PN-AAV-091

45365

AN OVERVIEW OF FINANCIAL AND ECONOMIC ANALYSIS OF HOUSING PROJECTS

APRIL 1986

Prepared by

Robert R. Nathan Associates, Inc.

Prepared for

The Agency for International Development
Office of Housing and Urban Programs

TABLE OF CONTENTS

		Page
I.	INTRODUCTION	1
II.	CHARACTERISTICS OF THE HOUSING SECTOR	7
	Economic Importance of Housing	7
	Constraints to Housing Development	11
	Factors Causing a Lack of Effective Demand	12
	Factors Affecting Supply	15
III.	HOUSING SECTOR PERFORMANCE	17
	Overall Role of Housing Sector	19
	Performance of Housing as a Productive Sector	26
	Contribution to Growth	26
	Trade	28
	Employment Creation	30
	Other Considerations	33
	Resource Mobilization	34
	Evaluation of Housing as Related to the Financial Sector	34
	Participation of Housing in the Financial Market	36
	Formal vs. Informal Lending for Housing	36
	Evaluation of Housing as Social Service Sector	37
IV.	HOUSING PROJECT DESIGN	43
	Defining Minimum Acceptable Housing Standards	45
	Quantifying Housing Needs	46
	Assessment of the Existing Housing Stock	46
	Determination of Future Housing Needs	49

		Page
	Constraints Analysis	50
	Resources Survey	53
	Analysis of Project Opportunities	54
V.	FINANCIAL AND ECONOMIC ANALYSIS OF HOUSING PROJECTS	57
	Overview	57
	Financial-Economic Criteria for Accepting a Housing Project	58
	Elements of a Housing Financial-Economic Analysis	63
	Estimating Direct and Indirect Impacts on the National Economy	66
	Economic Analysis of Housing Project Components (Excluding Credit and Construction)	73
	Financial Viability of Housing Construction and Credit Activities	76
	Step 1. Identify and Estimate Project Costs and Sources of Funding	78
	Step 2. Disaggregate Project Cost into Local and Foreign Currency Components	86
	Step 3. Estimate Expected Sales Prices by Type of Unit	86
	Step 4. Estimate Target Households' Average Affordable Investment and Compare to Expected Sales Price of Alternative Units	88
	Step 5. Analyze Financial Cash Flow and Feasibility of Project from Viewpoint of a Private Developer	95
	Step 6. Analyze Financial Cash Flow and Feasibility of Project from Viewpoint of Private Banks	101

Page

Step 7. Analyze Financial Cash Flow and Feasibility of Project from Viewpoint of a National Housing Authority 107

Step 8. Analyze Financial Cash Flow and Feasibility of Project from Viewpoint of National and/or Local Government 117

Economic Feasibility of a Housing Project 118

Step 1. Identify Project Costs That Were Excluded from the Financial Analysis 120

Step 2. Eliminate Project Financial Costs that Do Not Involve the Use of Resources 129

Step 3. Adjust Project Costs for Economic or Shadow Prices 129

Step 4. Estimate Project Benefits Based on Imputed Rental Value of Constructed Housing Units 133

Step 5. Estimate Economic Rate of Return of Project 135

VI. USING THE ECONOMIC ANALYSIS AS A TOOL TO IMPROVE PROGRAMMING IN THE HOUSING SECTOR 137

What Can Economic Analysis Tell Us? 138

Using the Analysis to Improve Housing Project Design and Implementation 138

Making the Go - No Go Decision on a Project 138

Using the Analysis to Improve the Design 139

Using the Analysis in Implementation and Evaluation 140

Applying the Analysis to Support Housing Sector Programming 142

	Page
Gauging the Broader Applicability of the Project Approach	142
Using the Economic Analysis to Support the Policy Dialogue	143
BIBLIOGRAPHY	145
APPENDIX A	148

LIST OF TABLES

Table		Page
1.	Personal Consumption Expenditures in the United States, 1984	8
2.	Household Income and Percentage of Household Expenditure on Housing, Utilities, and Transport, Selected Cities, Various Years	20
3.	Global Mean Expenditure Shares, Urban Latin America	22
4.	Share of Housing in Expenditure of Each Income Quartile	22
5.	Comparison of National Income per Capita with Percentage of Household Expenditure on Housing, Selected Cities, Various Years	23
6.	Share of Total Housing Expenditures in Each Income Quartile	24
7.	Housing as a Share of Construction and Fixed Capital Formation	26
8.	Growth of the Construction Sector in Developing Countries	27
9.	Direct Employment in Construction	31
10.	Growth in Construction Employment Compared to Other Sectors	32
11.	Ratio of Non-Farm Mortgage Holdings to Lender's Total Assets in the United States	36
12.	AID Housing Guaranty Project: Summary of Project Costs and Sources of Funding	81
13.	Foreign and Local Currency Project Costs by Project Component	87
14.	Estimated Sales Price by Type of Unit	89
15.	Financial Cash Flow Analysis from Viewpoint of Private Developer	99

Table		Page
15a.	Financial Cash Flow Analysis from Viewpoint of Private Developer	100
16.	Financial Cash Flow Analysis from Viewpoint of Private Bank	103
16a.	Financial Cash Flow Analysis from Viewpoint of Private Bank	105
17.	Financial Cash Flow Analysis from Viewpoint of Housing Authority	109
17a.	Financial Cash Flow Analysis from Viewpoint of Housing Authority	113
18.	Financial Cash Flow Analysis from Viewpoint of National and Local Government	121
18a.	Financial Cash Flow Analysis from Viewpoint of National and Local Government	125
19.	Project Costs in Economic Prices by Project Component	132
20.	Economic Analysis of a Housing Project	136

LIST OF FIGURES

Figure		Page
1.	An Input-Output Table for the Mexican Economy, 1965	69
2.	Example of Inverted Input-Output Matrix Showing Direct and Indirect Effect of Expenditure by Sector	72

I. INTRODUCTION

This overview is intended to assist analysts in applying financial and economic methods to the task of project development in the housing sector. Project development is accomplished through a succession of stages that, in AID housing projects, generally includes an Urban Development Assessment (UDA), a Shelter Sector Assessment (SSA), a Housing Needs Assessment (HNA), a Project Identification Document (PID), and a Project Paper (PP). The methods outlined in this paper may be applicable to any of these stages, and indeed could be successively refined as project development moves forward. They can also be applied as aids in monitoring ongoing projects and in the evaluation of housing projects following project completion.

Naturally, some of the issues discussed in the guidelines are more relevant at one stage of project development than at another. Not all issues or analytical techniques will be important for all projects, and time, data, and other constraints may prohibit the detailed investigation of all the theoretically relevant issues.

The intention of the overview is to provide broad coverage of major economic and financial issues faced by project developers, but the limited scope of the overview

does not permit all issues and applicable techniques to be treated with equal thoroughness. In applying the concepts discussed in this document, analysts will need to be selective in assessing their relevance to the particular project they are working on and in consulting additional references on subjects not fully developed in the guidelines.

The overview focuses on two major topics: housing projects and the housing sector. AID housing projects are developed to finance and build shelter for low-income people in developing countries. Projects generally involve a determinate number of units or "solutions" and a specific commitment of financial and other inputs facilitated by AID. Housing projects generally also aim at the achievement of broader institutional, policy, and regulatory improvements, to foster autonomous development and more effective performance of the indigenous housing sector.

A reliable assessment of the indigenous housing sector, its performance, and the incentives and constraints that condition it, is an indispensable first step in good project design. The understanding provided by such an assessment not only is key to identifying and prescribing policy and institutional measures needed for development of the housing sector, but also is an important guide for identifying effective uses of AID project resources. The discussion of issues related to housing sector performance is therefore presented first. It is an issues-oriented discussion, intended to provide a broad understanding of the interactions of the housing sector with the rest of the economy, and guide project developers in identifying key development constraints. Methods for analyzing such constraints and

their remedies, such as interest rate policy and other regulations affecting the banking sector, are not explained in detail, though references are given where needed.

Chapter II briefly describes the major characteristics of the housing sector in developing countries, including its economic, social, financial, technological, institutional, and major policy dimensions. Chapter III focuses on the assessment of sectoral performance and the identification of constraints to sector development.

Building on this treatment of sector performance and constraints, the discussion of housing projects contained in Chapter IV broaches the topic of project design. The major steps and procedures for moving from a sector assessment to an initial project design, methods for estimating housing needs and affordability, and options that may be considered for addressing important sectoral development constraints are briefly outlined.

Following the preparation of an initial project design, the process of evaluating that design begins. This evaluation, discussed in Chapter V, emphasizes two major criteria: financial viability of the project for each of the groups expected to contribute to its implementation, and measurement of the economic value of the project as a whole. Such measurement is necessary to ensure that resources directed to the project are making a contribution to economic development that is at least comparable to that offered by alternative investment projects. The basic methodology proposed to measure financial viability and economic worth is cost-benefit analysis. Its application to the search for answers

to these two sets of questions is explained in some detail and with specific reference to housing projects. Sample data and calculations are provided to illustrate their use. We believe that these illustrations will demonstrate both the feasibility and usefulness of applying cost-benefit analysis to low-income housing projects. Guidance on the use of these methods in the developing country context is the principal output of these guidelines. Cost-effectiveness analysis, closely related to cost-benefit analysis and sometimes an acceptable substitute, is also briefly discussed.

We conclude this introduction with a few brief remarks on the proper use of financial and economic analysis in the process of housing project development. Too often, cost-benefit analysis is used merely to validate a particular design, rather than as a tool for evaluating alternative designs. As most economists would admit, in all but the most extreme cases, "acceptable" and plausible results can be generated by judiciously fine-tuning the assumptions. Data limitations generally force the analyst to work on the basis of estimates, forecasts, and assumptions, which makes this kind of manipulation a fairly easy matter.

Seriously and properly applied, however, cost-benefit analysis can be an immensely valuable tool in the creative process of perfecting a project design. Its functions are basically two:

- To help detect gross flaws in the initial project design that might otherwise be overlooked

- To contribute to better and more thorough project design that can increase the project's economic value by providing a framework to hold major assumptions constant, so that alternative designs can more easily be compared

Properly used, financial and economic analysis can measurably improve efficiency in the use of scarce development resources. While some additional data and estimation burdens are placed on the analyst, the necessary calculations are greatly facilitated by the availability of micro computers. The major challenge posed by the use of the methodologies described herein is to the creativity of project designers, and only secondarily to their stamina.

II. CHARACTERISTICS OF THE HOUSING SECTOR

The "housing sector" and problems related to housing are multifaceted, complex, and closely linked with many aspects of human aspiration and endeavor. Housing analysts recognize the impossibility of divorcing housing questions from their cultural, social, political, and even aesthetic dimensions. The purely economic importance of housing is, however, often insufficiently appreciated.

Economic Importance of Housing

Recent data from the U.S. economy, supported by developing country data presented in subsequent chapters, clearly demonstrate that the economic dimensions of housing are far from secondary in importance. Housing is a leading sector in both consumption and investment. It provides substantial employment, both direct and indirect, on a basis that is -- despite the sensitivity of housing to economic fluctuations -- about as stable as major manufacturing industries such as automobiles. And, of course, the link between housing and financial markets is all-important.

Table 1 presents recent figures for the United States on personal consumption expenditures and their relation to GNP. As shown, housing and shelter-related expenditures

Previous Page Blank

Table 1. Personal Consumption Expenditures in the United States, 1984

Expenditure category	Expenditure (billion $)	Percent of total expenditure	Percent of GNP
Housing[a]	397.8	17	11
Household operation[b]	164.1	7	4
Furniture and household equipment	117.1	5	3
Fuel oil and coal	21.3	1	1
Subtotal	700.3	30	19
Food	444.3	19	12
Motor vehicles and parts	149.5	6	4
Gasoline and oil	91.7	4	2
Transport	78.2	3	2
Subtotal	319.4	13	9
Medical care	227.4	10	6
Clothing and shoes	140.3	6	4
Other services	298.1	13	8
Other nondurables	160.7	7	4
Other durables	51.8	2	1
Total, personal consumption expenditures	2,342.3	100	64

a. Includes imputed rent on owner-occupied housing.
b. Includes electricity, gas, and other.
Source: Economic Report of the President, 1985.

in 1984 accounted for 30 percent of personal consumption expenditures and almost 20 percent of GNP. Taken together, such expenses far outrank all other major consumption categories for U.S. families, including food, transportation, health care, and clothing. Even in developing countries, where food is usually the largest budget item, housing-related expenditures typically absorb 25-30 percent of household outlays.

In 1984, residential investment in the United States, at $154.4 billion, also accounted for 27 percent of total fixed investment, by far the largest share of any single industry group. Since 1970, real residential investment in the United States has grown at an annual rate of 2.0 percent, compared with growth rates of 3.0 and 1.0 percent for real GNP and for population, respectively. Although residential construction is a volatile activity, it shares this characteristic with many manufacturing industries, and, for that matter, agricultural export commodities. Over the last business cycle, housing starts fell 47 percent between 1978 and 1982, followed by a 63 percent expansion through 1984. Over the same period, auto production in the United States first fell by 35 percent and then expanded by 51 percent.

Housing finance is, of course, also a major component of mature financial systems. Non-commercial mortgage debt outstanding at the end of 1983 in the United States amounted to $1,365.6 billion. This was equivalent to 24 percent of the total assets of U.S. financial institutions and to about 40 percent of total private domestic debt outstanding. In developing countries, housing finance is often insufficiently developed and can be a major bottleneck for the

expansion of the housing sector, particularly as regards the production of low-cost housing. This is a topic to which we return later.

A strong case can be made for development assistance to the housing sector -- broadly viewed as including housing production and other activities linked to it, including finance and the building materials industry -- on purely economic grounds:

- Housing, like food, satisfies a basic human need.
- It provides employment and income, both direct and indirect, in magnitudes comparable to those of most manufacturing industries.
- Output and employment can be about as stable as those of many manufacturing industries, differing only in that production is not undertaken at a fixed location.
- It has the added advantages over industry of requiring relatively few skills of new entrants and little in the way of imported raw materials, machinery, or intermediate inputs.

<u>So long as housing output is matched by effective demand that is not generated by unusual or unsustainable subsidies, there is no reason to consider housing as any less developmentally sound than any other sector -- transportation, agriculture, or the assembly of household appliances</u>. Individual projects in any of these sectors can be economic or non-economic (meaning that they can or cannot compete at the margin with other investment projects in contributing to growth and development) depending on their design. The challenge, for all such sectors, lies in designing economically justifiable projects.

Admittedly, the design of economically justifiable low-income housing projects in developing countries is particularly demanding. This is because of the prevalence of constraints that restrict effective demand, restrict supply, and/or increase the costs of low-income housing in these countries. These constraints can be of an economic nature (low and poorly distributed national income), or may involve technological gaps or institutional deficiencies of various kinds. Very often, such constraints arise from overly restrictive or otherwise inappropriate government policies and regulations.

Also, low-income housing markets in developing countries are heterogeneous and complex. A variety of tenure arrangements can be found in LDCs, such as renting a room, renting a complete unit, owning a structure built on an untitled plot (squatting), owning a structure but holding a lease on the site, owning both the structure and the land but subletting parts of it, or owning and occupying the unit and the land. Each such arrangement may involve a formal or informal market of some kind, and varying degrees of government intervention and control. Financial systems, formal and informal, may be available to support one form of tenure but not others, with government regulation again playing an important role. On the supply side, a wide range of production arrangements may also exist -- family self-help, communal systems, landlords and housing companies, private contractors, developers, and government -- with regulatory and financial features peculiar to each.

