.5	Conversion Factor n = 1	Total n = 0.5	Total n = 1
1976	Land	22		1.14	1.14	25	25
1977	Land	22		1.14	1.14	25	25
	Development	2497		0.92	0.905	2297	2260
	Construction	7070		0.93	0.907	6568	6412
M = 62%			0.966		0.966		
SL = 25%			0.914		0.915		
UL = 13%			0.78		0.608		
	Water Meter	102		0.934	0.934	2005	2005
						10895	10702
1978	Maintenance	250		0.93	0.907	232	227
	Land	22		1.14	1.14	25	25
						257	252
2005	Maintenance	250		0.93	0.907	232	227
	Land	22		1.14	1.14	25	25
						257	252

Table 47: AMATEPEC - SOCIAL BENEFITS

1. Efficiency Benefits

2. Net effect of increased consumption

Year	Imputed Rent	Payment to IVU	Change in Consumption Absolute	Change in Consumption Per Capita	Total n = 0.5	Effect n = 1
1978	1482	1403	-198	-33	103	94
1979			146	27	-86	-82
1980			246	45	-162	-156
1981		678	581	97	-319	-311
1982		634	625	104	-342	-335
1983		593	666	111	-366	-359
1984		554	705	118	-390	-383
1985		517	742	124	-411	-405
1986		484	775	129	-428	-412
1987		452	807	135	-449	-444
1988		423	836	139	-462	-458
1989		395	864	144	-480	-476
1990		369	890	148	-494	-490
1991		345	914	152	-513	-508
1992		322	932	157	-526	-523
1993		301	958	160	-536	-534
1994		282	977	163	-547	-545
1995		263	996	166	-557	-556
1996		246	1013	168	-564	-563
1997		230	1029	171	-575	-575
1998-2007			1180	197	-668	-672

3. Social impact of change in market rents

Year	Total n = 0.5	Effect n = 1
1976-1977	0	0
1978-2007	150	670

Table 48: IVU - AMATEPEC - Appartments: Private Costs

	10% Deposit	Payment to IVU	Maintenance	Total Costs
1978	1403	828	250	2481
1979		774	250	1024
1980		724	250	976
1981		678	250	928
1982		634	250	884
		593	250	843
		554	250	804
		517	250	767
		484	250	734
1987		452	250	702
		423	250	673
		395	250	645
		369	250	619
		345	250	595
1992		322	250	572
		301	250	532
		263	250	513
		246	250	496
1997		230	250	480
		0	250	250
		0	250	250
		0	250	250
		0	250	250
2002		0	250	250
		0	250	250
		0	250	250
		0	250	250
		0	250	250
2007		0	250	250

Net present value (discounted at 12%) of costs = £8537

Table 49: FSDVM: San Jose Del Pino: Private Efficiency Benefits and Net Benefits

Year	Rent	Consumer Surplus	Sale Value	Total Benefits	Total Costs	Net Benefits
1978	1350	132		1482	2481	-999
1979	1350	132		1482	1024	+458
1980	1350	132		1482	974	508
1981	1350	132		1482	928	554
1982	1350	132		1482	884	598
	1350	132		1482	843	639
	1350	132		1482	804	676
	1350	132		1482	767	715
	1350	132		1482	734	748
1987	1350	132		1482	702	780
	1350	132		1482	673	809
	1350	132		1482	645	837
	1350	132		1482	619	863
	1350	132		1482	595	887
1992	1350	132		1482	572	910
	1350	132		1482	551	931
	1350	132		1482	532	950
	1350	132		1482	513	969
1997	1350	132		1482	496	986
	1350	132		1482	480	1232
	1350	132		1482	250	1232
	1350	132		1482	250	1232
	1350	132		1482	250	1232
2002	1350	132		1483	250	1232
	1350	132		1482	250	1232
	1350	132		1482	250	1232
	1350	132		1482	250	1232
2007	1350	132	11250	12732	250	12482

NPV of net benefits = £5254

NPV/Total costs = .6154

IRR = 54%

4. CALCULATION OF COSTS AND BENEFITS FOR SINGLE FAMILY UNITS IN THE IVU QUEZALTEPEQUE PROJECT

46. The project analyzed here is the third phase of a previous project carried out by IVU in Santa Tecla, in the AMSS; 86 single family units were built. Construction was carried out in 1977, but land is assumed to have been purchased in 1975 and partially developed in 1976 when the previous stages of the IVU project were built.

47. Land was already partially developed when purchased and, as no information was available on development costs, these were estimated by using the average cost of development per m^2 in several other FSDVM and IVU projects. The remaining costs were estimated as usual on the basis of the information provided by IVU. Maintenance is estimated as 3% of construction costs, as in the Amatepec project. Although the houses were already completed when sold, the beneficiaries carried out significant improvements, the costs of which is included as self-help.

48. Benefits consist of the usual imputed rent plus additional consumer's surplus. The imputed rent is ¢1113 (in 1974 colones). The additional consumer surplus is estimated by assuming that the initial housing expenditure is 10% of the total income, or ¢718. The equivalent rent of the price charged by IVU is ¢630. The additional consumer surplus is then ¢84 per year.

49. The social value of the increase in consumption accruing to the project beneficiaries is calculated by multiplying the annual increase in consumption by the corresponding distribution weights. The increase in consumption is calculated as the imputed rent plus the additional consumer

surplus, less the annual payment to IVU and the cost of maintenance and self help. The average income of the beneficaries is ¢760 per month (in 1976 colones). The original level of per capita consumption is thus taken as ¢1064 per month.

50. The social value of the impact on market rents is calculated as in the Amatepec case. The increase in low-income housing stock brought about per project dwelling is 2.4, and the social value is ¢173 when n = 0.5 and ¢745 for n = 1.

Private costs and benefits

51. Table 54 indicates the four types of private costs:

a) 10% downpayment made in the first year to IVU

b) Fixed payments to IVU over 20 years. The real value of these payments decreases.

c) Fixed (in real terms) maintenance cost.

d) ¢954 invested by the family in the first year to complete the house.

Table 50: QUEZALTEPEQUE EVALUATION - Efficiency Costs

Year	Item	1974¢	Conversion Factor		Total
1975	Land	14		1.14	16
1976	Land	14		1.14	16
	Development	619	633	0.903	560
1977	Land	14		1.14	16
	Development	725		0.903	655
	Construction	4298		0.908	3903
M = 71%			0.953		
SL = 19%			0.871		
UL = 10%			0.660		
	Other	1857		0.934	1734
	Water Meter	114	7008	0.934	106
					6414
1978	Land	14		1.14	16
	Self help	954	968	0.870	830
M = 75%			0.893		846
L = 25%			0.80		
1979	Land	14		1.14	16
	Maintenance	214	228	0.908	194
2004	Land	14		1.14	16
	Maintenance	214	228	0.908	194
					210

Table 51: QUEZALTEPEQUE EVALUATION - Efficiency Benefits

Year	Item	1974 c	Conversion Factor	Total
1976	Imputed Rent	0	0.89	0
	Consumer's Surplus	0	0.89	0
1978-2004	IR	1113	0.89	990
	CS	84		75
				1065

Table 52: QUEZALTEPEQUE - SOCIAL COSTS

Year	Item	1974 ¢	Conversion Factor n = 0.5	Conversion Factor n = 1	Total n = 0.5	Total n = 1
1975	Land	14		1.14	16	16
1976	Land	14		1.14	16	16
	Development	619	0.92	0.905	570	560
					586	576
1977	Land	14		1.14	16	16
	Development	725	0.92	0.905	667	656
	Construction	4298	0.928	0.911	3989	3915
M = 71%		0.953	0.953			
SL = 19%		0.914	0.915			
UL = 10%		0.78	0.608			
	Other	1857	0.934	0.934	1734	1734
	Water Meter	114	0.934	0.934	106	106
					6512	6427
1978	Land	14	1.14	1.14	16	16
	Self help	954	0.887	0.871	846	831
					862	847
1979	Land	14	1.14	1.14	16	16
	Maintenance	214	0.918	0.911	199	195
					215	211
2004	Land	14	1.14	1.14	16	16
	Maintenance	214	0.918	0.911	199	195
					215	211

Table 53: QUEZALTEPEQUE - SOCIAL BENEFITS

1. Efficiency Benefits (see Table 51)

2. I_1: Social value of increase in consumption

Year	Consumption Absolute	Consumption Per Capita	Total Value n = 0.5	Total Value n = 1
1975-77	0	0	0	0
1978	-133	-24	82	-230
1979	180	33	-118	-114
1980	260	47	-164	-170
1981	464	77	-271	-282
1982	499	83	-292	-305
1983	529	88	-310	-324
1984	559	93	-328	-343
1985	587	98	-346	-362
1986	613	102	-361	-378
1987	637	106	-375	-393
1988	660	110	-390	-409
1989	682	114	-404	-424
1990	701	117	-415	-436
1991	720	120	-426	-448
1992	737	123	-437	-460
1993	753	126	-442	-472
1994	768	128	-456	-479
1995	782	130	-463	-487
1996	795	133	-474	-499
1997	807	134	-478	-503
1998-2004	988	164	-589	-623

3. I_2: Social value of changes in low-income market rent.

	n = 0.5	n = 1
1978-2007	127	789

Table 54: IVU QUETZALTEPEQUE PRIVATE COSTS

	10% Deposit	Payment to IVU	Maintenance	Self-Help Construction	Total Costs
1978	829	783	214	954	2566
1979		719	214		933
1980		639	214		853
1981		435	214		649
1982		400	214		614
		370	214		584
		340	214		554
		312	214		526
		286	214		500
1987		262	214		476
		239	214		453
		217	214		431
		198	214		412
		179	214		393
1992		162	214		376
		146	214		360
		131	214		345
		117	214		331
		104	214		318
1997		92	214		306
		0	214		214
		0	214		214
		0	214		214
		0	214		214
2002		0	214		214
		0	214		214
		0	214		214
		0	214		214
		0	214		214
2007		0	214		214

Present value of costs
(discounted at 12%) = £7085

Table 55: QUETZALTEPEQUE PRIVATE BENEFITS AND NET BENEFITS

Year	Rent	Consumer Surplus	Sale Value	Total Benefits	Total Costs	Net Benefits
1978	1113	84		1197	2566	-1369
				1197	933	264
				1197	853	344
				1197	649	548
1982				1197	614	583
				1197	584	613
				1197	554	643
				1197	526	671
				1197	500	697
1987				1197	476	721
				1197	453	744
				1197	431	766
				1197	412	785
				1197	393	804
1992				1197	376	821
				1197	360	837
				1197	345	852
				1197	331	866
				1197	318	879
1997				1197	306	891
				1197	214	983
				1197	214	983
				1197	214	983
				1197	214	983
2002				1197	214	983
				1197	214	983
				1197	214	983
				1197	214	983
				1197	214	983
2007	1113	84	9275	10472	214	10258

NPV of Net Benefits = ¢4061

NPV/Total Costs = .5731

IRR = 35%

5. CALCULATION OF THE COSTS AND BENEFITS OF SQUATTER UPGRADING IN THE IVU

52. La Fosa is in the center of the AMSS, located on publicly-owned land of which almost one third is owned by IVU and the remainder is government land. Some 300 families live in the settlement. In 1973 IVU decided to rehabilitate part of the tugurio. The rehabilitation project affected 62 dwellings and included simple works of earthmoving, water and sewage connection and installation of a sanitary unit with shower and a wash basin.

53. The costs include development, construction of the sanitary unit by a contractor, and construction by self-help. The work by IVU was carried out in 1973, while it is assumed that self-help was carried out in 1974 and 1975. Given the relatively low quality of the dwellings, maintenance costs are estimated as 5% of total construction costs. Land is assigned a 0 value, since, as the families were already living there, it had no opportunity cost.

54. The efficiency benefits include the imputed rent (¢600 per year, in 1974 colones) plus the additional consumers' surplus. The average monthly payment to IVU is ¢11 (¢132 per year in 1974 colones). The equivalent rent charged is ¢325 per year.

55. The imputed rent of dwellings in the independent (non-project) sector of the tugurio is ¢360; if this is taken as the previous consumption level of the beneficiaries the additional consumer's surplus can be estimated as 1/2 (600 - 325) (1 - 0.60) = ¢55 per year.