Constraints to Housing Development

Despite this complexity, government programs and donor assistance to the housing sector should be based on a firm

understanding of why the sector is not performing adequately, rather than on a preconceived notion of what the assistance program should include. Consequently, the first step in developing a housing program should be an analysis of the sector to identify the constraints that are preventing the market from effectively meeting the nation's housing needs. This analysis may be as simple or complex as the time and availability of resources dictate, but it should examine all of the following:

- Lack of effective demand for housing, in total or among a particular target population
- Availability of financing for construction or home purchases
- Availability of inputs permitting the supply of housing on a cost-effective basis
- Access to sites for housing

This analysis is critical if the project sponsors are to target their assistance effectively. If government policies make housing investments unprofitable, for example, then simply improving the availability of investment funds for housing is unlikely to appreciably expand the supply.

Factors Causing a Lack of Effective Demand

Household Income

The primary cause of insufficient effective demand is, of course, low income. While this problem clearly lies outside the scope of those responsible for the housing sector, low incomes are the single most important barrier

between people and adequate housing. If society is unwilling to accept the consequences of poverty for housing quality, and unable to increase incomes in the short run, then the most direct way to improve housing is to provide income subsidies to the poor. Such lump-sum or in-kind transfers are widely used in developed countries, including the United States, with generally positive results, but this may be an unaffordably expensive solution.

Regulatory Factors

Where incomes are sufficiently high to provide an adequate standard of housing (however determined), but the market is failing to provide it, the analyst should look for problems such as the following:

- Rent controls that prevent housing owners from earning a fair return on their investment, promote deterioration of existing housing, or restrict effective mobility in the housing market

- Technical standards, such as building codes, that are set at unrealistically high levels, so that builders are prevented from improving the housing stock at a price affordable to the consumer

Availability of Financing

Expansion of the housing stock generally requires that loan financing be available for both the builder and the home buyer (who may be the same in the case of rental housing or improvements to existing housing). An examination of housing finance should address the following questions:

- Do formal institutions exist (banks, savings and loans, building societies) to finance housing construction?

- Are there specialized lending institutions for housing finance?

- Are both public and private sector lenders active in the housing market?

- How is the informal housing sector currently financed (money-lenders, savings, etc.)?

- Is there an equity market or capital market permitting builders to assemble the equity portion of their total investment?

- Are real and nominal interest rates in the housing sector in line with those in other sectors and with the economic rate of return to investment in the society?

- Are existing lending institutions active in the housing sector (to what extent? If not, why not?)

- Do collateral requirements and other regulations pose a barrier to builder finance?

- Is default a major problem in the financial market for construction, and do adequate procedures (e.g., foreclosure) exist to protect the lender and the borrower?

- Are macroeconomic conditions conducive to long-term investments?

- Are there banking regulations or other policies that make it difficult for financial institutions to operate in the housing sector?

- Is there an established real estate market such that the values of property can be readily determined and buyers, sellers, and lenders each have ready access to the market?

The answers to these questions, which may be obtained by interviewing people involved in the housing market or by more formal surveys of the financial institutions, should provide a good overview of the housing finance situation and the need for intervention in construction credit, if any.

Factors Affecting Supply

Availability of Inputs

Housing generally uses few, if any, imported materials and is relatively labor-intensive. Nonetheless, housing construction may be severely disrupted by the lack of labor with skills in particular construction trades (e.g., electricians) or a shortage of critical inputs (e.g., wiring, plumbing supplies), even if the total value contributed by these inputs is relatively low. The analyst should therefore determine whether there are shortages in key building materials or skill areas, the cause of such shortages, and the market's response (e.g., use of alternatives, development of a black market).

Lack of access to improved building technologies may also pose a constraint to expansion of housing, especially for low-income residents. Introduction of improved designs or construction methods may then be an effective means of expanding the supply of housing at a given price.

Access to Sites

Housing is relatively intensive in its use of land. In some situations, the lack of sites for housing construction has become a serious barrier to expansion of housing.

Although multi-story dwellings may be built on existing sites, international evidence indicates that multi-story buildings cost considerably more per family unit than single-story buildings.

From a policy perspective, however, analysis of the situation may reveal that the lack of sites is not the result of an absolute shortage of land but is instead due to factors that may be addressed by the government or the donors. These include:

- Inadequate or outdated land laws that leave titles unclear or inhibit transfer of title
- Zoning regulations that unjustifiably prevent housing from being constructed in particular locations or limit the types of housing that can be built
- Lack of infrastructure (roads, power, water) that raises the cost of housing construction to the builder or reduces demand
- Lack of social services (schools, markets, public transport) that restricts demand for housing in an otherwise acceptable location

Housing is unique in that the value of the good is determined in part by the location in which it is produced. Although it does not necessarily cost more to build in the central city than in the rural areas (excluding the cost of the land itself), the rental income and sale value of the resulting dwelling are generally many times higher in urban areas. The lack of suitable building sites in relatively less desirable locations may thus effectively constrain the supply of low-cost housing, and by opening up such sites, the government may remove a major barrier to private construction of housing for low-income residents.

III. HOUSING SECTOR PERFORMANCE

This chapter presents a condensed approach to constructing a profile of the housing sector in a particular country, with the aim of assisting the analyst to place development of that sector in the context of the national economy. This approach provides a workable alternative to a full-scale housing sector analysis, in the event that such an analysis is not available and cannot be performed as part of the design effort, but it by no means replaces such an in-depth review as a guide to planning and programming in the sector. The performance profile is based on four steps, which together provide both a static appraisal of the housing sector as it currently exists and an assessment of its dynamic role as a source of national development and economic growth:

- Determination of the current role of the housing sector in the economy
- Evaluation of housing as productive sector
- Evaluation of housing as related to the financial sector
- Evaluation of housing as a social service sector

Each of these perspectives is equally valid and useful in understanding the housing sector. In the past, a narrow

perspective of housing as a social service sector has clouded assessment of potential assistance programs in the sector. In particular, there has been a tendency within AID and other donor agencies to confuse housing as a consumption good with the housing industry's role as a productive sector. This confusion has led to an overemphasis on the benefits to consumers of housing, in particular poor households, relative to increasing the income of the producers of housing; that is, the construction and finance industries (including construction workers).

The situation may be compared to that in the agricultural sector, where a long-standing debate continues as to whether consumer perspectives, particularly related to nutrition, should be given more weight relative to producer perspectives, focusing especially on small farmer income and employment. Both perspectives clearly have validity, and neither can be permitted to exclude the other if a complete understanding of sectoral issues is to be reached. The approach used here includes elements from each of these perspectives, to provide the analyst with a complete, if abbreviated, view of the sector.

An overview of sectoral performance in each of the four areas outlined above may be obtained by comparing the nation's housing sector to those of other nations at a similar stage of development and by constructing various ratios that enable the analyst to measure the housing sector against other elements of the national economy. Throughout this section, we have provided tables summarizing the performance of a range of countries in each of these respects, to serve as a standard of comparison against which individual country housing sectors may be measured.

Overall Role of the Housing Sector

Along with food, housing is usually one of the largest items in the household budget. Table 2 presents the pattern of expenditure for housing and related services in countries with a wide range of economic conditions. Table 3 summarizes overall expenditure patterns drawing on data from Latin America.

Within a given country, the share of income spent on housing varies with economic status. Typically, housing expenditures are highest among the very poor (as a share of total expenditures), but are generally fairly constant in the remainder of the population. This pattern is illustrated in Tables 4 and 5, which provide data on housing expenditures relative to income in a variety of countries.

In absolute terms, however, total expenditure on housing is highest in the upper income groups. Typically, the top 25 percent of households account for roughly half of total expenditures on housing. This pattern is shown in Table 6.

The demand for housing is slightly elastic with respect to total expenditure income (that is, housing expenditures rise as a percentage of total expenditure as income rises) but inelastic with respect to total income (because savings increase relative to consumption expenditures as incomes rise). Income elasticities for housing have been estimated at around 0.9 for lower-income countries in Latin America and around 0.7 for higher-income countries, while expenditure elasticities have been estimated in the range of 1.1-1.2. In other words, a 10 percent increase in total

Table 2. Household Income and Percentage of Household Expenditure on Housing, Utilities, and Transport, Selected Cities, Various Years

Country, city, and year	Monthly household income (U.S. dollars)	Percentage of expenditure		
		Housing	Utilities[a]	Transport
Colombia: Bogota, 1972	0.0 - 23.8	59.3[b]	6.8	4.9[c]
	23.9 - 47.6	24.1	3.3	3.9
	47.7 - 71.4	23.1	3.5	5.3
	71.5 - 95.2	21.9	2.7	2.8
	95.3 -142.8	22.7	2.8	3.7
	142.9 -238.1	26.6	3.0	4.0
	238.2 -809.5	24.4	1.9	5.2
	809.6 and over	22.0	1.5	12.9
Hong Kong, 1973	80.8 -303.0	19.8[b]	3.1	4.0
	303.1 -606.7	18.4	2.7	4.9
India: Bombay, Calcutta, Delhi, and Madras, 1964	0.0 - 2.70	6.2[d]	n.a.	1.2
	2.71- 3.10	2.5	n.a.	0.6
	3.11- 3.75	2.8	n.a.	1.3
	3.76- 4.38	4.3	n.a.	1.9
	4.39- 5.00	3.4	n.a.	2.0
	5.01- 5.84	3.7	n.a.	1.4
	5.85- 7.09	5.2	n.a.	1.9
	7.10- 8.97	5.8	n.a.	3.1
	8.98- 11.47	5.3	n.a.	3.1
	11.48- 15.64	5.0	n.a.	2.9
	15.65 and over	7.6	n.a.	5.6
Kenya: Nairobi, 1968	0.0 - 28.0	46.0	n.a.	n.a.
	28.1 - 42.0	22.0	n.a.	n.a.
	42.1 - 70.0	15.0	n.a.	n.a.
	70.1 -140.0	12.5	n.a.	n.a.
	140.1 -280.0	18.5	n.a.	n.a.
	280.1 and over	15.0	n.a.	n.a.

(Continued)

Table 2. (Continued)

Country, city, and year	Monthly household income (U.S. dollars)	Percentage of expenditure		
		Housing	Utili-ties	Trans-port
Korea: all cities, 1970	0.0 - 44.4	18.1[b]	10.6	3.6[c]
	44.5 - 74.0	16.5	8.6	4.6
	74.1 -103.7	16.9	6.8	4.7
	103.8 -133.3	17.3	5.7	4.4
	133.4 -162.9	18.2	5.4	5.0
	163.0 -192.6	18.2	5.0	4.3
	192.7 and over	19.6	4.7	5.6

Note: n.a. = Not available.

a. Includes fuel and electricity.

b. Private housing.

c. Purchase and use of transport services and personal equipment.

d. Includes rent and expenditure on repair and maintenance; excludes land purchase.

Source: Grimes, p. 68. Sources of data as cited in original document: Colombia, Departmento Administrativo Nacional de Estadisticas (Bogota, 1972, Hong Kong, Hong Kong Census and Statistics Department, 1973/74 Household Expenditure Survey; India, Government of India, The National Sample Survey, 19th Round, July 1964-June 1965: Tables with Notes on Consumer Expenditure (New Delhi: Cabinet Secretariat, 1971); Kenya, Urban Household Expenditure Survey 1968-69; Korea, Annual Report on the Family Income and Expenditure Survey (Seoul; Economic Planning Board, 1970, 1970).

Table 3. Global Mean Expenditure Shares, Urban Latin America (Percent of total expenditure)

Spending category: location	Food	Housing and maintenance	Furnishings and operations	Clothing	Other
Colombia					
Bogota	39.3	25.2	7.0	8.8	19.7
Total Urban	42.7	23.5	6.7	7.7	19.4
Chile (Santiago)	34.0	26.2	10.2	12.7	16.9
Ecuador					
Quito	34.4	33.7	7.2	9.7	15.0
Total Urban	38.1	30.4	7.6	8.3	15.6
Peru (Lima)	33.7	23.7	12.3	8.6	21.7

Source: Musgrove, pp. 128-129.

Table 4. Share of Housing in Expenditure of Each Income Quartile (Percent)

	Income quartile			
Location	First (lowest)	Second	Third	Fourth (highest)
Bogota, Colombia	21.6	25.6	27.5	26.1
Santiago, Chile	23.9	24.6	27.0	29.3
Lima, Peru	16.1	17.3	20.8	26.0
Quito, Ecuador	19.2	20.9	26.4	38.2

Source: Musgrove, pp. 295-304.

Table 5. Comparison of National Income per Capita with Percentage of Household Expenditure on Housing, Selected Cities, Various Years

Country and city[a]	Year	National income per capita, 1970 (U.S. dollars)	Average percentage of household expenditure on housing
Hong Kong		970	
Hong Kong	1973		15.1
Singapore		920	
Singapore	1973		19.5[b]
Mexico		670	
Mexico City	1973		20.0[c]
Jamaica		670	
Kingston	1963-64		11.7[d]
Korea		n.i.	
All cities	1972		18.5
Seoul	1972		20.1
Philippines		210	
All cities	1971		12.5
Manila[e]	1971		18.0
India		110	
Calcutta	1971		15.0[f]
Zaire		90	
Kinshasa	1970		13.5
Bukavu	1971		13.5
Kinsangani	1972		11.9

Note: n.i. = Not included in source document.

a. In descending order of national income per capita.

b. Rentals in Housing Board flats, including utilities, as percentage of household income.

c. Rough average of rent or amortization as percentage of household income for low to middle-income families.

d. Working-class urban households.

e. Metropolitan area.

f. Rent and taxes paid as a percentage of household income for low-income families with total incomes up to US$300 a year.

Source: Grimes, p. 67.

Table 6. Share of Total Housing Expenditures in Each Income Quartile

(Percent)

City and country	Income Quartile			
	First (lowest)	Second	Third	Fourth (highest)
Bogota, Colombia	7.9	16.0	24.0	52.0
Santiago, Chile	9.7	14.2	23.0	53.1
Lima, Peru	8.6	12.1	22.1	57.6
Quito, Ecuador	3.4	7.3	17.6	72.2

Source: Musgrove, pp. 305-318.

income would cause housing expenditures to increase by 7-9 percent, while a 10 percent rise in expenditures would typically result in hosuing expenditures 11-12 percent higher than the previous level (the difference being due primarily to increases in savings relative to expenditure as income rises).

Examining cross-country data, it appears that there is a tendency for housing expenditures to increase as a share of total expenditures as national income increases, mirroring the pattern for individual household expenditures in a given economy. This may be due as much to the relative decline of expenditures on food as national incomes rise as to an increase in housing expenditures. Cross-country comparisons do not always provide a reliable indicator of the future evolution of an individual country, but this finding nonetheless suggests that housing retains its importance as economic development proceeds.

The relationship between housing expenditures and other consumer decisions in developing countries (or in developed

countries, for that matter) is poorly understood. It may be hypothesized, however, that high prices for housing discourage private savings, both because they reduce income available after basic family needs have been met and because investment in housing is itself one of the most important vehicles for private saving and investment, and such investments are discouraged by high housing prices.