56. The average monthly income per family is estimated as ¢398 in 1976 colones (¢313 in 1974 colones). The average family size is 6.6 members. The distribution weights applied to the efficiency benefits in order to arrive at the social benefits are calculated assuming that the original consumption before the project was the total income, that is, ¢506 per

capita and year. Distribution weights for discrete increases in consumption were applied to the second component of the benefits, I_1.

57. Since the beneficiaries were previously living in the same place, no changes take place in the low-income housing stock and therefore, the I_2 component has a 0 value. (The increase in stock arising from the qualitative improvement is disregarded in this case.)

Private costs and benefits

58. Table 60 identifies 3 types of private costs:

a) Payments to IVU which are fixed and hence decline in real terms.

b) C2038 of self-help invested by the families during the first two years of the project.

c) An annual maintenance cost

Table 61 gives the 3 usual types of benefits.

Table 56: LA FOSA - EFFICIENCY COSTS

Year	Item	1974¢	Conversion Factor		Total
1973	Land	0			
	Development	658		0.903	594
	Construction	454		0.841	382
	M 27%		0.94		
	SL 50%		0.87		
	UL 23%		0.66		
	Other	171		0.934	160
					1,036
1974	Self-help	1019		0.845	861
	M 74%		0.93		
	SL 18%		0.87		
	UL 8%		0		
1975	Self-help	1019		0.845	861
1976-2002 per year	Maintenace	160		0.845	135

Table 57: LA FOSA - EFFICIENCY BENEFITS

		1974£	CF	
1974	Imputed rent	325	0.94	305
	Consumers surplus	-	0.94	0
1975	Imputed rent	465	0.94	437
	Consumers surplus	27	0.94	25
				462
1976-200	Imputed rent	600	0.94	564
Per year	Consumers surplus	55	0.94	52
				616

Table 58: LA FOSA - SOCIAL COSTS

Year	Item	1974C	C Factor		Total	
1973	Development	658	0.92	0.90	605	592
	Construction	454	0.89	0.85	408	386
M = 27%			0.94	0.94		
SL = 50%			0.914	0.915		
UL = 23%			0.78	0.615		
	Other	171	0.934	0.934	160	160
					1,173	1,138
1974	Self-help	1019	0.847	0.847	863	863
M 74%			0.934	0.934		
SL 17%			0.914	0.915		
UL 9%			0	0		
1975	Self-help	1019	0.847	0.847	863	863
1976-2002	Maintenance Per year	160	0.847	0.847	136	136

Table 59: LA FOSA - SOCIAL BENEFITS

1. Efficiency Benefits

2. Increase in Consumption

Year	Payment to IVU	Consumption		Total Effect	
		Absolute	Per capita	n = 0.5	n = 1
1974	132	-826	-125	256	-147
75	119	-646	- 98	213	-76
76	104	301	46	-124	-34
77	94	401	61	-164	-50
78	85	410	62	-167	-52
79	79	422	64	-170	-54
80	73	429	65	-176	-56
81	66	432	66	-179	-58
82	63	436	67	-182	-59
83	59	440	67	-185	-61
84	55	444	68	-185	-61
85	51	447	68	-187	-62
86	48	450	68	-187	-62
87	45	453	69	-191	-63
88	42	456	69	-191	-63
89	39	458	69	-191	-63
90	37	461	70	-194	-65
91	34	463	70	-194	-65
92	32	465	70	-194	-65
93	30	467	71	-196	-66
94-2003		469	71	-196	-66

Table 60: IVU LA FOSA PRIVATE COSTS

Year	Payment to IVU	Self-Help	Maintenance	Total Costs
1974	132	1019		1151
75	119	1019		1138
76	104		160	264
77	94		160	254
78	85		160	245
79	79		160	239
80	73		160	233
81	68		160	228
82	63		160	223
83	59		160	219
84	55		160	215
85	51		160	211
86	48		160	208
87	45		160	205
88	42		160	202
89	39		160	199
90	37		160	197
91	34		160	194
92	32		160	192
93	30		160	190
94			160	160
95			160	160
96			160	160
97			160	160
98			160	160
99			160	160
2000			160	160
2001			160	160
2002			160	160
2003			160	160

PV of Costs = 3760

(discounted at 12%)

Table 61: IVU LA FOSA

Private Benefits and Net Benefits

Year	Imputed Rent	Consumer Surplus	Sale Price	Total Benefits	Total Costs	Net Benefits
1974	325			325	1151	-826
75	465	27		492	1138	-646
76	600	55		655	264	+391
77	600	55		655	254	401
78	600	55		655	245	410
79	600	55		655	239	416
80	600	55		655	233	422
	600	55		655	228	427
	600	55		655	223	432
	600	55		655	219	436
	600	55		655	215	440
85	600	55		655	211	444
	600	55		655	208	447
	600	55		655	205	450
	600	55		655	202	453
	600	55		655	199	456
90	600	55		655	197	458
	600	55		655	194	461
	600	55		655	192	463
	600	55		655	190	465
	600	55		655	188	467
95	600	55		655	160	495
	600	55		655	160	495
	600	55		655	160	495
	600	55		655	160	495
	600	55		655	160	495
2000	600	55		655	160	495
2001	600	55		655	160	495
2002	600	55		655	160	495
2003	600	55	5000	5655	160	495

NPV = 1857

12% discount

WBCR = 0.4939

IRR = 25%

6. CALCULATION OF COSTS AND BENEFITS FOR SINGLE FAMILY UNITS IN THE FONDO SOCIAL "SAN JOSE DE SOYAPANGO" PROJECT

59. The Fondo Social para la Vivienda (FSV) carries out its projects by buying houses built by private contractors and selling them to eligible families (who must be covered by the National Social Security Program) through a loan repaid in monthly payments at an interest rate varying with the income level of the borrower. FSV funds come from three different sources: i) about 8% are contributed by participant workers (0.5% of their salaries); ii) 78% of the funds are the contribution of the employers; consisting of 5% of the salaries of the participant workers; and iii) the public sector has contributed so far about 14% of the total funds.

60. The project discussed here is the San Jose de Soyapango project, which consisted in the construction of 277 single-family houses by private developers between 1975 and 1976; of these, 240 were purchased by the FSV in 1976 and sold to the beneficiaries in mid-1977. Information on costs was supplied by the FSV.

61. Rent was imputed in the usual way and amounted to ¢1243 per year (in 1974 colones). For the calculation of the additional consumer's surplus it was assumed that the previous housing consumption of the beneficiaries was 10% of their income. Average income is ¢868 (in 1976 colones) per family and month. The initial amount of housing consumed is then ¢820, while the amount consumed after the project is the imputed rent, ¢1243. The average equivalent rent charged per unit is ¢775. The additional consumer surplus, estimated using equations 1 to 3 is then ¢80 per year.

62. In the social evaluation it is estimated that beneficiaries save 15% of their income. Discrete distribution weights are used in the evaluation of the increase in consumption arising from the project and of the additional consumer's surplus. The initial consumption level is thus ¢1148 per capita and year. As in the IVU projects, 50% of the down payment is assumed to reduce consumption in the first year, and 25% in each of the following two years.

63. The increase in the housing stock in terms of meson units is 2.8 per new dwelling, that is, the ratio of the rent the beneficiaries were paying to the rent of the meson unit. The effect of changes in market rent is then calculated using equation 10, as ¢102 for n = 0.5 and ¢908 for n = 1.

64. The distributional impact of the Fund itself is not considered. There is a certain redistribution of income from high-income employers to the employees and also from the lower income employees to the beneficiaries (usually of higher income than the average contributor to the Fund). However, it would be meaningless to analyze the effect only from this point of view when no information exists on the side effects of the Ley del Fondo on global employment and other macroeconomic variables.

Private costs and benefits

65. Only two types of costs were identified (Table 67) because the project does not involve any self-help component or downpayment:

a) Fixed payments to the FSV over a 20 year period.

These decline in real terms.

b) Maintenance costs

66. Table 68 indicates the 3 usual types of benefits.

Table 62: FONDO SOCIAL - SAN JOSE PROJECT - EFFICIENCY COSTS

Year	Item	1974¢	Conversion Factor	Total
1974	Land	23	1:14	27
		2297	0.967	1991
				2018
	M 56%		0.933	
	SL 10%		0.871	
	UL 5%		0. 66	
	O 24%		0.934	
1975	Land	23	1. 14	27
	Construction	2297	0.867	1991
				2018
1976	Land	23	1. 14	27
	Construction	2297	0.867	1991
				2018
1977	Land	23	1.14	27
	Maintenance	104	0.867	90
				117
1978	Land	23	1.14	27
	Maintenance	207	0.867	180
				207
2003	Land	23	1.14	27
	Maintenance	207	0.867	180
				207

Table 63: FSV - EFFICIENCY BENEFITS

Year			Conversion Factor	Total
1974-1976	Imputed rent	0	0.89	
	Consumer Surplus	0	0.89	
1977	IR	622	0.89	553
	CS	40		36
				589
1978-2003	IR	1243		1106
	CS	80		72
				1178

Table 64: FSV - SOCIAL COSTS

Year	Item	1974 c	Conversion Factor n = 0.5	Conversion Factor n = 1	Total n = 0.5	Total n = 1
1974	Land	23	1.14	1.14	27	27
	Construction	2297	0.877	0.869	2014	1996
	N = 56%		0.933	0.933		
	SL = 10%		0.914	0.915		
	VL = 05%		0.78	0.615		
	O = 24%		0.934	0.934		
1975-76	Land	23	1.14	1.14	27	27
	Construction	2297	0.877	0.869	2014	1996
1977	Land	23	1.14	1.14		27
	Maintenance	104	0.877	0.869	91	90
1978-2003	Land	23	1.14	1.14	91	90
	Maintenance	207	0.877	0.869	182	180

Table 65: FSV - SOCIAL EFFECT OF INCREASED CONSUMPTION AND CONSUMER'S SURPLUS

	Increase in Consumption = Consumption		Imputed Rent - d_i		Payment W_i		- Maintenance Total Effect	
	Absolute	Per Capita	n=0.5	n=1	n=0.5	n=1	n=0.5	n=1
1977	-409	-75	0.82	0.57	0.41	0.32	262	272
1978	-59	-11	0.73	0.54	0.37	0.3	39	41
1979	137	25	0.73	0.53	0.37	0.3	-90	-95
1980	355	66	0.72	0.53	0.36	0.3	-35	-20
1981	389	72	0.72	0.53	0.36	0.3	-38	-22
1982	434	80	0.72	0.53	0.36	0.3	-42	-24
1983	474	88	0.72	0.53	0.36	0.3	-47	-26
1984	514	95	0.72	0.53	0.36	0.3	-50	-29
1985	550	102	0.72	0.53	0.36	0.3	-54	-31
1986	583	108	0.72	0.53	0.36	0.3	-57	-32
1987	616	114	0.72	0.52	0.36	0.29	-60	-33
1988	641	119	0.72	0.52	0.36	0.29	-63	-34
1989	673	125	0.72	0.52	0.36	0.29	-66	-36
1990	699	129	0.72	0.52	0.36	0.29	-68	-37
1991	723	134	0.72	0.52	0.36	0.29	-71	-39
1992	746	138	0.72	0.52	0.36	0.29	-73	-40
1993	767	142	0.72	0.51	0.36	0.29	-75	-41
1994	787	146	0.72	0.51	0.36	0.28	-77	-41
1995	805	149	0.72	0.51	0.36	0.28	-79	-42
1996	822	152	0.72	0.51	0.36	0.28	-81	-43
1997-2006	1069	198	0.71	0.51	0.35	0.28	-107	-55