Ownership of a home affects the family economy in a variety of ways. Home ownership is a hedge against inflation, a store of value for the family, a capital asset against which it may borrow for investment or consumption, as well as a consumer durable providing a stream of shelter services over time. Where the home is a primary location for productive activity, as it is in many small-scale enterprises, the home makes up a significant share of the capital assets of the entrepreneur as well.

To judge the role of housing in national income and investment, it is useful to construct a series of ratios and compare these to similar statistics from other countries. In general, construction, including housing, is a significant investment activity in economies at all stages of development, although it ranks well behind agriculture, industry, and (usually) government as a source of total income. Table 7 illustrates the importance of construction and housing in national investment in a range of countries.

As these data indicate, residential construction makes up about one-third of all construction in developing countries and 15 to 25 percent of gross fixed capital formation. Thus it is a significant element in national production and investment, though not a dominant factor in either.

Table 7. Housing as a Share of Construction and Fixed Capital Formation

Country	Residential construction	Other construction	Fixed capital formation	Construction	K-Form	GNP	Capital (dollars)
	----(millions of local currency)----			----(percent)----			
Bolivia	1,359.00	2,407.00	8,830.00	.36	.15	.03	13.90
Botswana	12.90	39.90	79.10	.24	.16	.05	25.33
Cameroon[a]	29.90	29.40	119.70	.50	.25	.05	18.53
Ecuador	3,637.00	9,528.00	27,204.00	.28	.13	.03	20.59
El Salvador	88.00	257.00	968.00	.26	.09	.02	8.49
Ethiopia	217.10	165.00	579.70	.57	.37	.04	3.81
Honduras	79.00	163.00	456.00	.33	.17	.04	12.53
India[a]	18.65	53.47	131.08	.26	.14	.03	3.76
Jordan	24.20	36.40	87.90	.40	.28	.09	39.52
Kenya	42.47	88.56	242.54	.32	.18	.04	8.62
Korea[a]	445.00	917.00	2,544.00	.33	.17	.04	26.07
Philippines	4,033.00	7,681.00	27,800.00	.34	.15	.04	13.02
Tanzania	408.00	1,165.00	3,540.00	.26	.12	.02	3.58
Thailand	7,718.00	18,247.00	68,830.00	.30	.11	.03	9.04

a. In billions of local currency unit.
Sources: Residential Construction, Fixed Capital Formation, and Total Construction: UN Yearbook of National Accounts Statistics, 1978. GNP and population: UN Statistical Yearbook, 1979/80.

Performance of Housing as a Productive Sector

Contribution to Growth

As a growth sector, construction lies in an intermediate position between manufacturing and agriculture, the two main sources of income and growth in developing economies. Over the 1960-77 period, the construction sector grew at an average annual rate of growth of 7.1 percent in the world's developing market economies taken as a whole, compared to agriculture's 2.8 percent and manufacturing's 7.6 percent.

It thus grew more than twice as rapidly as total GDP during the period, which expanded at an average rate of 3.5 percent. Comparison of individual country experience during the period is shown in Table 8.

Table 8. Growth of the Construction Sector in Developing Countries (average annual rate of increase at constant prices)

Region	1960-65		1965-70		1970-75	
	GDP	Const.	GDP	Const.	GDP	Const.
Africa (excluding South Africa)	5.0	1.6	5.9	6.3	5.0	12.5
Latin America and Caribbean	5.2	2.7	6.3	9.1	7.0	7.9
Asia and the Middle East	7.8	9.3	8.0	6.0	9.0	11.0

Source: UN Yearbook of National Accounts Statistics, 1978.

Little information exists that would permit a comparison of housing construction with other construction in terms of the capacity for growth and contribution to national income. The pattern of economic expansion suggests, however, that housing will play a slowly diminishing role in total construction as the economy grows, because housing appears to be income-inelastic (that is, demand for housing will grow less rapidly than total income) and because other types of construction (factories, office buildings) naturally assume greater importance as non-farm production rises. By contrast, housing construction logically plays a greater role in countries characterized by rapid population growth, small and stagnant industrial sectors, and a high rate of urbanization, i.e., the countries with the greatest need for assistance.

Trade

Construction activity is by and large neutral with respect to its impact on trade. Particularly at the lower end of the technology spectrum, construction relies heavily on local labor and indigenously produced materials. Thus, expansion of construction is well-suited to situations where increased reliance on local factors of production (labor, credit, etc.) is desired for economic or political reasons. Improvements in construction technology and construction of higher-value dwellings and other buildings are generally associated with an increase in the import component of construction, which is often interpreted as an argument in favor of low-cost construction methods and emphasis on construction for the lower end of the income scale.

By its nature, the housing industry uses imports, usually in modest quantities, and does not generate exports; thus housing does not directly contribute to improving the balance of payments and, in general, its impact on trade is neutral. As such, it may be quite attractive relative to other types of investment that, especially in the early years, may have a large negative impact on the trade balance.

Housing's impact on the balance of payments depends, however, on how it is financed. If construction is financed by borrowing abroad, its negative effect may become a factor deserving attention. To the extent that investment in housing displaces other investments with a more positive (or negative) impact on the balance of payments, it may be argued that housing investments worsen (or improve) a nation's balance of payments position. This is stretching

the argument a bit too far, however, since it is rarely possible to identify a clear connection between housing and the displacement of other investments, either positive or negative.

The labor-intensive aspect of the construction industry, relative at least to other industries, is reflected in a somewhat more favorable impact on the balance of payments, because the expenditure pattern of construction workers favors low-priced goods and services produced in the country over more expensive imports. This relationship lies behind housing's high income multiplier, relative to other investments in other sectors.

Although housing itself cannot be exported, the housing industry may lead to export expansion indirectly through a variety of mechanisms. Construction labor, especially in the building trades, is rapidly becoming an international commodity, with labor services accounting for a large share of export earnings in the Middle East, and South and East Asia.

Some countries, such as Korea, have succeeded in exporting the services of their construction industries, competing successfully with indigenous construction firms in both developed and developing countries. Korean exports of construction services increased 16,000 percent between 1971 and 1978, growing from a level equivalent to less than 1 percent of manufactured exports in 1971 to nearly 17 percent in 1978. Thus, individual and corporate capacity developed in the domestic construction industry has been translated into a source of export earnings. In addition, an expansion of housing construction expands the market for construction

materials, such as ceramic tile, and for furniture and other products for which there is considerable export potential.

It is difficult to say whether other countries will be able to duplicate the Korean experience. There are signs that the construction industry in India, for example, is moving into international markets, but this pattern will probably remain an exception, rather than a model that many others can follow.

Employment Creation

The labor-intensive character of construction translates into a high level of job creation per unit of investment. Insufficient information exists to permit cross-country comparisons on this issue, but studies completed in individual countries suggest that housing ranks favorably relative to other sectors in job creation. A detailed examination of construction and employment in Mexico,[1] for example, found that construction ranked sixth among 15 industrial sectors in man-years of work generated per million pesos invested, taking into consideration both direct and indirect effects, while another study[2] found that in Colombia, a total of eight jobs were created for every $10,000 invested in housing (1979 prices), or about $1,250 per job.

Construction as a whole supplied approximately 10 percent of jobs in developing countries in 1976. Data on

---

1. Araud, Boon, Urguidi and Strassman, Studies on Employment in the Mexican Housing Industry, OECD, 1973.
2. Grimes, p. 32.

employment in housing construction as such are generally not available, but it may be expected that residential construction accounts for a somewhat higher percentage of construction employment than implied by its share in the value of construction output, since housing tends to be more labor-intensive than other forms of construction. Tables 9 and 10 present data on housing employment as a share of total employment and as a source of growth in the job market.

Construction is not, of course, the only source of jobs in the housing sector. Residential construction also generates demand for construction materials, furnishings, and related goods and services that are translated into jobs throughout the manufacturing and service sectors. Little quantitative information is available on the number of indirect jobs created by the housing sector outside of construction. In his review of housing issues, Grimes comments (p. 32) that studies in a number of countries have estimated income multipliers for housing construction of

Table 9. Direct Employment in Construction (Percent of civilian labor force)

	1963	1970
Egypt	4.6	2.5
Cuba	8.0	17.5[a]
Kenya	n.a.	4.8
Korea	2.5	2.9
Panama	3.5	5.5
Philippines	3.0	3.1[a]
Uganda	n.a.	15.2
Zambia	n.a.	18.5

Note: n.a. = Data not available.
Source: ILO Yearbook, 1972.

Table 10. Growth in Construction Employment Compared to Other Sectors (1970 employment as a percent of 1963 employment)

	Construction	All non-agricultural	Manu-facturing	Total
Cameroon	155.6	134.1	320.0	138.3
Egypt	107.1[a]	122.4	122.7[a]	120.0
El Salvador	121.5	124.9	121.2	n.a.
Korea	144.6	162.2	215.6	120.5
Philippines	118.8	110.1	109.2	113.1
Tanzania	188.7	143.4	198.4	107.6
Uganda	181.6	156.7	200.2	140.8
Zambia	224.9	166.5	n.a.	154.2

Note: n.a. = Data not available.
a. 1969.
Source: ILO Yearbook, 1972.

around two. That is, a given expenditure on housing will ultimately generate an increase in national production and income approximately twice as large, or, in very rough terms, one housing-related job is indirectly created for every construction job, assuming that the non-construction industries are, on average, as labor-intensive as housing construction.

There is no reason to expect that the income multiplier for housing is necessarily two in all countries and situations, regardless of the type of construction or local economic conditions. It is clearly preferable to use an income multiplier based on analysis of the local economy, rather than applying a "rule of thumb" that rests on a very limited number of analyses. <u>If, however, no local study is available, a multiplier of two may be used as a rough estimate, provided that the results are treated with the caution and skepticisim that they deserve</u>.

Other Considerations

Each sector has positive and negative aspects as a "growth pole" that are hard to quantify but are nonetheless important in determining whether public support and investment in the sector are warranted. Housing's main advantage (and also its main disadvantage) is the high degree of responsiveness to macroeconomic stimulation. Housing starts and other housing-related investments are highly sensitive to interest rates and therefore respond rapidly to Keynesian measures to increase aggregate demand (such as deficit spending) and monetarist measures that rely on increases in the supply of money to fuel expansion. Thus, measures to stimulate housing are reflected in an increase in jobs and economic activity more quickly than efforts to stimulate other sectors. Moreover, housing's high income multiplier and high labor intensity translate into a rapid increase in demand for related industries and a quick flow of resources into the economy from construction workers' earnings. For these reasons, Keynes advocated housing stimulation as a means of countering short-term recession.

The negative side of this, of course, is that housing contracts rapidly in periods of economic slowdown. Housing starts, construction jobs, and so on, decline during hard times as readily as they expand during good ones. Thus production in the housing sector tends to fluctuate more than in most other sectors.

A second advantage of housing as a growth sector is that it is highly dispersed geographically. It is not concentrated in the primary city nor is it limited to major

urban areas alone. In many countries with rising income, casual inspection suggests that housing investment is greater in the rural areas and secondary cities, especially if rent controls and other restrictions inhibit investment in the main urban areas.

Housing investment also plays an important role in decentralization of development through the impact of housing availability on individual decisions to move to a new area. A lack of adequate, affordable housing can be a major deterrent to attracting workers to areas of expanding economic opportunity.

Resource Mobilization

The role of the housing sector in mobilizing financial resources for investment is discussed in the following section. Housing can also play a role in mobilizing underutilized labor resources. Access to home ownership has been informally linked to greater investment of family time in housing improvement, i.e., in the formation of residential capital. Improvement of the home provides one of the only channels available to the individual for transforming his or her labor into a permanent asset, when avenues for wage employment and other enterprises have been exhausted. Such personal investment in the housing stock is believed to be substantial but is extremely hard to quantify.

Evaluation of Housing as Related to the Financial Sector

While it can be argued that the desire (and opportunity) to own a house is a powerful incentive for

individual savings, it is difficult to determine what effect, if any, an expansion in the availability of housing, or a drop in its price, has on aggregate savings behavior. It is equally difficult to determine what impact the expansion of housing finance institutions, as distinct from other financial intermediaries, has on the availability of funds for investment or the cost of administering such funds.

Private savings are clearly an important source of investment capital in both the developed and developing world, although information on the distribution of savings between individuals and other entities (government, corporations) is scarce in developing countries. It has been estimated that individual savings channeled through financial institutions accounted for approximately one-quarter of the net investment in India in 1960, for example. Total savings by households were equivalent to one-third of gross capital formation in 1960, and rose to one-half of gross capital formation in 1970.[1]

There is very little information on the influence of housing market conditions on private savings behavior. While it may be hypothesized that individual savings are encouraged by the existence of a mortgage market that enables individuals to finance the purchase of residential property, there is no formal evidence to support or disprove this hypothesis, whether in developed or developing countries. Indeed, efforts to quantify the link between individual savings and the interest rate (or other measures of return) have generally been inconclusive.

---

1. UN Yearbook of National Account Statistics, 1978.

Participation of Housing in the Financial Market

Lending for housing constitutes a major share of the portfolio of formal lending institutions, including both specialized mortgage lenders (e.g., savings and loans and public housing banks) and non-specialized lenders (e.g., commercial banks and life-insurance companies). Table 11 shows how the share of non-farm mortgages (on both housing and commercial property) in total assets has varied over time in the United States.

Table 11. Ratio of Non-Farm Mortgage Holdings to Lender's Total Assets in the United States (percent)

Year	Mutual savings banks	Commercial banks	Life insurance companies	Savings & loan banks
1920	46.5	4.8	16.0	74.3
1925	52.4	7.5	24.0	90.8
1930	57.3	7.7	29.3	85.7
1935	45.5	5.9	18.5	63.1
1940	40.5	5.4	16.5	75.8
1945	24.6	2.6	13.1	62.5
1950	36.7	7.5	23.1	81.3

Source: Morton, 1956, p. 55.

Overall, non-farm mortgages rose in the United States from 28 percent of total private debt in 1920 to 53 percent in 1950. They thus constitute the core of the banking system's holdings.

Formal vs. Informal Lending for Housing

As development of the financial market proceeds, the proportion of total mortgage lending that is held in formal

intermediary institutions increases. Figure 1 shows how the roles of the main mortgage lenders in residential mortgages have evolved over time in the United States. Whereas non-institutional lending accounted for over half of all mortgage finance at the turn of the century, by 1950 it had declined to around 15 percent, replaced by a mixture of institutional lenders.

This same pattern of evolution in the capital market takes place in developing countries. As the economy develops, capital markets become increasingly formalized, so that both savings and investment funds are channeled through intermediary organizations rather than handled through individual transactions. This process of intermediation serves to reduce the cost of loan funds while increasing the security and return to investors and thus expands the availability of loan funds for economic growth and expansion. Little work has been done on the role of housing loan portfolios in the development of this process, but it is reasonable to expect that mortgage lending assists intermediary institutions in building up their total assets, achieving economies of scale in loan management, and generally in reaching maturity as financial institutions.

Evaluation of Housing as a Social Service Sector

Assessing the performance of the housing sector clearly goes beyond income and employment generation, or its contributions to motivating savings behavior and the development of financial markets. These are important factors that have frequently been underemphasized in the past, but the satisfaction of a basic human need at an acceptable level remains the primary concern of housing project developers.