Table 66: FSV - SOCIAL BENEFITS

1. Efficiency Benefits

2. I_1 = Increase in Consumption = Imputed Rent - Payment - Maintenance

		Consumption		Total Effect	
	Payment to FSV	Absolute	Per Capita	n=0.5	n=1
1977	934	-795	-147		
1978	838	133	25	- 81	- 85
1979	726	345	45	-146	-155
1980	654	317	59	-192	-205
1981	623	348	64	-208	-222
1982	581	390	72	-235	-251
1983	545	926	79	-258	-276
1984	509	462	86	-281	-301
1985	475	496	92	-302	-323
1986	445	526	97	-318	-341
1987	415	556	103	-338	-363
1988	388	583	108	-355	-382
1989	362	609	113	-372	-400
1990	338	633	117	-386	-415
1991	317	654	121	-399	-419
1992	296	675	125	-400	-444
1993	276	695	129	-426	-459
1994	258	713	132	-437	-470
1995	242	729	135	-441	-482
1996	226	745	138	-457	-493
1997-2006	0	971	180	-601	-652

3. I_2 = Social value of change or market rent

Year	n = 0.5	n = 1
1977-2006	102	908

Table 67: FSV - Private Costs

	Payment to FSV	Maintenance	Total
1977	934	104	1038
1978	838	207	1045
1979	780	207	987
1980	726	207	933
1981	674	207	881
	623	207	830
	581	207	788
	545	207	752
	509	207	716
1986	475	207	682
	445	207	652
	415	207	622
	388	207	595
	362	207	569
	338	207	545
	317	207	524
	296	207	503
	276	207	483
	258	207	465
1996	242	207	449
	0	207	207
	0	207	207
	0	207	207
	0	207	207
2001	0	207	207
	0	207	207
	0	207	207
	0	207	207
	0	207	207
2006	0	207	207

NPV (discounted at 12%)

of costs = £7007

Table 68: FSV - Private Benefits and Net Benefits

	Rent	Consumer Surplus	Sale Price	Total Benefits	Total Costs	Net Benefits
1977	622	40		662	1038	-376
1978	1243	80		1323	1045	278
1979	1243	80		1323	987	336
1980	1243	80		1323	933	390
1981	1243	80		1323	881	442
	1243	80		1323	830	493
	1243	80		1323	788	535
	1243	80		1323	752	571
	1243	80		1323	716	607
1986	1243	80		1323	682	641
	1243	80		1323	652	671
	1243	80		1323	622	701
	1243	80		1323	595	728
	1243	80		1323	569	754
1991	1243	80		1323	545	778
	1243	80		1323	524	799
	1243	80		1323	503	820
	1243	80		1323	483	840
	1243	80		1323	465	858
1996	1243	80		1323	449	874
	1243	80		1323	207	1116
	1243	80		1323	207	1116
	1243	80		1323	207	1116
	1243	80		1323	207	1116
2001	1243	80		1323	207	1116
	1243	80		1323	207	1116
	1243	80		1323	207	1116
	1243	80		1323	207	1116
	1243	80		1323	207	1116
2006	1243	80	10358	11681	207	11474

NPV of Benefits = ¢4655

NPV.Total Costs = .6643

IRR = 90%

7. CALCULATION OF THE COSTS AND BENEFITS OF A SQUATTER SETTLEMENT OF PRIVATE LAND

67. In order to arrive at the costs and benefits, interviews were carried out in a centrally located tugurio on private land.

68. It is not possible to have an accurate estimate for the cost of building the dwelling, since most families bought their house when they moved to the tugurio. The average price at which they bought the original house is converted to a border price assuming that the mix of labor and materials was the same as that of the costs incurred later. A 15% mark-up is assumed on the price of the dwelling bought, and therefore only 85% of the price is considered as cost. Although the data refer to different years our calculations are referred to 1974. The maintenance costs are taken as 10% per annum of the construction costs given the low-quality of the structure. Land is shadow-priced at the cost of the agricultural output loss.

69. Benefits consist of the imputed market rent. Since in this case there are no subsidies involved, the additional consumer's surplus is negligible.

70. The social benefits are calculated as the sum of the net efficiency benefits, B_E, I_1, (the social value of the increase in consumption accruing to the beneficiaries) and I_2, (the effect on low-income market rents). I_1 is calculated as the imputed rent less maintenance costs and the rent of the land, which is estimated as an annual payment of ¢64 (in 1974 colones). The result is a discrete increase in consumption from an initial level of ¢400 per capita and year. This increase is weighted by applying the corresponding distribution weights, and the total effect is shown in table 71.

Private costs and benefits

71. Table 72 gives the 3 types of private costs:

a) The purchase price of the house from the previous owner was estimated to be £380. This is 1.1765 times the price used in estimating public costs, as in that case the purchase price was discounted by 15% to eliminate the presumed profit charged by the previous owner over the price he had paid for materials and labor.

b) A maintenance cost. This is the same as for the public costs.

c) £288 invested in self-help construction during the first year.

72. Table 73 gives the 2 components of benefits.

Table 69: TUGURIO - EFFICIENCY COSTS

Year	Item	1974¢	Conversion Factor	Total
1974	Land	6	1.14	7
	Sanitation	19	0.934	18
	Previous Cost	330	0.92	304
	Self help	288	0.92	265
	M = 0.87		0.96	
	UL = 0.13		0.66	
				594
1975-2003	Land	6	1.14	7
Per Year	Maintenance	62	0.92	57
				68

Table 70: TUGURIO - EFFICIENCY BENEFITS

Year	1974£	Conversion Factor	Total
1975-2004	200	0.94	188

Social Costs

Year	Item	1974£	Conversion Factor n=0.5	Conversion Factor n=1	Total n=0.5	Total n=1
1974	Land	6	1.14	1.14	7	7
	Sanitation	19	0.934	0.934	18	18
	Previous house	330	0.94	0.91	310	300
	Self help	288	0.94	0.91	271	262
					606	587
	M = 0.87		0.96	0.96		
	UL = 0.134		0.78	0.61		
1975-2003	Land	6	1.14	1.14	7	7
Per Year	Maintenance	62	0.94	0.91	58	56

Table 71: TUGURIO - SOCIAL BENEFITS

1. Efficiency benefits

2. I_1: social value of increase in consumption

Year	£ Absolute	Per Capita	Total Effect n=0.5	n=1
1974	-536	-89	114	-272
1975-2003	72	12	-22	16

3. I_2: social value of changes in market rents.

	n=0.5	n=1
1975-2003	44	£314

Table 72: TUGURIO - Private Costs

	Purchase Price	Maintenance	Self-help	Total
1974	380	62	288	730
75		62		62
76		62		62
77		62		62
78		62		62
		62		62
		62		62
		62		62
		62		62
		62		62
83		62		62
		62		62
		62		62
		62		62
		62		62
		62		62
88		62		62
		62		62
		62		62
		62		62
		62		62
93		62		62
		62		62
		62		62
		62		62
		62		62
98		62		62
		62		62
		62		62
		62		62
		62		62
2003		62		62

NPV (Discounted at 12%)
of Costs = c1227

Table 73: TUGURIO - Private Benefits and Net Benefits

	Rent	Sale Price	Total Benefits	Total Cost	Net Benefits
1974	200		200	730	-530
75	200		200	62	138
76	200		200	62	138
77	200		200	62	138
78	200		200	62	138
79	200		200	62	138
80	200		200	62	138
81	200		200	62	138
82	200		200	62	138
83	200		200	62	138
84	200		200	62	138
85	200		200	62	138
86	200		200	62	138
87	200		200	62	138
88	200		200	62	138
89	200		200	62	138
90	200		200	62	138
91	200		200	62	138
92	200		200	62	138
93	200		200	62	138
94	200		200	62	138
95	200		200	62	138
96	200		200	62	138
97	200		200	62	138
98	200		200	62	138
99	200		200	62	138
2000	200		200	62	138
01	200		200	62	138
02	200		200	62	138
03	200	1666	1866	62	1804

NPV of Private Benefits = £639
NPV/Total Cost = .5205
IRR = 26%

8. CALCULATION OF COSTS AND BENEFITS IN AN EXTRA-LEGAL SUBDIVISION

73. The information on colonias ilegales comes partially from a study carried out by the FSDVM in 1975, "La Vivienda Popular en El Salvador", and partially from direct surveys done in 1978. Although a small proportion of the dwellings in the colonias (about 10%) are rented out, the alternative evaluated here is the owner occupied house in the illegal sub-division.

74. From the costs side, the average cost of building a house in the colonias is taken from the study La Vivienda Popular. The shares of the different elements in total costs are taken from the interviews, which also constitute the basis for the calculation on the corresponding conversion factors. Administrative costs consist of the salaries paid to people in charge of collecting the rents and the cost of maintaining the common areas in the colonias.

75. The benefits include the imputed rent on the dwellings plus the additional consumer's surplus. The imputed rent is ¢720 per year (in 1974 colones). The initial housing consumption is calculated as 10% of the beneficaries' income, or ¢356 per year. The equivalent rent of the dwelling is ¢608. The additional consumer's surplus of the house is ¢29 per year. Both benefit components are reduced in the first years of project life to reflect the unfinished condition of the dwelling.

76. The social costs are converted using the social parameters. The social benefits include the three usual components, as shown in Table 77. The increase in consumption is converted using the conversion factor for low income consumption, since the average income per family is below ¢600. The distribution weights are calculated for a marginal increase in consumption from an original level of consumtpion of ¢456 (in 1974 ¢).

77. I_2, the effect on market rents, is calculated using equatioin (10), where the increase in the housing stock is 1.2 per new dwelling. The total effect would depend on the number of lots in the colonias, the average of which is estimated as 304 lots per colonia. The total effect is ¢87 for n = 0.5 and ¢391 for n = 1.

78. An additional cost, also produced by the tugurios, is not considered in the evaluation although it might be important: the fact that these unplanned settlements spread over the urban area increases the costs of developing the site at a later stage, particularly where water supply and sewerage are concerned. It also hampers the possibility of rational, urban development by creating these settlements without facilities which are difficult to provide at a later stage. However, the colonias might well be one way whereby poor people get some minimum kind of housing in a country where rational economic planning is not feasible at this point in the light of the existing economic and social constraints.

Private costs and benefits

79. Table 78 gives the 5 types of private costs:

a) ¢200 which represents a 10% downpayment to be paid in the first year.

b) Fixed yearly payment to be made during the first 10 years at 10% interest. This declines in real terms.

c) ¢400 for service connections

d) ¢2412 invested by the family in materials and labor during the first 3 years.

e) A maintenance cost which begins in year 4.

80. Table 79 gives the 3 usual types of private benefits.

Impact of different financial terms on private benefit/cost indicators

81. Although the characteristics of the FDVM housing units and those of the colonia ilegal are often quite similar, FSDVM participants receive preferential loans well below the market rate. The difference in these loan terms makes the FSDVM considerably more attractive in private terms than the colonias. In order to control for different financial terms, an analysis was made to determine the impact of offering similar financial terms to colonia households to those offered to the FSDVM. The results of this analysis are given in Table 80, where estimations of benefit/cost ratios are given under 4 different sets of assumptions:

a) 6% loans repayable over a 20 year period. The family does not complete the construction for 3 years (the usual assumption)

b) 6% loans repayable over a 20 year period but with the construction being completed after one year. This assumption is included because access to financing may permit families to speed up the completion of their house.

c) 12% loans repayable over 20 years. 3 years required to complete the construction.

d) 12% loans repayable over 20 years. Construction completed in one year.

82. The estimations presented in Table 80 show that the IRR varies from a high of 35% under the assumption of 6% financing with completion of house in one year, to a low of 19.5% with the assumption of 12% financing and completion of the house in 3 years. The effect of financing can be seen to be extremely important as the IRR becomes 250% higher than under present conditions where families are only receiving partial financing (for the cost

of land only) which must be repaid over a 10 year period at about 10%.

83. Tables 81 and 82 present cost and benefit figures respectively for the most favorable situation (6% loan and completion of construction in 1 year). The tables for the calculations based on the other 3 sets of assumptions have not been included.