Housing involves much more than a collection of structures. Environmental conditions effecting human health; access to community service facilities such as schools, libraries, parks, playing fields, clinics, churches, markets, fire and police departments; as well as access to income-producing opportunities are all aspects that need to be evaluated in assessing the ability of the housing sector to perform the full range of its social functions.

In rapidly growing urban areas of many developing countries, the failure of the housing sector to adequately provide for the full range of human needs is a major cause for international concern. Health conditions in many low-income urban areas -- aggrevated by overcrowding, a lack of drainage, potable water or sewage facilities of any kind -- are viewed by many as unacceptable. Few if any community services are available to the residents of such areas, contributing to illiteracy, criminality and other social problems. Job opportunities in the immediate vicinity of such neighborhoods are scarce, and it is not unusual to find people having to walk for hours to their places of daily employment because of the lack or costliness of transport services. Such conditions obviously and urgently need to be addressed.

These problems cannot be attributed entirely to poor housing, of course. Indeed, the difficulty of drawing a clear and quantifiable link between housing and social problems raises a serious barrier for estimation of the social costs and benefits of housing. Unlike the effects of poor nutrition, which are readily measured in terms of human

health and quality of life, the effects of poor housing are difficult to determine with precision.

Equally problematic is the determination of a minimum standard for housing that is acceptable to society. Again, the comparison to nutrition is instructive. We can determine a minimum daily requirement for protein, calories, and a host of vitamins, but what is the minimum daily requirement for a roof?

It is not possible, therefore, to formulate a general prescription for addressing inadequacies in the performance of housing as a social service sector. General elements of an approach can be identified, however, and these include, most importantly, the following:

- Developing a set of standards that are not only acceptable in the sense of basic human needs, but achievable within the resource constraints of the particular country context
- Identifying the policy and regulatory constraints that inhibit private sector production of housing that meets human needs at an acceptable standard
- Demonstrating the validity of policy and regulatory reform and private-sector-led approaches through the formulation and implementation of viable interventions in the housing sector, in the form of projects, reform programs, or other actions by the public and private sector

Realistically, many countries (and their governments) lack the resources to provide their entire population with housing that meets a standard that can be considered adequate, no matter how modestly this standard is set. These

same countries often lack as well the capacity to meet the population's requirement for food, but to date the international community has proven relatively more successful in filling the nutritional gap through food aid and international loans. The housing gap simply does not generate the visible and politically powerful impact of malnutrition.

It is thus critically important for housing planners to examine and reexamine the minimum standards set for housing, not to raise them but instead to seek ways of lowering them, to reduce the cost of the minimal unit to a level where the national goal becomes attainable in a realistic time frame (e.g., twenty years).

If national planners, political leaders, and donors cannot agree on an attainable goal, against which current performance and future progress can be measured, then the evaluation of the housing sector's performance in delivering social services must be measured against current and past performance. The following questions provide a rough checklist for such measurement of housing sector performance:

- Is the percentage of the population living in unacceptable housing (however defined) rising or falling?
- Is the housing stock (however measured) growing more or less rapidly than the population? Than national income?
- Is the total population living in housing lacking critical amenities (clean water, sanitary facilities, etc.) rising or falling?
- Is the average distance travelled to work increasing or decreasing for lower income population groups?

- Is the space per person or per family rising or falling, especially for the lower 25 percent of the population by income?

- Is the number of persons per room rising or falling, again with special reference to low income groups?

- Is the percentage of the total housing stock (or the absolute number of units) with comparatively undesirable characteristics (e.g., dirt floors, thatched roofs)?

- Is the percentage of low-income families' expenditure absorbed by rent rising or falling?

- Is the percentage of national expenditure on housing that is directed at low-income housing rising or falling?

IV. HOUSING PROJECT DESIGN

Following an assessment of housing sector performance, the development of an initial project design generally requires further efforts in five main areas:

- The definition of minimally acceptable housing standards
- The quantification of housing needs in relation to those standards
- An analysis of constraints impeding the satisfaction of needs through the market
- A survey of available physical, human, institutional, financial, and technical resources
- The identification and analysis of opportunities for overcoming constraints and leveraging available resources through project intervention

These elements are obviously closely interrelated. Resource availability, for example, could and should influence the definition of housing construction standards. The adequacy and suitability of available resources is clearly also a function of the magnitude of estimated needs. Constraints to market development include, prominently, the affordability of alternative housing solutions, which is in turn influenced by the housing standards that are in effect.

Previous Page Blank

A number of approaches have been developed by AID and others to assess housing needs and compare alternative strategies for meeting the housing deficit. The Housing Needs Assessment Model, developed by Robert R. Nathan Associates and the Urban Institute, provides a method for integrating available information on the housing stock, demographic changes, and investment to obtain an estimate of the future need for housing. PADCO and others have developed the PADCO/Bertaud Model to assist in matching housing construction costs to the ability to pay of beneficiaries and government housing authorities. The Urban Institute is currently working on an expansion of the housing needs assessment model, the Housing Finance Strategy Methodology, which will improve the model's ability to incorporate alternative modes of financing into the comparison of housing strategies. The Country Risk Analysis methodology developed by Booz Allen may also be helpful, assisting the analyst to identify factors likely to affect the country's capital markets in the future and to assess other risk factors affecting the project. These methods are well documented in previous reports of the housing office and other sources included in the Bibliography and, consequently, need not be discussed further here.

As the housing project design moves toward selection of a specific intervention, alternatives must be identified and measured to determine their fit with existing constraints, resources, and opportunities, as well as their impact on housing needs. Many initial project ideas can be dropped without formal analysis. As the number of potentially viable alternatives is gradually reduced, formalized methods of project analysis are increasingly brought to bear as an aid to the designers' judgment.

The basic parameters that guide the project designer through this process are briefly described below.

Defining Minimum Acceptable Housing Standards

Appropriate definitions of the minimum acceptable housing standards will vary according to cultural preferences and regional and climatic conditions. Normally, these standards consider the type of housing construction materials used, the type and accessibility of sanitary sewage disposal, and the availability of a sanitary water supply and electricity. It is very likely that an analyst may have to formulate varying definitions of minimum acceptable housing standards for different regions of a country (such as highland vs. lowlands) or for different areas (such as metropolitan, secondary cities, or rural).

Where the target beneficiaries are in the lowest income strata, it is often more useful to try to define a maximum affordable standard, rather than a minimum standard. Experience indicates that government leaders and planners have a great deal of difficulty defining a minimum standard that is realistic, given the availability of funds to the government and the beneficiaries themselves and the number of households in the beneficiary group. As a result, the minimum standard loses its meaning, because only a fraction of the beneficiary group can be brought to this level, while large numbers remain in housing far below the official minimum. Although analysts have made considerable progress in bringing the minimum standard of publicly assisted housing down to earth, and therefore increasing the number

of families that can be brought up to this level, the search for ways to reduce the cost per beneficiary must continue.

Climatic conditions most likely would affect the minimum standard for construction materials and the type of construction. In tropical lowlands, simple houses built from materials such as bamboo with thatched roofs might be adequate to provide shelter, whereas in chilly highlands, better insulated, more permanent structures of concrete or adobe may be required. Similarly, minimum housing standards for sanitary sewage disposal may vary among areas. In densely populated metropolitan areas, a rather sophisticated piped sewage system may be necessary for health reasons, while latrines or septic tanks may be adequate for other areas.

In terms of water supply, minimum acceptable standards may vary from piped water inside the housing unit (although this is rarely affordable) to an outside faucet, a communal well or cistern, or access to a clean stream. In determining the minimum acceptable standard, the analyst should be most concerned with sanitary and health considerations, rather than esthetics or the level of services that would be desirable, if resources were unconstrained.

Quantifying Housing Needs

Assessment of the Existing Housing Stock

In many countries, information on the characteristics of the existing housing stock is compiled in a periodic census of population and housing. The reliability of these

data, however, varies greatly across countries and, within countries, between income groups, rural and urban areas, and so on. In many countries, data are not available at all or are too suspect to be used as a basis for analysis.

If official, economy-wide data are unavailable or unreliable, the analyst may be able to find a relatively reliable study of a particular region. Such a study can be used to adjust national figures (by comparing the official estimate for the same region to that in the more reliable study) or to project conditions on a larger scale, although both of these approaches are risky if the analyst has no means to judge whether the region studied is typical.

If available, data from at least the two most recent censuses should be reviewed and analyzed, if possible, by the regional and sector disaggregations for which definitions of minimum acceptable housing standards were defined. These data should provide information on the number and type of units added to the housing stock between the two censuses. If possible, trends in housing characteristics should be analyzed for the following areas:

- Total number of units added to the housing stock
- Percentage of units by type of housing construction
- Percentage of units by type of sewage disposal
- Percentage of units by type of water supply
- Percentage of units with electricity

In reviewing these data, it is important to try to analyze the number of units added by public and private production of housing. This can provide a basis for determining the private sector's ability to generate housing in the future, and provides background on the success of past government-sponsored housing projects. Reviews of these trends on a regional and sector basis will help housing analysts determine where the greatest needs are for infrastructure improvements and complete housing projects.

The aim of this analysis is to provide a basis for categorizing the existing housing stock into three classifications:

- Permanent, meaning that it meets the minimum acceptable housing standard
- Substandard and upgradable
- Substandard and not upgradable

Overcrowding can make housing unacceptable, regardless of its physical condition. The rate of overcrowding varies immensely among countries and regions, and among urban and rural areas. Much of this variation is due to differences in the definition of an overcrowded unit. Varying climates, cultural traditions, and unit layouts often defy the efforts of planners to arrive at a definition of the standard criterion of persons per room. In some countries or regions, it is standard for a multigenerational, extended family to constitute one household and share one dwelling unit, whereas in other countries this condition is considered overcrowded. Because of these differences, the planner will have to determine what constitutes overcrowding and

whether new construction is required to remedy the situation.

Determination of Future Housing Needs

The magnitude of future housing needs can be estimated based upon the review of the existing housing stock discussed above and projection of population growth, household formation, and regional migration. In all, the future need for housing can be disaggregated into the following five components:

- Housing required to replace unacceptable and non-upgradable existing units
- Construction required to upgrade housing stock not meeting minimum standards
- Housing required to alleviate current overcrowding
- Construction required to replace aging existing stock of acceptable construction
- Housing required to accommodate new households formed over time

The first three components of future housing need are determined as a result of the review of existing housing stock. The fourth component, replacement of acceptable but aging housing stock, is often overlooked by housing analysts. Housing, like any asset, has a maximum life.

The fifth component of future housing need, housing required to accommodate new households formed over time, requires review and analysis of population projections,

trends in average household size, and regional migration patterns. For most countries, relatively recent projections of future population growth are available. If population projections are not available at levels disaggregated to correspond to the regional and sectoral areas used in the assessment of the existing housing stock, estimates of the disaggregated population growth should be prepared based upon review of historical trends. These reviews should include an analysis of the natural growth rates (birth rate minus death rate) and migration between regions and among sectors.

Constraints Analysis

As described in Chapter II, a wide variety of constraints can limit the ability of the market to satisfy housing needs. It will often be the case that the impact of statutory housing standards on costs will be a major constraining factor on the affordability and effective demand for formal sector housing by low-income groups. Reform of building codes and other statutes to more realistic standards and support for cost-reducing technological innovations are major options for addressing this constraint.

Rent controls, insecure tenure and the scarcity of financing for low-income housing production and sale are among the other major constraints most frequently encountered. Each presents complex and difficult problems.

In a situation of housing scarcity, the sudden removal of rent controls could result, for example, in sharply increased and even exploitative rents with disastrous financial consequences for tenants who have occupied their

housing for extended periods. It should be emphasized, however, that the low rents under rent control are often illusory, when "key money" and unofficial side rent payments are added to the official rent. Generally, gradual escalation in controlled rent ceilings, accompanied by incentives for the increased production of housing, will be a more tractable approach.

Tenure problems often arise in the context of rapid and uncontrolled urban migration, and squatting by new arivals on private or publicly owned lands on the periphery of major cities. In the case of private lands, adjudication of titles to squatters generally involves also a financial settlement in favor of the former owners, which would in practice fall on the government. A natural reluctance to shoulder this financial burden is often encountered.

Even in the case of publicly held lands, granting of titles without exacting payment from squatters is often viewed as an encouragement to accelerated migration and squatting. Since squatters generally lack the means for such payments and are often composed of a transitory population, tenure problems are often allowed to simmer unattended.

Financing to permit squatters to pay for land they occupy as part of the titling process, along with shelter upgrading, community development and job creation efforts aimed at improving stability of tenure, are possible elements of a package for redressing tenure problems.

Low-income housing finance is not easily raised in developing countries, particularly in situations involving

insecure tenure, income instability and high rates of turnover in occupancy.

In these situations, a clear role for government exists in reducing the risks faced by financial institutions. Guarantee or insurance programs and the commitment of resources for the provision of infrastructure, for example, can be helpful.

This still leaves the basic problem of raising financial resources; however, this is a problem that is far broader in scope than that of financing land purchases or even that of financing housing construction and sales. Financial markets in developing countries are genuinely weak, and disproportionately so in comparison with other measures of economic development. There are many reasons for this including the effects of inflationary monetary, fiscal, and foreign exchange rate policies, administered interest rates kept below the rate of inflation, and a wide range of regulations that increase costs, reduce competition, and limit the adaptability of financial sector institutions. Special problems faced by housing finance institutions include: they must deal with households on the lending and deposit sides, which leads to substantial risks and high transaction costs relative to the size of loans; the extensive term intermediation required of them in lending long even though borrowing short; and the exposure to inflationary environments that this implies. Given their comparative disadvantages, it is not unusual to find that the development of housing finance institutions has lagged behind commercial banks and other less risky intermediation sectors in competing for the limited financial savings that are available in developing countries.

AID is clearly in a position to help, partly through the financing it makes available directly through project lending, but perhaps more importantly through the analytic resources and influence it can bring to bear in helping governments to structure effective policy and regulatory reform packages. Financial analysis, such as is proposed in these guidelines, can help to uncover the implications of interest rate and other monetary policies on the viability of commercial financing of housing loans and mortgages in a given developing country, and suggest measures needed to facilitate their participation. Financial policy analysis, and the policy reform and institutional development initiatives it can lead to, is becoming an increasingly important aspect of housing project design.

Resources Survey

An obviously important but sometimes underemphasized aspect of housing project design is the identification and appraisal of available resources in-country, and an assessment of their adequacy in relation to estimated housing needs.

The availability and costs of financial resources have been discussed above. In addition a comprehensive appraisal should be carried out of the availability and costs or efficiency of:

- Construction materials, both domestic and imported
- Building sites
- Skilled, semiskilled, and unskilled construction workers

- Experienced building contractors
- Engineering and project management expertise
- Institutional resources and capabilities in urban planning and regulatory agencies
- Institutional resources and capabilities in the areas of infrastructure construction and maintenance
- Institutional resources at the community level that might be used in the administration of building loans or self-help labor pools

A variety of other resources could be relevant to specific projects in particular countries. The point is that project designers should make every effort to become well-appraised of the resources available to work with, both with respect to resource limits that will have a bearing on project design and implementation, and also with the purposes of identifying indegenous resources specific to the country situation that can be incorporated and make a positive contribution toward maximizing project impact.

Analysis of Project Opportunities

Conscious and deliberate attention to each of the four design elements described above -- standards definition, needs assessment, constraints analysis, and resource appraisal -- should lead to the identification of a variety of opportunities that offer realistic prospects for productive AID intervention.

In evaluating such opportunities, it should be kept in mind that AID resources and the direct outputs attributable to the application of those resources are limited in

relation to the magnitude of the problems encountered in developing countries. These resources should be used, to the extent possible, as a catalyst that serves to make possible the mobilization of other resources that might otherwise be underutilized or misdirected. Leverage, both with respect to additional resources and to securing the policy, regulatory and institutional reforms necessary to ensure project viability, should be a primary concern in project design.

Careful financial and economic analysis of alternative project designs is necessary to ensure that project participants and the resources they contribute are profitably and effectively used, and that maximum economic benefits are derived from AID's intervention. Detailed guidance on the use of financial and economic analysis in the course of housing project design is given in the next chapter.

V. FINANCIAL AND ECONOMIC ANALYSIS OF HOUSING PROJECTS

Overview

The economic and financial analysis of a housing project begins once a set of activities has been identified that is believed to be feasible and to address real constraints to development of the housing sector. The foregoing section identified the types of activities most commonly included in housing projects, to serve as a framework for the discussion of specific analytic techniques and how they can be applied to housing projects.

We have organized this discussion into three parts: (1) an overview that discusses the elements of economic analysis for housing projects and describes one method of analyzing the economic linkages of the project to the larger economy; (2) a brief discussion of economic and financial concerns surrounding project components that do not involve construction or direct provision of credit to finance construction or purchase of housing (e.g., technical assistance in designing housing standards); and (3) a step-by-step description of how to complete the financial analysis of construction and credit activities, focusing on

Previous Page Blank

the viewpoints of the main project participants, and how to translate the results into an economic analysis.

As this organization implies, we do not advocate that the analysts devote their time to detailed analysis of activities other than housing construction and finance. The economic acrobatics needed for quantitative analysis of activities, such as training and technical assistance, are rarely cost-effective. It is always possible to assemble a set of assumptions that makes the activity attractive, with a little thought and effort, and there is no reliable method of determining whether the assumptions are more or less valid than alternative sets. Consequently, these analyses provide little information of use in designing or implementing a project. Given the limited resources available for analysis, it is generally preferable to focus attention on those components that involve cash outlays by beneficiary groups, since the financial and economic viability of these activities is vital to project success. Here, too, we have recommended an approach that relies heavily on concrete costs and benefits, rather than real but hard to measure variables such as health benefits, well-being associated with home ownership, etc.

Financial-Economic Criteria for Accepting a Housing Project

From a financial or economic point of view, a housing project is like any other type of project and its economic or financial acceptability is therefore measured in the same way as for other projects. This is not to say that any project that fails the test of economic or financial profitability should necessarily be rejected; on the contrary, there may be valid social, political, or other

reasons for going forward, despite a low economic return. These latter reasons are not the subject of this manual, however.

The most common measures of financial and economic return are the net present value (NPV), the internal rate of return (IRR), and the benefit-cost ratio (B/C). Each of these is discussed in detail in the standard texts on project analysis, some of which are listed in the Bibliography; nonetheless, a brief review of these concepts may be useful to the non-economist.

Each of these measures is based on the concept that money (or other things of value) is worth more today than at some point in the future. This is not because it will buy less in the future, due to inflation, but because money or other things of value that can be enjoyed now are preferred by most people to the alternative of waiting to enjoy them later (this is called time preference). If one has the item now, the alternative of waiting is always available in any case.

With regard to money in particular, a dollar in hand today can be invested to earn interest. If the interest rate is 10 percent, a dollar today will be worth $1.10 next year (ignoring inflation). Therefore, a dollar next year is clearly less desirable than a dollar now, because by waiting until next year one loses the opportunity to earn that extra 10 cents (hence the term opportunity cost). To compare a dollar today with a dollar next year, it is necessary to discount the future-year dollar to reflect the loss of interest implied by the delay. A dollar next year is worth only $0.91 today at an interest rate (or discount rate) of

10 percent, because if one had $0.91 today, one could put it in the bank and have $1.00 next year. Thus the discount rate is the prevailing rate of return to investment in the economy.

Most projects have costs in the early years and benefits in the later years. To compare these various costs and benefits, it is necessary to make them equivalent by correcting for the time factor, so that they can be added up to get the total net benefit. For convenience, economists generally bring all costs and benefits back to the first year by discounting to reflect how far in the future each is expected to occur. Thus a dollar of cost or benefit in year one is worth $1.00, a year-two dollar is worth $0.91, a year-three dollar is worth $0.83, etc.

The NPV, IRR, and B/C ratio are all alternative ways of stating the total value of the discounted costs and benefits.

The Net Present Value is simply the sum of the costs and benefits in all years (each discounted by the prevailing real rate of return in the economy, i.e., after correcting for inflation). The Benefit-Cost Ratio is the ratio of total discounted benefits to total discounted costs. For example, a project with a cost of $1.00 in year 1 and a benefit of $1.15 in year 2 would have an NPV of $1.05 at a discount rate of 10 percent (because the discounted benefits -- 1.15/1.10 or 1.05 -- less the discounted costs -- 1.00 is equal to 0.05). It would have a B/C ratio of 1.05.

The higher the rate of return in the economy, the more costs and benefits in future years are discounted relative

to those in early years. For example, at a 15 percent interest rate, next year's dollar is worth not $0.91 today, but only $0.87. Since benefits tend to come later than costs, the NPV tends to fall as the discount rate rises and future benefits are discounted more and more relative to near-term costs.

At some discount rate, the NPV declines to zero, that is, the total discounted benefits are just equal to the total discounted costs. This rate, where the NPV falls to zero, is the Internal Rate of Return. In the simple example above, the IRR is 15 percent, because the discounted benefits (1.15/1.15) would then equal the discounted costs (1.00).

Experience indicates that, in most cases, the IRR is the most useful means of expressing the sum of costs and benefits in a single number. The B/C ratio is very sensitive to how costs and benefits are defined. If an equivalent amount is added to the costs and benefits, the ratio changes, even though common sense suggests that these additions should cancel out and have no effect on the analysis. The NPV is a good summary measure, but it cannot be used to compare projects of different sizes, since a large, marginally profitable project can have a higher NPV than a small, highly profitable one. Other measures, such as the pay-back period (the number of years before accumulated benefits equal accumulated costs), have generally fallen into disuse because they do not provide a measure of the project as a whole.

The primary difference between an economic and a financial analysis lies in what costs and benefits are

included (or excluded) and how they are valued. In a financial analysis, the costs and benefits are evaluated in much the same way that an individual investor would analyze a potential investment (detailed examples of the financial analysis of a housing project are provided below).

Economic analyses, however, also include costs and benefits that affect society as a whole, but may not be reflected in the financial analysis. Later sections of this manual will discuss these additional costs and benefits, and other adjustments to the financial analysis for the purposes of economic analysis.

Nonetheless, it is worth emphasizing here the importance of defining costs and benefits in conservative terms. It is easy, and often tempting, to inflate project benefits by adding in any number of indirect benefits. Housing projects are particularly subject to this danger, since housing indirectly affects so many aspects of society. For example, a case could be made that improved housing raises the probability that children will remain in school, thus raising their future earnings. These future earnings should not be included as benefits, however, unless the analyst is also willing to include all the additional costs associated with the extra years of schooling.

The analysis will always rest on firm ground if the project's return is estimated on the basis of direct costs and benefits only. A project with a low rate of return on ths basis may still be justified by the indirect benefits, but these two arguments should be kept strictly separate.

Elements of a Housing Financial-Economic Analysis

For reasons rooted in the history and legislation behind AID's Housing Guarantee Program, the economic and financial analyses of AID housing projects have typically addressed two issues that have little relationship to the housing sector:

- The capacity of the host government to service debt, including country risk analysis
- The role of AID assistance in adding to the country's foreign exchange reserves

Both of these are valid issues from the standpoint of determining whether AID programming in the country is justified, but they have little relevance to the economic or financial feasibility of the housing project itself. Housing projects do not add or detract appreciably from a country's ability to service debt, compared to borrowing for other purposes, nor is the donor's decision to finance local costs with hard currency in any way linked to the sector in which the project is located. To see this more clearly, one has only to ask:

> "Does the project provide the foreign exchange revenues needed to pay off the loan in the future?"
>
> "Does the project provide the government revenue needed to repay the loan?"

In most cases, the answer to the first question is clearly no, and the answer to the second may be yes or no, depending on how the project is structured. In other words,

it is a policy question for the U.S. government whether it wishes to use its assistance funds to enable the host government to finance its international borrowings more easily and whether it wishes to finance local costs associated with development programs. Neither of these is a housing sector economic issue.

This is not say that the debt service and foreign exchange issues should not be addressed in a housing project analysis; to the extent that this practice is required by the legislation or other programmatic concerns, it can and must be continued. But this analysis is in no way a substitute for a financial and economic analysis of the housing project itself. Consequently, these guidelines will focus on the latter and will not address the debt service and foreign exchange issue further; the reader is referred to other guidelines for assistance in addressing these issues.[1]

What, then, is the subject of financial and economic analysis for a housing project? This analysis addresses two related questions:

- Is the project financially feasible and attractive to each participant group (the sponsoring agency, the bank or other financing agency, the developer, and the consumer)? That is, does it generate revenues that cover expenses and generate a reasonable return for each participant?

- Is the project economically feasible and attractive, that is, if the project's costs and revenues are revalued at economic prices

---

1. See, for example, Fariborz Ghadar, "Country-Risk Assessment and Its Impact on the Reserve Requirements for AID-HGA Loan Portfolio," August 1984.

(and non-economic costs and revenues are subtracted), does the project still cover its costs and provide a reasonable return for society as a whole?

Economic prices are estimates of what the price would be if there were no distortions (price controls, subsidies, import restrictions, etc.) in the market, and prices were therefore determined entirely by how much it cost to produce the good and how much the purchasers were willing to pay. They also exclude from observed prices elements that do not reflect a true economic cost, such as tariffs and indirect taxes, that merely represent a transfer payment from one group to another. Economic prices are also called shadow prices and economic-accounting prices.

All of these questions require that the housing project to be financed be reasonably well-defined before the analysis begins. The analyst must know how many units will be built, at what cost, and at what price they will be rented or sold, as well as how the expenditures at each level will be financed. In some cases, project funds do not finance a specific set of housing units but instead are pooled with other funds in a housing finance agency, so that it is not possible to say exactly how many units will be built. In this case, the analysts may use one of two approaches:

- The analysis may be based on averages of the loan portfolio of the agency, the typical housing unit, the typical borrower, etc.
- The analysis may identify the maximum (or minimum) levels that key factors in the portfolio can take if the project is to be financially and economically feasible and then determine whether these are reasonable,

given the economic environment in which the project must operate.

Using the second approach, for example, the analyst might begin with the maximum rent that members of the beneficiary group can pay (based on a portion of their income) and then compare this amount to the cost of a housing unit under a variety of assumptions regarding the terms of the loan, the size of the unit, etc., to determine whether there is a potential match between costs and resources. The results of this analysis can be used to set limits on the loan portfolio to be funded by the project and to estimate the number of loans that can be financed with various portfolio structures.

In both cases, the analysts are well-advised to restrict their considerations to costs and benefits that are directly attributable to the project. Nonetheless, it is useful to supplement the quantified analysis of project-related costs and benefits (discussed in detail below) with a rough analysis of the project's overall impact on employment and income in the economy. The next section discusses how this task can be completed, drawing on available information regarding interrelationships in the national economy.

Estimating Direct and Indirect Impacts on the National Economy

There are three approaches to estimating the project's total impact on national income and employment, taking into consideration both forward linkages (increased economic activity generated by the expenditures of project-earned

income, such as payments to construction workers) and backward linkages (increased economic activity generated by project-related purchases of goods and services on the local economy, such as construction material).

The first and most preferable method is to draw on detailed analyses of the direct and indirect employment and income effects of housing projects in the particular country under analysis. This option is rarely available, but the analyst should verify that in fact no such studies have been completed before turning to one of the other methods.

The second and least preferable method is to use a rule of thumb based on detailed studies from other economies. Based on a very limited number of studies, several authors (Grimes, Katsura) have recommended that an income multiplier of two is appropriate for housing construction (that is, each dollar of housing construction will ultimately lead to another dollar of economic activity in the economy as a whole).

Estimates of total income impact derived from this rule of thumb should, in the authors' opinion, be regarded as illustrative or indicative and should not be included in the estimate of the project's benefits for purposes of calculating the project's economic profitability. In particular, the estimated income multiplier measures gross income generated, not income net of increases that would have occurred had the investment been made in another sector. While housing appears to rank relatively high compared to other sectors in this regard, it is a serious overstatement to compare a multiplier-inflated estimate of housing

benefits with estimates for other sectors that do not include the equivalent multiplier.

The third method relies on estimates derived from an input-output matrix describing the national economy. Such matrices have been prepared for a number of countries as the result of macroeconomic research or model-building exercises. While it is virtually out of the question to prepare such a matrix for the purposes of a housing project analysis, it is certainly worth the effort to determine whether an input-output matrix has been compiled by others, since housing and/or construction are usually included as sectors in a matrix.

An input-output matrix is simply a chart that summarizes the interrelationships among the different sectors of an economy. An entry in column "a" and row "b" indicates the amount of economic activity in sector "a" that results from one dollar of economic activity in sector "b". That is, it indicates the purchases made by sector "b" of the output of sector "a" for the purpose of producing a given amount of "b."

Figure 1 shows a condensed input-output table for Mexico. By looking at the 11th row (construction), we can see that construction is an input into the production in all sectors of the Mexican economy, although it does not account for a large share of the input to any sector. It is most important in agriculture (column 1) and services (column 15). The construction industry (shown as column 11) uses inputs from all other sectors as well, drawing particularly from the two metal industries (rows 9 and 10). Thus, for example, construction used products from basic metal

Figure 1.

An Input-Output Table for the Mexican Economy, 1965 (Inter-Industry Deliverables)

Millions of 1960 pesos

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	2,598	27	1	10,038	1,447	743	767	1	3	47	5	-	6	-	25
2	1	1,256	175	31	5	11	130	163	707	242	349	7	15	10	8
3	795	192	4,018	555	245	138	176	326	427	292	201	292	237	1,410	132
4	2,126	14	15	4,177	73	47	180	8	32	42	66	3	82	39	153
5	669	14	20	117	3,189	54	131	18	39	137	61	7	131	17	118
6	158	43	101	546	134	1,481	343	137	67	308	591	18	624	66	501
7	949	123	74	167	768	191	1,399	51	53	599	268	15	114	419	446
8	4	14	10	314	7	18	78	251	98	73	2,105	1	29	3	24
9	61	85	34	180	77	56	92	50	1,330	2,027	1,820	13	192	37	209
10	287	63	66	395	138	72	133	64	89	1,461	1,295	70	300	134	649
11	179	30	35	56	50	22	28	38	34	19	97	58	121	99	515
12	94	132	4	206	162	88	105	112	97	106	79	108	364	41	219
13	1,536	205	269	3,349	2,005	838	1,212	395	177	1,068	2,558	126	511	854	1,795
14	1	11	16	72	42	29	42	12	11	77	32	16	4,288	33	182
15	204	190	310	849	447	344	484	116	371	526	562	58	2,346	335	2,554
Total Gross Production	41,223	5,419	13,258	32,163	16,154	7,995	11,714	3,605	7,266	18,823	21,413	3,078	72,574	11,483	41,782

Source: J. Sandee, op.cit., part of aggregated input-output table for 1965, as cited in Arnaud, et al., p. 183

Sectors

1. Agriculture, live-stock, wood exploitation and fishing
2. Mining and quarrying
3. Extraction and refining of oil and production of coal and petrol derivates
4. Food products, beverages and tobacco
5. Textile production, clothing and leather products
6. Wood products, furniture, paper production and printing and publishing
7. Chemical products, rubber and plastic products
8. Production of non-metal mineral products
9. Basic metal industries
10. Production and repair of metal products
11. Construction
12. Electricity
13. Commerce
14. Transport
15. Services

industries with a value of over 2 billion pesos, while construction contributed 34 million pesos to production in the basic metal industries.