Table 74: COLONIA ILEGAL - EFFICIENCY COSTS

Year	Item	1974¢		Conversion Factor	Total
1	Land	7		1.14	8
	Design Development	122		0.87	106
	Connection to Electricity and Water	400		0.934	374
	Administrative Costs	80		0.88	70
	Self Help	1206	1815	0.84	1013
					1571
	M 65%			0.96	
	SL 25%			0.87	
	SH 10%			0	
2 - 3	Land	7		1.14	8
	Administrative	80	690	0.88	70
	Self Help	603		0.84	507
					585
4 - 30	Land	7		1.14	8
	Maintenance	96	183	0.84	81
	Administrative Costs	80		0.88	80
					169

Table 75: COLONIA ILEGAL - EFFICIENCY BENEFITS

Year	Benefit	Conversion Factor	Total
1	0	-	0
2	IR 500	0.94	470
	CS 20		19
3	IR 610		573
	CS 24		23
4 - 30	IR 720		677
	CS 29		27

Table 76: COLONIA ILEGAL - SOCIAL COSTS

Year	Item	1974¢	Conversion Factor		Total	
			n = 0.5	n = 1	n = 0.5	n = 1
1	Land	7	1.14	1.14	8	8
	Design	122	0.914	0.915	111	112
	Development	400	0.92	0.90	360	360
	Administrative Costs	80	0.92	0.91	74	73
	Self Help	1206	0.85	0.86	1025	1037
2 - 3	Land	7	1.14	1.14	8	8
	Administrative Costs	80	0.92	0.91	74	73
	Self Help	603	0.85	0.86	512	519
4 - 30	Land	7	1.14	1.14	8	8
	Maintenance	96	0.85	0.86	82	83
	Administrative Costs	80	0.92	0.91	74	73

Table 77: COLONIA ILEGAL - SOCIAL BENEFITS

1. - Efficiency benefits

2. - I_1 = social effect of changes in consumption

Year	Payment	Consumption		Total Effect	
		Absolute	Per Capita	Absolute	Per Capita
1	Downpayment 200	-1486	-288	214	-1531
	Monthly payment 400				
2	360	-329	- 55	116	-17
3	315	-263	- 44	34	- 9
4	284	371	82	-207	-70
5	250	405	67	-166	-50
6	222	433	72	-180	-57
7	200	455	76	-190	-62
8	190	465	78	-196	-65
9	178	477	80	-201	-67
10	167	488	81	-204	-69
11	156	499	83	-209	-72
12	145	510	85	-215	-75
13	136	519	87	-220	-77
14	127	528	88	-223	-80
15	119	536	89	-226	-80
16	111	544	91	-232	-84
17	104	551	92	-234	-85
18	97	558	93	-237	-87
19	90	565	94	-240	-88
20	85	570	95	-242	-89
21	79	576	96	-245	-91

3. - I_2 = social value of changes in rent

Year	Net Benefit	
	n = 0.5	n = 1
1	0	
2-32	87	391

Table 78: Colonia Ilegal. Private Efficiency Costs

	Down payment	Yearly Payment	Service Connections	Self-Help	Maintenance	Total Cost
1974	200	400	400	1206		2206
1975		360		603		963
1976		310		603		913
1977		276			96	372
1978		248			96	344
		231			96	327
		214			96	310
		200			96	296
		186			96	282
1983		173			96	269
					96	96
					96	96
					96	96
					96	96
1988					96	96
					96	96
					96	96
					96	96
					96	96
1993					96	96
					96	96
					96	96
					96	96
					96	96
1998					96	96
					96	96
					96	96
					96	96
					96	96
2003					96	96

NPV (discounted at 12%) of costs = £5223

Table 79: Colonia Ilegal. Private benefits and net benefits

	Rent	Consumer Surplus	Sale Price	Total Benefits	Total Costs	Net Benefits
1974	0	0		0	2206	-2206
1975	500	20		520	963	- 443
1976	610	24		634	913	- 279
1977	720	29		749	372	377
1978	720	29		749	344	405
1979	720	29		749	327	422
1980	720	29		749	310	439
1981	720	29		749	296	453
1982	720	29		749	282	467
1983	720	29		749	269	480
1984	720	29		749	96	653
1985	720	29		749	96	653
1986	720	29		749	96	653
1987	720	29		749	96	653
1988	720	29		749	96	653
1989	720	29		749	96	653
1990	720	29		749	96	653
1991	720	29		749	96	653
1992	720	29		749	96	653
1993	720	29		749	96	653
1994	720	29		749	96	653
1995	720	29		749	96	653
1996	720	29		749	96	653
1997	720	29		749	96	653
1998	720	29		749	96	653
1999	720	29		749	96	653
2000	720	29		749	96	653
2001	720	29		749	96	653
2002	720	29		749	96	653
2003	720	29	6000	6749	96	6653

NPV of Private benefits = ¢713
NPV/Total cost = .1365
IRR = 14%

TABLE 80: EFFECT ON BENEFIT/COST RATIO FOR COLONIA ILEGAL OF DIFFERENT FINANCIAL ARRANGEMENTS WITH 20 YEAR LOANS AT 6% AND 12%. PRIVATE ANALYSIS

Interest rate	Benefit/cost indicator	Number of years to complete house construction: 1 year	3 years
6%	IRR	35.25	32.25
	NPV	¢2968	¢2564
	NPV/COST	0.76	0.76
12%	IRR	20.95	19.65
	NPV	¢1548	¢1414
	NPV/COST	0.33	0.31
Present terms (10% interest repayable over 10 years)	IRR	14	
	NPV	¢713	
	NPV/COST	0.1365	

Note: In the previous analysis it was assumed that it would take about 3 years to complete the construction of the house. However, if complete financing can be obtained it might be possible for the family to complete the construction in one year and hence to increase the benefit flow in the early years. For this reason the table compares the effect on the indicators of assuming completion in one or three years.