The difference between the value of all the inputs and the value of the final output represents the cost of labor, capital, and other "factors of production." This additional value, called "value-added," is equivalent to the net income earned by the productive factors, after the cost of intermediate inputs has been allowed for. Value-added is usually shown as an extra row (that is, category of input) on the bottom of the input-output matrix. In some input-output tables, the final use of the goods produced is indicated in an additional set of columns added to the right side of the table, indicating the level of goods produced in each sector that went into final consumption (by consumers, the government, or investors), rather than being used as an intermediate input into the production of other goods and services.

If information is available on the amount of employment in each sector (either total or per dollar of output), then the input-output table can also be used to estimate the total employment effect of a dollar of expenditure on housing construction, by multiplying the employment coefficient in each sector (employees per dollar of output) by the amount of output generated in that sector by a dollar of expenditure on housing.

For analytic purposes, the input-output table is usually converted into one of several alternative forms. The most useful is the <u>inverted matrix</u>, which indicates the total direct and indirect effect on production in each

sector of a one-unit (e.g., 1 peso) increase in production in another sector. Figure 2 shows part of the inverted matrix that was derived from the Mexican table shown above. Row 2, for example, indicates that .07 pesos of housing expenditure that would result from a peso of expenditure in the mining and quarrying sector. (In this example, the analyst has disaggregated construction and housing into various sub-sectors; interested readers may refer to the original source for an explanation of how and why this was done.)

The calculations necessary to transform a basic table, such as shown in Figure 1 into an inverted matrix are quite complex. As a practical matter, analysts of housing projects may find it useful to search out such a matrix, so that they can calculate the direct and indirect effects of expenditures in the housing sector, but it will almost never be worthwhile trying to carry out these calculations for the project analysis, even if a basic table with sufficient detail is available.

Many planning ministries publish the basic input-output table (generally with local currency as the unit of measure) and such ministries are also the best source for an inverted matrix. (It should be noted, however, that the inverted matrix for the U.S. economy, prepared by the Department of Commerce, is calculated only every five years and even then is available only after a seven-year delay.) Since the basic relationships in the productive economy change very slowly (barring unusual circumstances such as a war), an input-output matrix continues to be useful for several years after it is prepared.

Figure 2

Example of Inverted Input-Output Matrix
Showing Direct and Indirect Effect
of Expenditure by Sector
(Partial Matrix)

	11.2 TOTAL	11.2.1	11.2.2	11.2.3	11.2.4	11.2.5	11.2.6	11.2.7	11.2.8
1	.0193	.0161	.0180	.0198	.0208	.0199	.0232	.0231	.0258
2	.0725	.0804	.0814	.0644	.0734	.0736	.0544	.0521	.0525
3	.0551	.0554	.0615	.0517	.0475	.0603	.0523	.0517	.0495
4	.0056	.0051	.0055	.0056	.0057	.0056	.0060	.0060	.0064
5	.0113	.0064	.0065	.0064	.0311	.0069	.0069	.0072	.0352
6	.1139	.0925	.1041	.1245	.1082	.1238	.1572	.1573	.1417
7	.0525	.0492	.0547	.0531	.0555	.0473	.0491	.0443	.0522
8	.1568	.1766	.1728	.1471	.1294	.1810	.1461	.1292	.1033
9	.1109	.1237	.1254	.0956	.0734	.1414	.1165	.1235	.1012
10	.1203	.1307	.1175	.0925	.1162	.1348	.1134	.1646	.2029
11.1	.0215	.0251	.0234	.0203	.0179	.0193	.0183	.0176	.0218
11.2	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12	.0134	.0137	.0138	.0129	.0127	.0143	.0132	.0129	.0125
13	.2428	.1815	.1962	.2915	.3307	.1826	.2681	.2676	.3049
14	.0187	.0145	.0154	.0208	.0266	.0148	.0196	.0198	.0245
15	.1237	.1031	.1085	.1392	.1516	.1063	.1329	.1337	.1452

Source: Arnaud, et al., p. 188.

Economic Analysis of Housing Project Components (Excluding Credit and Construction)

Previous sections have identified six basic activities that are often included in housing projects:

1. Policy analysis and reform
2. Technology development and transfer
3. Institutional development
4. Infrastructure, site development, and community services
5. Construction of housing
6. Financing of housing construction or purchase

While no housing project is likely to include all of these activities, many will include components in more than one category. For example, a project directed at housing finance may include both the establishment or expansion of a credit program for purchasers (Activity 6) and training for bank personnel (Activity 3).

In an ideal situation, the economic analysis would thoroughly examine the financial and economic return in each of the project's activities. This is generally not feasible, given the limited resources likely to be available for the project's economic analysis. Where a more limited effort is necessary, the analyst has two basic choices: to conduct a rough analysis of all project components or to conduct a more thorough analysis focused on one or two components.

These guidelines recommend the latter approach, concentrating scarce analytic resources on estimating the financial and economic return to project components in Activities 4, 5 and 6 only. Quantitative analysis of components in the other areas, while not excluded completely, should take second place to a thorough analysis of construction and finance activities. There are several practical and theoretical reasons for this recommendation:

- Quantification of benefits from activities other than construction and finance is difficult and not readily subject to verification, whereas the benefits from the latter two activities -- housing services -- can be measured on the basis of sales prices and rents (corrected if necessary to reflect price controls, etc.).

- Importance in total project cost: In most cases, construction and credit are the largest components in the budget and would therefore dominate the economic analysis, even if all components were included.

- Impact on project feasibility: The project can survive a low rate of return to research and training activities, but a credit fund or construction activity that loses money in financial terms will in all likelihood doom the project.

- Potential for negative impact on project participants is much greater for infrastructure (impact on government operating budget), construction (impact on developers and home purchasers), and credit (impact on borrowers and lending institutions). The project economist has a responsibility to ensure (in so far as is possible) that the project will not leave these groups worse off.

For all of these reasons, it is rarely a cost-effective use of scarce analyst's time to perform full-scale economic

analyses of project components other than those involving the actual financing and construction of housing. Nonetheless, it is useful to conduct an informal review of the design for activities in policy analysis, technology development, and institutional development from the standpoint of project economics. This review can identify improvements in the design that will increase the economic return, even though this increase eludes quantification.

To accomplish this review, the project design team should answer the following three questions for each component:

- Is this activity really necessary? Is this activity "nice to have" or actually required to accomplish the project's purpose? What would be the impact on the project if this component were eliminated or drastically scaled down?

- Is there a cheaper way to complete this activity? Can less expensive, in-country resources be substituted for expensive, off-shore resources, such as expatriate technical assistance and training in the U.S.? Can short-term technical assistance and training be substituted for long-term inputs? Can the levels of TA or training be pared? Can rented facilities be substituted for construction?

- Can the host government really afford this activity? Any program, no matter how needed or how well-designed, will be ineffective if the host government cannot continue to meet its recurrent cost requirements at an adequate level to sustain its usefulness. In an environment of increasing budgetary stringency in the developing world, this concern cannot be treated casually: it simply cannot be assumed that funding for a worthwhile activity will be found "somehow." There is little use in training people whose jobs depend on project funding, or who will not be able to operate after the project because there are no funds for offices, transportation, or communications.

In-country resources, such as local universities and professional services firms, are inevitably much cheaper than their U.S. equivalents, but also usually suffer from serious technical deficiencies. In many situations, short-term U.S. inputs can be used to "top up" their skills, thus reducing total costs and building local capacity for the future.

Whenever it is possible to push costs into the future or bring benefits closer to the present, such action will have a positive effect on the project's economic rate of return (whether calculated or not). This basic economic principle can come into conflict with project implementation logic, however, which has demonstrated time and again that delays increase costs, especially in current, i.e., continually inflating, dollars. Consequently, overall project returns are maximized by speeding up implementation as much as possible to bring benefits forward, while pushing costs out of the project entirely through such approaches as sites and services, core houses that can be upgraded by beneficiaries at a later date with their own funds, and minimal infrastructure that can be expanded and improved serveral years later (when, it is hoped, funds will be more plentiful than at present). Even when the total cost from staged construction exceeds that for one-time construction, the net economic return to the former strategy is usually higher because future costs are heavily discounted in economic analysis.

Financial Viability of Housing Construction and Credit Activities

This section will provide a step-by-step presentation of how to complete a financial analysis of how to complete

a financial analysis of a housing construction activity and how to determine whether the project is financially viable from the viewpoint of key project participants. This analysis will serve five purposes: (1) it will enable the project designers to determine whether the project is financially viable without subsidies, which is critical to project success; (2) it will indicate whether the design is appropriate for the target audience and target rental (sale) market or whether redesign to reduce costs is necessary; (3) it will assess the financial attractiveness of the project to private developers and banks; (4) it will identify financial requirements of the project by national and/or local governments and by national housing authorities; and (5) it will establish the framework for the economic analysis.

The discussion will proceed through each of the major steps for analyzing the financial viability of a housing project. The major steps are:

Step 1. Identify and estimate project costs and sources of funding.

Step 2. Disaggregate estimated project costs into local and foreign currency components.

Step 3. Estimate expected sales price by type of unit.

Step 4. Estimate target households' affordable investment, and compare to expected sales price of alternative units.

Step 5. Analyze financial cash flow and feasibility of project from viewpoint of a private developer.

Step 6. Analyze financial cash flow and feasibility of project from viewpoint of private banks.

Step 7. Analyze financial cash flow and feasibility of project from viewpoint of a national housing authority.

Step 8. Analyze financial cash flow and feasibility of project from viewpoint of national and/or local government.

For many of the steps, tables pertaining to a hypothetical housing project will be presented to illustrate the techniques of financial analysis discussed. All revenues, costs and rates presented are purely hypothetical and are presented only to illustrate the financial analysis techniques. They should not be construed or used as rule-of-thumb estimates to substitute for actual project-specific data.

Although inflation is excluded in an economic analysis, it clearly can have a major impact on project financial viability. Consequently, the tables for the financial cash flow analysis are presented in both constant and current (inflating) dollars.

Step 1. Identify and Estimate Project Costs and Sources of Funding

The accurate estimation of project costs is a critical step in the financial feasibility analysis. Before addressing specific cost items to be included in the analysis, it is worthwhile to discuss a few points regarding how all financial costs should be measured. First, all project costs should be expressed in current or nominal terms, meaning that they include adjustment for future inflation. For inflation of construction costs, the analyst should examine recent trends in construction costs inflation

relative to the general inflation rate. If substantially different rates of inflation have been recorded in the construction sector relative to the entire economy, the analyst may consider adjusting the projected overall inflation rate to reflect construction sector experience.[1]

While the financial analysis will ultimately be presented in current terms, the analyst will often find it more convenient to first prepare estimates in constant or real terms (not including future inflation), and then to adjust the estimates for projected inflation, as we have done here. Normally, an allowance for inflation would be added to total project costs, but, for simplicity, we have not done so.

For the estimation of project costs, it is often useful to prepare unit cost estimates for specific project components, prior to calculating total costs. Typically, unit costs will be expressed in terms of per hectare or acre, per square foot, per linear foot, or other relevant units, depending on the specific cost component. These unit cost estimates will be helpful in comparing project costs to those of other projects and will assist in fine-tuning the project design between alternative configurations.

The project analyst will decide on the appropriate level of detail of the project cost estimates, depending on the size and nature of the project, the availability of detailed cost data, and the amount of time and resources

---

1. It is possible that a large housing construction program or project could increase the rate of construction cost escalation. However, most housing projects would not be of a significant size to affect overall construction costs, particularly in areas with high rates of unemployment.

available for conducting the analysis. Presented below is a discussion of project costs that often arise in housing projects and that should be included in the financial analysis.

Land

While housing projects generally require the acquisition and development of land, many projects do not incur financial costs for land acquisition. Oftentimes, land for housing projects is granted by the local or national government, or it may be donated by an individual or organization, or already owned by the developer or the beneficiaries themselves. This point is one of the clearest demonstrations of where project costs will differ for the financial and economic analyses. In the financial analysis, only costs that involve the outlay of cash or its equivalent are included, whereas the economic analysis discussed later will attempt to measure the full cost to society of the scarce land resource.

For projects for which land has to be acquired, cost should be estimated at the current market value for such land. The value of the land will most likely depend on its location and on its degree of improvement, i.e., provision of basic infrastructure such as roads, electricity, sewage disposal, and water supply. The analyst should attempt to estimate its cost per acre or hectare and make comparisons to other land or housing lots in similar areas and with comparable infrastructure improvements.

For the example shown in Table 12, it was assumed that the financial cost of land acquisition was to be incurred by the private developer, with 90 percent of the cost funded by

Table 12. AID Housing Guaranty Project: Summary of Project Costs and Sources of Funding

Project component	Project Costs			Funding source						
	Quantity of units	Unit cost	Total cost	Nat./local gov't	Housing Authority	Private Developer	AID grant	Private bank	Project Benef.	Total funding
Land acquisition			2438			244		2194		2438
Total Infrastructure										
Road			4000	3200	200	60		540		4000
Electricity			1500	1200	75	23		203		1500
Water supply			2500	2000	125	38		338		2500
Waste disposal			3000	2400	150	45		405		3000
Housing Construction										
Type A	500	2.625	1313		1181				131	1313
Type B	1000	3.750	3750			375		3000	375	3750
Type C	500	6.000	3000			300		2400	300	3000
Technical assistance & project admin.			2000		250	750	1000			2000
Marketing			300		75	225				300
Total Costs			23801	8800	2056	2059	1000	9079	806	23801

a loan from a private bank. It was assumed for the financial analysis that additional land for infrastructure and for some housing units would be donated by the government.

Infrastructure

Most housing projects require expenditures for providing or improving basic infrastructure. These expenditures are appropriately considered project costs in that they would not have been incurred if the project was not undertaken. For many infrastructure items, it may be unclear which costs would have been incurred with and without the project. For example, a housing project being constructed on the outskirts of an urban area may require electric power lines to be extended from the urban area. If this were undertaken solely for this housing project, then it clearly would be a project cost. But what if plans and construction had already been started to extend the electric power lines to an existing neighboring community directly past the site of the housing project? In this case, it could be argued that the extension of the power lines is not a project cost. However, even in this case, electrical connections from the housing project to the main power line should be included.

Similar questions concerning the definition of project costs may arise with road construction costs, water supply lines, and sewage disposal facilities. To determine what constitutes a project cost, the analyst should determine if financial expenses would not have been incurred or could have been avoided if the project were not undertaken. If that is the case, then the financial expenses are appropriately attributable to the project.

The analyst should prepare estimates of per-unit costs for these and other infrastructure requirements of the project before determining total financial infrastructure costs. These unit costs will facilitate comparison between projects and project design. For many housing projects, infrastructure cost may represent as much as 30 to 40 percent of the total project cost.