TABLE 81: Adjusted for the Completion of a House in 1 Year Using a Loan of £870 for 20 years at 6% Interest Yearly.
COLONIA ILEGAL. Private Efficiency Costs

Year	Downpayment	6% Interest Yearly Payment	Service Connections	Maintenance	Total Costs
1974	200	425	400	-	1025
1975		380		96	476
1976		327		96	423
1977		291		96	387
1978		262		96	358
1979		244		96	340
1980		227		96	323
1981		211		96	307
1982		196		96	292
1983		182		96	278
1984		170		96	266
1985		158		96	254
1986		147		96	243
1987		136		96	232
1988		127		96	223
1989		118		96	214
1990		110		96	206
1991		102		96	198
1992		95		96	191
1993		88		96	184
1994				96	96
1995				96	96
				96	96
				96	96
				96	96
				96	96
2000				96	96
2001				96	96
2002				96	96
2003				96	96

PV of Costs = 3550.4

TABLE 82: COLONIA ILEGAL. PRIVATE BENEFITS AND NET BENEFITS

Year	Imputed Rent	Consumer Surplus	Sale Price	Total Benefits	Total Costs	Net Benefits
1974	0	0		0	1025	-1025
1975	720	29		749	476	273
1976	720	29		749	423	326
1977	720	29		749	387	362
1978	720	29		749	358	391
1979	720	29		749	340	409
1980	720	29		749	323	426
1981	720	29		749	307	442
1982	720	29		749	292	457
1983	720	29		749	278	471
1984	720	29		749	266	483
1985	720	29		749	254	495
1986	720	29		749	243	506
1987	720	29		749	232	517
1988	720	29		749	223	526
1989	720	29		749	214	535
1990	720	29		749	206	543
1991	720	29		749	198	551
1992	720	29		749	191	558
1993	720	29		749	184	565
1994	720	29		749	96	653
1995	720	29		749	96	653
1996	720	29		749	96	653
1995	720	29		749	96	653
1996	720	29		749	96	653
1997	720	29		749	96	653
1998	720	29		749	96	653
1999	720	29		749	96	653
2000	720	29		749	96	653
2001	720	29		749	96	653
2002	720	29		749	96	653
2003	720	29	6000	6749	96	6653

IRR = 35.25%

NPV = 2698.27

NPV/PV of Total Costs = 0.76

9. CALCULATION OF COSTS AND BENEFITS IN A TENEMENT (MESON)

84. The meson used for the estimation of costs and benefits of this informal housing market option was selected so that it could be considered as typical. It has 56 rooms with an average area of 12 m^2. It is relatively new (built in 1964), and subsequent improvements have been made.

85. The only information on construction costs was the price paid by the owner in 1964. It was assumed that the cost of land was 30% of the total costs. The general conversion factor for construction was used to find the efficiency costs. Operating costs, including maintenance, electricity, and garbage collection and administration costs are included because they are paid by the owner and not by the tenants and therefore reflected in the market price. The efficiency benefits are the market rents charged, averaging £320 per room per year. In addition to this there is the additional consumer's surplus generated through the decrease in rents resulting from the increase in the low-income housing stock. This is calculated as $\frac{1}{2} \Delta r . \Delta Q$ where $r = \frac{1}{2} Er_1 x \frac{\Delta Q}{Q}$.

The $cs = \frac{1}{2} Er_1$ where r_1 is the market rent before the project, Q is the low-income housing stock and E the elasticity of rents to changes in stock. The increase in stock resulting from the project is calculated as the number of rooms in the meson times the ratio of the rent per room to the average market rent of the meson unit. The total effect is almost negligible (£10 per year) due to the small size of the project as compared with the low-income housing stock.

86. The first element of social benefits is the efficiency benefits, calculated as explained above. The second component, I_1, (the changes in consumption brought about by the project) depends in this case on the project financing. It was assumed that 70% was financed through a mortgage, while the down payment was financed mostly by the owner's savings and only 20% of it represented a decrease in consumption. The marginal propensity to save, s_1 is taken as 20%. The owners are assumed to belong to income group 5 (over ¢1000 per month) and the corresponding distribution weights are calculated for the change in consumption, the initial consumption being ¢2900 per capita and year.

87. Finally, the change in rents brought about by the project is calculated using equation 10 plus the additional consumer's surplus, estimated as explained in para. 85. The social value is ¢4406 for n = 0.5 and ¢19,786 for n = 1. while the social value of the additional consumer surplus is ¢3 for n = 0.5 and ¢4 for n = 1.

Private costs and benefits

88. No estimate was made of private costs and benefits to the family renting the tenement room. Using the present methodology both costs and benefits would have been put equal to rent so the analysis would be meaningless.

Table 83: MESON - EFFICIENCY COSTS

Year	Item	1974£	Conversion Factor	Total
1	Land	150	1.14	171
	Construction	98000	0.903	88500
	Connection to water and electricity	2450	0.934	2280
				88951
2 - 30	Land	150	1.14	171
	Operating costs	2384	0.83	1970
				2141
Maintenance	13%	0.903		
VL	38%	0.66		
Other	49%	0.934		

Efficiency Benefits

Year		Conversion Factor	Total
1	0		
2 - 30	15000	0.89	13350

Table 84: MESON - SOCIAL COSTS

Year	Item	1974£	Conversion Factor		Total	
			n = 0.5	n = 1	n = 0.5	n = 1
1	Land	150	1.14	1.14	171	171
	Construction	98000	0.92	0.90	90160	88200
	Connection to water and electricity	2450	0.934	0.934	7288	7288
					92618	90659
2 - 30	Land	150	1.14	1.14	171	171
	Operating costs	2384	0.87	0.81	2074	1927
					2145	2098

Table 85: MESON - SOCIAL BENEFITS

1. - Efficiency benefits

2. - I_1 = social value of changes in consumption

Year	Payment	Consumption Absolute	Consumption per capita	Total Effect n = 0.5	Total Effect n = 1
1	11516	-11516	-1152	4242	4929
2	10514	1682	336	-1353	-1588
3	9107	2807	561	-2279	-2673
4	8203	3530	707	-2887	-3385
5	7229	4310	862	-3538	-4147
6	6426	4952	990	-4080	-4780
7	5703	5466	1093	-4519	-5292
8	5508	5686	1137	-4707	-5511
9	5140	5981	1196	-4960	-5806
10	4819	6238	1247	-5179	-6061
11	4500	6493	1299	-5402	-6322
12	4206	6728	1346	-5607	-6557
13	3934	6946	1389	-5791	-6772
14	3672	7155	1431	-5973	-6986
15	3432	7347	1469	-6137	-7177
16	3204	7530	1506	-6298	-7364
17	2996	7696	1539	-6442	-7532
18	2800	7853	1571	-6581	-7693
19	2617	7999	1600	-6707	-7840
20	2445	8137	1628	-6830	-7982
22 - 30	-	10092	2020	-8553	-9981

3. I_2 = social value of changes in market rent

Year	n = 0.5	n = 1
1 - 30	4406	19786

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