It is often useful to distinguish between the provision of basic infrastructure to an area or project and the cost of connections to hook up individual units to the main network. This is because the cost of the basic infrastructure network will often be incurred by the national and/or local government, while the unit connections will often be installed by a private developer or a national housing authority implementing the project.

These assumptions were used in the example presented in Table V-1, where the infrastructure costs are divided among the government, housing authority and private developer. Again, it is assumed that the private developer obtains 90 percent funding for its costs from a private bank. The national/local government and housing authority's portions of the project are assumed to be financed by an AID housing guaranty loan.

Housing Construction

For many housing projects, there will normally be several types of units constructed, offering a variety of living space, configurations of rooms, and construction materials. In some cases, complete units will be constructed, while other projects may include site-and-services only. In

addition, some units may be completely constructed, while others provide just a basic core unit or even just the structural components of a house (floor, roof and two walls). The analyst should prepare separate cost estimates for each alternative type of unit contained in the project.

For the illustrative housing project depicted in Table V-1, three types of housing units were assumed that vary according to the size and number of unit to be constructed. The smallest unit, Type A, was assumed to be constructed by the housing authority, while unit Types B and C are assumed to be constructed by the private developer through private bank financing. The project beneficiaries, purchasers of the constructed units, are assumed to contribute 10 percent of housing construction costs via a downpayment on the purchase of a unit.

Community Facilities

Particularly for large housing projects, a component of the project will often include the construction and provision of common community facilities. Facilities such as schools, clinics and public parks are often considered an integral part of the project, and in many cases represent a significant portion of total project costs. These common facilities should be considered for the purposes of the project's financial analysis in a parallel way to infrastructure needs such as roads, water, and electricity.

The illustrative housing project presented with this discussion does not include a separate component for community facilities, focusing instead on the provision of basic

housing and infrastructure. If an actual project were to include the construction of community facilities, the cost of such facilities should be estimated and the source of funding identified.

Other Project Costs

The project costs discussed above generally account for the vast majority of financial expenditures of a housing project. However, depending on the nature and scope of the project, other project costs may be of significance. The financial cost of developing, administering, and implementing the project is one example. These costs may include salaries of project staff, purchases, operating and maintenance expenses of project vehicles, and technical assistance that may be required for the project.

Other project costs estimated and identified for the example presented in Table V-1 include technical assistance grants provided by AID, and project administration and marketing costs incurred by the housing authority and private developer.

Although we have included these costs in our example, some or all of these costs are commonly excluded from the analysis. The analyst should be guided by prevailing practice in the particular mission, since the primary aim of the analysis is to determine how the project compares to alternative uses of AID or government resources.

Step 2. Disaggregate Project Cost into Local and Foreign Currency Components

There are several reasons why it is important to estimate the local and foreign currency costs of the project. First, the national government and international lending institutions will be concerned about the project's requirement for foreign currency outlays and the nation's overall capability to repay loans in foreign currency. Second, the economic analysis of the housing project will specifically assess the social cost of foreign currency in evaluating the economic feasibility of the project.

The foreign and local currency costs of the illustrative housing project are presented in Table 13. In addition, local currency costs are divided into categories that will be useful for conducting the economic analysis. In the example shown in Table 13, it was assumed that foreign currency costs represented 10 percent of the financial cost of infrastructure and housing construction. Local currency cost categories identified include import duties and taxes, material and equipment costs, and skilled and unskilled labor.

Step 3. Estimate Expected Sales Prices by Type of Unit

The project analyst should prepare estimates of the expected sales price for each type of unit in the housing project, based upon the unit costs estimated earlier. These costs include those related to land acquisition, infrastructure connections to the housing units, housing construction, project administration and marketing. Provision should be

Table 13. Foreign and Local Currency Project Costs by Project Component

Project component	Foreign currency cost			Local currency cost					
	Materials and equipment	Labor and consultants	Subtotal	Import duties & other taxes	Materials and equipment	Labor			Total cost
						Skilled	Unskilled	Subtotal	
Land acquisition									2438
Total Infrastructure									
Road	400		400	320	1800	592	888	3600	4000
Electricity	150		150	120	675	222	333	1350	1500
Water supply	250		250	200	1125	370	555	2250	2500
Waste disposal	300		300	240	1350	444	666	2700	3000
Housing Construction									
Type A	131		131	105	591	291	194	1182	1313
Type B	375		375	300	1688	833	555	3375	3750
Type C	300		300	240	1350	666	444	2700	3000
Technical assistance & project admin.		1000	1000			1000		1000	2000
Marketing						300	–	300	300
Total Costs	1906	1000	2906	1525	8578	4718	3635	18457	23801

made for contingencies (at least 10 percent), and the private developer's mark-up or profit.

For the example shown in Table 14, land acquisition costs by type of unit were based on the size of the plot, while housing construction costs were based on the size of the constructed unit. On-site infrastructure connections and project administration and marketing were assumed to be the same for all types of unit. As Type A units are assumed to be constructed by the housing authority on land donated by the government, no cost for land acquisition or developer's mark-up were included for these units.

In our example, we have simplified the problem somewhat by using a fixed developer mark-up, rather than calculating appropriate mark-ups based on the developer's borrowing costs, the rate of return available in the economy, risk, and so on. If time and data permit, the analyst should examine how changes in these various factors would affect the developer's mark-up, and therefore the sales price or, if the sales price is fixed, how the developer's return would be affected by such changes.

Step 4. Estimate Target Households' Average Affordable Investment and Compare to Expected Sales Price of Alternative Units

The comparison of the affordable capital cost of dwelling units for households at different income strata to the expected sales price of the units is an integral part of determining the financial viability of a housing project. If the target households cannot reasonably afford the type of units contained in the preliminary project design, the

Table 14. Estimated Sales Price By Type of Unit

Item	Unit type A	Unit type B	Unit type C	Total for all units
Number of units	500	1000	500	2000
Size of plot(sq.m)	80	100	125	202500
Size of unit(sq.m)	35	50	80	107500
	Cost per unit($$)			$$(000's)
Land acquisition	0	1500	1875	2438
On Site Infrastructure				
Road	400	400	400	800
Electricity	150	150	150	300
Water supply	250	250	250	500
Waste disposal	300	300	300	600
Housing Construction	2625	3750	6000	8063
Project administration	500	500	500	1000
Marketing	150	150	150	300
Subtotal	4375	7000	9625	14000
Contingencies- 10%	438	700	963	1400
Total cost	4813	7700	10588	15400
Developer's Markup (A-0%,B-25%,C-30%)	0	1925	3176	3513
Estimated sales price	4813	9625	13764	18913

feasibility of attracting private developers and private financing is greatly reduced. Guidelines for the evaluation of key determinants of housing affordability, such as average income levels, the distribution of income, the share of household income available for mortgage payments, and prevailing financial lending terms and conditions, are presented in this section.[1]

Estimating Average Household Income and Income Distribution

Estimates of household incomes and income distribution are key factors in determining the level of housing affordability of various income groups. The most desirable and reliable method for estimating income levels and distribution is through a well-designed household survey of adequate size. Most countries periodically perform household income and expenditure surveys to establish the number of people receiving income in each household and the amounts of their monthly income. Income figures for the base year for metropolitan, urban, and rural areas are generally available. Household survey information will generally also provide information on the distribution of income by households, which is necessary for identifying the income of target groups. Ideally, figures will include the percentage of income devoted to housing and other basic necessities. In the absence of current figures, estimates can be developed. In some cases, the income distribution can be assumed to have remained constant since the last survey, and

---

1. For a more complete discussion of determinants of housing affordability, see the AID Occasional Paper Preparing a National Housing Needs Assessment, prepared by Robert R. Nathan Associates, Inc. and the Urban Institute, March 1984.

the whole distribution escalated for the change in average income. However, the analyst should be particularly cautious of making assumptions concerning the updated distribution of income using a survey more than a few years old. For many developing countries, income distribution can change significantly with economic conditions and policies.

In computing household incomes and housing expenditures, planners often must modify data to compensate for underreporting. There are strong incentives to underreport income -- poor households want to remain eligible for means-tested government programs, and the wealthy want to avoid income taxes. Housing expenditures are also often underreported because of omission of in-kind labor, the opportunity cost of equity already invested in home ownership, recall problems in recording improvements, and the like.

In the absence of surveys of household income and/or expenditures, the analyst should conduct an informal survey of local rental rates and current expenditures for housing. Alternatively, the analyst could attempt to estimate average household income for a hypothetical family using statistics on average household, minimum wage rates in the formal and informal sector, and the number of family members working. Estimates of household income derived from such methods should be tested for their sensitivity to key assumptions.

Estimating Share of Household Income Available for Housing Investment

In the absence of detailed and reliable household expenditure surveys, the percentage of gross household income which may be presumed to be available for housing

expenditures (mortgage service or rent, plus recurrent expenditures on items such as maintenance, utilities, and real estate taxes) must be estimated on the basis of informed judgment. In estimating the appropriate share of household income that can be devoted to these expenditures, care must be taken to consider the definition of income against which this estimate will be applied.

From an economic viewpoint, it may be argued that an extremely broad definition of income should be used to reflect a household's total income. This broad definition would include all sources of household income, including remunerations, rents, and payments-in-kind. While it is theoretically reasonable that a household could substitute payments-in-kind for its monetary requirements for many purposes, it is less likely to be able to convert or substitute a significant portion of these types of payments for purposes of making mortgage payments.

Based on this consideration, one would expect a reasonable estimate of the share of income that can be devoted to housing to be lower than estimates based on a more narrow income definition. In most countries, estimates of the share of income devoted to housing are normally in the area of 25 percent. However, estimates have ranged from 20 percent to 35 percent for some countries and target groups. It is important to recognize that the share of income assumed to be available for housing radically alters the estimate of housing affordability. For this reason, it is recommended that the analyst be extremely careful in verifying the consistency of definitions of income to be used and to conduct sensitivity tests for a range of estimates for this critical assumption.

After preparing estimates of the target households' income available for housing, the financial analyst should determine the amount of income available for a mortgage or rent payment. This involves subtracting recurring household expenditures such as normal maintenance, electricity, and water costs from the total income available for housing. Typically, these recurring household expenditures constitute 10 to 15 percent of total housing expenses, but this also varies greatly from country to country.

A final consideration in this area is whether the beneficiaries will be owners or renters. Although there is little concrete information on this issue, experience and common sense suggest that families are willing and able to dedicate a larger share of their income to housing if they are purchasing than if they are only renting. For most families, their home is likely to be their largest investment, as well as the largest single item in their consumption budget, and thus a portion of family savings can be added to the affordable rent figure to estimate an affordable mortgage payment.

Comparing Average Target Household Affordable Capital Cost to Sales Price of Alternative Units

The target households' affordable mortgage payment estimated above should be capitalized so that affordable costs can be compared with the project's per-unit housing costs. The analyst should conduct a review of current existing mortgage terms and conditions that would apply to purchase of the project's housing units.

The type of mortgage instrument used can significantly affect the target households' affordable capital cost. In the past decade, many financial institutions have begun to offer a variety of mortgage instruments other than the conventional fixed-rate level payment mortgage. These alternative mortgage instruments are designed to reflect factors such as anticipated increased earnings of the borrower over time, fluctuating levels of interest rates, high rates of inflation, and irregular income patterns over time.

It is recommended that financial analysts of housing projects calculate the target household affordable capital costs, first using a conventional mortgage instrument and then using alternative mortgage instruments that would be available from local financing institutions. In addition to these calculations of the amount of housing a family can finance, the analyst should include estimates of the average down payment families will be making to determine the total affordable housing cost. In many areas, families have accumulated wealth in the form of durable goods and livestock that can be converted into cash for a larger down payment, resulting in a higher affordable price.

If the project's housing units' expected sales price is greater than the target group's affordable capital cost, the project's financial viability or its ability to reach the target group may be questionable. It implies that project costs will have to be reduced or that some sort of subsidy will be required, such as below-market financing and government or private contributions for land acquisition or construction materials. Alternatively, it implies that households with income above the target group may have to

purchase the units. The financial analyst should make efforts to estimate the explicit or implicit subsidies that would be required and should give serious consideration to project alternatives that could lower the project's cost.

Step 5. Analyze Financial Cash Flow and Feasibility of Project from Viewpoint of a Private Developer

Many countries are currently trying to promote the development and construction of lower income housing by the private sector. Traditionally, these types of housing projects were left to the public sector, as private developers considered them riskier and financially less attractive than the development of other housing. However, the need for lower income housing has been recognized as being beyond the resources and capacity of the public sector alone. There is also some sentiment that the private sector may be able to provide the large number of housing solutions required on a more economic and efficient basis. Regardless of the motivation, measures to streamline the development process and to reduce some of the uncertainties and risks of the private sector participation in lower income housing projects are being formulated in many nations. This section will look at the major financial elements of housing projects from the viewpoint of a private developer's cash flow.

A private developer will be primarily interested in the amount and timing of revenues and expenses related to the housing project and how the overall financial returns compare with other investment alternatives of comparable financial risk. For many project components, it is often

more convenient to think of project revenues and expenses as sources and uses of funds.

Typically, the majority of private developers' costs will be associated with the actual construction of housing units. In some instances, the private developer may also share some of the other project costs, such as land acquisition, infrastructure improvement, and construction of community facilities.

For the financial cash flow analysis, the key element is determining when these costs will be incurred. For example, the housing construction may be split among several phases of construction extending over several years. The analyst should therefore allocate the construction costs over the scheduled construction period, reflecting when the private developer will be expected to incur the financial costs.

Instead of financing all of the construction costs from its own resources, a private developer will usually obtain loans from private local or international banks. The cost of these loans in terms of interest and principal repayments will often represent a significant portion of the private developer's project costs. As a means of estimating these costs, the analyst should review current lending terms and practices that would be applicable to such a loan. Estimates should be made of the annual interest and principal payments that the private developer would incur, preferably under alternative financing scenarios.

The private developer's revenues or sources of funds for the housing project will typically consist of proceeds from loans and revenues from the sale of housing units. For

large projects, loan disbursements are often spread out over several years. Proceeds from loans should be entered for the year in which the private developer actually receives the funds from the bank.

Estimates of the private developer's revenues from the sale of housing units should be based on the expected sales price per unit and a projected schedule of sales based upon the phasing and completion of construction.

Subtracting the private developer's total project costs from the project revenues yields an estimate of net cash flow before taxes. From this figure, estimates of the private developer's annual income taxes should be subtracted to obtain the estimated net cash flow from the project after taxes. This figure represents the annual profit or loss of the private developer from the the project.

Analysis of the private developer's financial net cash flow after taxes provides important information concerning the developer's assessment of the project's financial feasibility. First, it indicates years when the developer will have to input its own financial resources (when net cash flow is negative), and when it can expect to be earning a profit. In addition, the overall rate of return to the private developer can be estimated from the annual financial net cash flow.

One measure of the worth of the project to the private developer is the financial internal rate of return. This measure is one of the most often used methods of evaluating projects that takes into account the time value of money.

Other measures of the project's feasibility that incorporate the time value of money include the net present value and benefit-cost ratio. The private developer will assess these financial rate of return measurements relative to rates of return of other possible investments and their risks.

Tables 15 and 15a present the financial cash flow from the viewpoint of a private developer for the illustrative housing project in constant and current forms, assuming 12 percent inflation. Land acquisition costs were assumed to be incurred during the first year, while construction-related costs were spread over a three-year period. Marketing costs correspond to the sales of units which were assumed to occur one year after construction.

For the calculation of taxable income, an adjustment to the estimated financial revenues and costs concerning the loan is required. In most countries, taxable income would not include proceeds from the loan nor the cost of principal repayments. Only the interest expense from the loan should be included in taxable income. However, from the perspective of the private developer's cash flow analysis, both of these items are appropriately included.

Note that inflation greatly increases the apparent profitability to the developer, since he sells his units at inflated prices. In addition, he is able to repay the construction loan with relatively cheaper dollars, due to the effect of inflation. Thus, in the example shown in Table 15a, the developer's internal rate of return has increased an attractive 55 percent.

Table 15. Finacial Cash Flow Analysis From Viewpoint of Private Developer
(Current Dollars)

Item	Year 1	Year 2	Year 3	Year 4
Project Costs(Uses of Funds)				
Land acquisition	2438			
Basic infrastructure				
Road	200	212	225	
Electricity	75	80	84	
Water supply	125	133	140	
Waste disposal	150	159	169	
Housing construction				
Type A	0	0	0	
Type B	1250	1325	1405	
Type C	1000	1060	1124	
Project administration	250	265	281	
Marketing		80	84	89
Interest payments at 15%	370	617	370	123
Principal repayment	0	1646	1646	1646
TOTAL COSTS	5958	5576	5528	1859
Project Revenues(Sources of funds)				
Proceeds from loans	4939			
Revenues from sale of units				
Type A				
Type B		3529	3882	4270
Type C		2523	2776	3053
Subtotal		6052	6657	7323
TOTAL REVENUES	4939	6052	6657	7323
Net cash flow before taxes	-919	476	1129	5464
Taxable income	-5858	2122	2776	7110
Income taxes at 30%	0	637	833	2133
Net cash flow after taxes	-919	-161	297	3331
Internal Rate of Return	0.55			

Table 15a. Financial Cash Flow Analysis From Viewpoint of Private Developer (Constant Dollars)

Item	Year 1	Year 2	Year 3	Year 4
Project Costs(Uses of Funds)				
Land acquisition	2438			
On Site Infrastructure				
Road	200	200	200	
Electricity	75	75	75	
Water supply	125	125	125	
Waste disposal	150	150	150	
Housing construction				
Type A	0	0	0	
Type B	1250	1250	1250	
Type C	1000	1000	1000	
Project administration	250	250	250	
Marketing		75	75	75
Interest payments at 15%	370	617	370	123
Principal repayment	0	1646	1646	1646
TOTAL COSTS	5858	5339	5142	1845
Project Revenues(Sources of funds)				
Proceeds from loans	4939			
Revenues from sale of units				
Type A				
Type B		3208	3208	3208
Type C		2294	2294	2294
Subtotal		5502	5502	5502
TOTAL REVENUES	4939	5502	5502	5502
Net cash flow before taxes	-.19	113	360	3657
Taxable income	-5858	1760	2007	5304
Income taxes at 30%	0	528	602	1591
Net cash flow after taxes	-919	-415	-242	2066
Internal Rate of Return	0.12			

Step 6. Analyze Financial Cash Flow and Feasibility of Project from Viewpoint of Private Banks

The capital intensiveness of housing projects requires the participation of a credit institution. Generally, a private bank will help finance private developers' land acquisition and construction programs and will assist individual purchasers of housing units. Without financing from a credit institution of one type or another, the successful completion of a housing project is remote. What, then, would a private bank consider in determining the financial feasibility of its participation in a housing project?

A private bank, like any other investor, is concerned about the soundness of the investment in terms of expected financial return relative to its financial risk. Certainly, a private bank will assess the market value of the units contained in the housing project relative to the total cost of construction. It will similarly be concerned about the cost of the units relative to the affordable capital costs of the target households. It will also evaluate the credit-worthiness of the private developer and its past experience with similar projects.

Another consideration of a private bank is its expected financial cash flow that would be generated by the project. Similar to other project participants, a private bank would assess the project's financial costs and revenues and evaluate its financial internal rate of return from the projected net cash flow. Elements that would be included in a private bank's cash flow analysis from a housing project are discussed below.

A private bank's costs or uses of funds related to a housing project will consist of loan disbursements to project participants and beneficiaries, the cost of obtaining those funds, loan administration expenses, and costs related to delinquent or defaulted loans. A private bank's project revenues will consist of interest earned on the outstanding loan balances and the repayment of principal.

An example of a financial cash flow analysis from the viewpoint of a private bank is presented in Tables 16 (constant) and 16a (current). In this example, the private bank obtains funds at an interest rate of 11 percent and earns interest from borrowers at 15 percent. Loan disbursements and the receipt of interest and principal payments are recorded for the year in which they occur.

For the calculation of taxable income and income taxes, only interest paid and earned by the private bank should be included. Loan disbursements and principal repayments, while certainly cash flows, are not normally considered as expenses or income for tax purposes.

In this example, the cost of loan administration and delinquent and defaulted loans are not explicitly included in the presentation of project costs. Given the greater uncertainty in measuring those items, it is recommended that the project analyst compute the private bank's rate of return excluding those items and evaluate whether the estimated rate of return is sufficient to cover those financial risks.

Table 16. Financial Cash Flow Analysis From Viewpoint of Private Bank
(Constant Dollars)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Project Costs(Uses of Funds)								
Loan disbursements								
Private Developer	4939							
Project Beneficiaries		4952	4952	4952				
Cost of obtaining funds at 11%	272	907	1265	1590	1534	1485	1428	1363
Total Loans outstanding	4939	8245	11499	14455	13949	13500	12985	12393
TOTAL COSTS	5211	4213	4519	4545	1534	1485	1428	1363
Project Revenues(Sources of funds)								
Private developer's loan								
Interest earned at 15%	370	617	370	123				
Principal repayment	0	1646	1646	1646				
Project beneficiaries' loans								
Interest earned at 15%	0	371	1106	1797	2092	2025	1948	1859
Principal repayment	0	52	350	506	448	515	593	682
TOTAL REVENUES	370	2686	3472	4072	2540	2540	2540	2540
Net cash flow before taxes	-4841	-1527	-1047	-474	1006	1055	1112	1177
Taxable income	98	81	212	330	558	540	519	496
Income taxes	30	24	63	99	167	162	156	149
Net cash flow after taxes	-4870	-1551	-1110	-573	839	893	956	1029
Internal Rate of Return	0.089							
Net present value at 0%	11056							
Net present value at 5%	3188							
Net present value at 10%	-640							

Continued--

Table 16. (Continued)

Financial Cash Flow Analysis From Viewpoint of Private Bank
(Constant Dollars)

Item	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18
Project Costs(Uses of Funds)										
Loan disbursements										
Private Developer										
Project Beneficiaries										
Cost of obtaining funds at 11%	1288	1202	1103	989	858	707	534	218	73	0
Total Loans outstanding	11711	10927	10026	8989	7797	6427	4850	1978	664	0
TOTAL COSTS	1288	1202	1103	989	858	707	534	218	73	0
Project Revenues(Sources of funds)										
Private developer's loan										
Interest earned at 15%										
Principal repayment										
Project beneficiaries' loans										
Interest earned at 15%	1757	1639	1504	1348	1170	964	728	545	199	100
Principal repayment	784	901	1037	1192	1371	1576	1813	2806	1312	564
TOTAL REVENUES	2540	2540	2540	2540	2540	2540	2540	3351	1511	664
Net cash flow before taxes	1252	1338	1438	1552	1683	1833	2007	3134	1438	664
Taxable income	468	437	401	360	312	257	194	328	126	100
Income taxes	141	131	120	108	94	77	58	98	38	30
Net cash flow after taxes	1112	1207	1317	1444	1589	1756	1949	3035	1400	634
Internal Rate of Return										
Net present value at 0%										
Net present value at 5%										
Net present value at 10%										

Table 16a. Financial Cash Flow Analysis From Viewpoint of Private Bank
(Current Dollars)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Project Costs(Uses of Funds)								
Loan disbursements								
Private Developer	4939							
Project Beneficiaries		5249	5564	5898				
Cost of obtaining funds at 11%	272	940	1365	1813	1777	1729	1674	1611
Total Loans outstanding	4939	8542	12405	16479	16155	15720	15220	14645
TOTAL COSTS	5211	4543	5227	5887	1777	1729	1674	1611
Project Revenues(Sources of funds)								
Private developer's loan								
Interest earned at 15%	370	617	370	123				
Principal repayment	0	1646	1646	1646				
Project beneficiaries' loans								
Interest earned at 15%	0	394	1196	2029	2423	2358	2283	2197
Principal repayment	0	55	177	324	435	500	575	661
TOTAL REVENUES	370	2712	3389	4123	2858	2858	2858	2858
Net cash flow before taxes	-4841	-1831	-1838	-1764	1081	1129	1184	1247
Taxable income	98	71	202	340	646	629	609	586
Income taxes	30	21	61	102	194	189	183	176
Net cash flow after taxes	-4870	-1852	-1898	-1866	887	940	1001	1071
Internal Rate of Return	0.071							
Net present value at 0%	10630							
Net present value at 5%	2063							
Net present value at 10%	-1922							

Continued--

Table 16a. (Continued)

Financial Cash Flow Analysis From Viewpoint of Private Bank
(Current Dollars)

Item	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18
Project Costs(Uses of Funds)										
Loan disbursements										
Private Developer										
Project Beneficiaries										
Cost of obtaining funds at 11%	1538	1455	1358	1248	1121	974	806	490	217	0
Total Loans outstanding	13984	13224	12350	11344	10188	8859	7330	4451	1971	0
TOTAL COSTS	1538	1455	1358	1248	1121	974	806	490	217	0
Project Revenues(Sources of funds)										
Private developer's loan										
Interest earned at 15%										
Principal repayment										
Project beneficiaries' loans										
Interest earned at 15%	2098	1984	1852	1702	1528	1329	1099	931	575	296
Principal repayment	760	874	1005	1156	1330	1529	1758	1927	2283	1664
TOTAL REVENUES	2858	2858	2858	2858	2858	2858	2858	2858	2858	1960
Net cash flow before taxes	1320	1403	1499	1610	1737	1883	2052	2368	2641	1960
Taxable income	559	529	494	454	408	354	293	441	358	296
Income taxes	168	159	148	136	122	106	88	132	107	89
Net cash flow after taxes	1152	1245	1351	1474	1615	1777	1964	2236	2534	1871
Internal Rate of Return										
Net present value at 0%										
Net present value at 5%										
Net present value at 10%										

For this illustrative housing project, the private bank would have a 3.8 percent internal rate of return on its portfolio for the housing project. This rate of return may not be adequate to cover administrative, delinquency, and default costs of the loans and to provide an adequate profit. Depending on local experience with these items, the project analyst might recommend that the projected spread between interest paid and earned by the bank be re-examined.

Note that inflation reduces the bank's return even further, since it receives payments calculated in pre-inflation terms.

Step 7. Analyze Financial Cash Flow and Feasibility of Project from Viewpoint of a National Housing Authority

In many countries, a national housing authority will have the responsibility of overseeing a low-income housing project and may actually participate in the construction and implementation of the project. The role of the housing authority for some projects may be similar to that of a private developer, constructing and selling housing units, and may also include a role similar to a private bank -- providing mortgages to project beneficiaries.

While the mandate for a national housing authority may not specify that it maximize profits, it nonetheless is appropriately concerned about the financial effect of housing projects on its liquidity and stability as an institution. Certainly a financially solvent housing authority will be in a stronger position to undertake subsequent housing projects.

Tables 17 and 17a present an illustrative financial cash flow analysis for a national housing authority involved in both the construction and financing of housing units. In this example, the housing authority was only responsible for unit Type A, the smallest and least expensive housing alternative in the project.

Project-related costs for the housing authority include land acquisition, on-site infrastructure connection to the housing units, housing construction, project administration and marketing, and interest and principal payments for funds borrowed from either the central bank or directly from AID.

In the example presented, the housing authority did not incur a financial cost for land acquisition, as land was assumed to be donated for the project by the government. On-site infrastructure, housing construction and project administration were estimated on per-unit costs and split over the three-year construction period. Marketing costs were assumed to be incurred during the four-year period required to sell all of the constructed units. The housing authority's interest expense was based on a 10 percent rate on outstanding loan balances, while principal was to be repaid evenly over a 20-year period following a 10-year grace period.

Revenues or sources of funds for the housing authority consist of loan proceeds from the central bank or AID, downpayments from the purchasers of the units, and mortgage payments.

Table 17. Financial Cash Flow Analysis From Viewpoint of Housing Authority
(Constant Dollars)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Project Costs(Uses of Funds)								
Land acquisition	0							
On Site Infrastructure								
Road	67	67	67					
Electricity	25	25	25					
Water supply	42	42	42					
Waste disposal	50	50	50					
Subtotal								
Housing construction								
Type A	438	438	438					
Type B	0							
Type C	0							
Subtotal								
Project administration	83	83	83					
Marketing		19	19	19	19			
Interest payments at 10 %	32	95	158	190	190	190	190	190
Principal repayment(10 year grace period)								
TOTAL COSTS	736	818	882	209	209	190	190	190
Project Revenues(Sources of funds)								
Proceeds from loans(90% of project building costs)	634	634	634					
Revenues from sale of units								
down payments, 10%	0	60	60	60	60			
mortgage payments (25 years at 12%)		34	102	171	240	274	274	274
Subtotal								
TOTAL REVENUES	634	728	796	231	300	274	274	274
Net cash flow	-102	-90	-85	22	91	84	84	84
Internal Rate of Return	0.182							
Net present value at 0%	1532							
Net present value at 10%	199							
Net present value at 20%	-20							
Net Present Value at 30%	-77							

Continued--

Table 17 (Continued)

Financial Cash Flow Analysis From Viewpoint of Housing Authority
(Constant Dollars)

Item	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
Project Costs(Uses of Funds)								
Land acquisition								
On Site Infrastructure								
Road								
Electricity								
Water supply								
Waste disposal								
Subtotal								
Housing construction								
Type A								
Type B								
Type C								
Subtotal								
Project administration								
Marketing								
Interest payments at 10 %	190	190	181	171	162	152	143	133
Principal repayment(10 year grace period)			95	95	95	95	95	95
TOTAL COSTS	190	190	276	266	257	247	238	228
Project Revenues(Sources of funds)								
Proceeds from loans(90% of project building costs)								
Revenues from sale of units								
down payments, 10%								
mortgage payments (25 years at 12%)	274	274	274	274	274	274	274	274
Subtotal								
TOTAL REVENUES	274	274	274	274	274	274	274	274
Net cash flow	84	84	-2	7	17	26	36	45
Internal Rate of Return								
Net present value at 0%								
Net present value at 10%								
Net present value at 20%								
Net Present Value at 30%								

(Continued)

Table 17 (Continued)

Financial Cash Flow Analysis From Viewpoint of Housing Authority
(Constant Dollars)

Item	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24
Project Costs(Uses of Funds)								
Land acquisition								
On Site Infrastructure								
Road								
Electricity								
Water supply								
Waste disposal								
Subtotal								
Housing construction								
Type A								
Type B								
Type C								
Subtotal								
Project administration								
Marketing								
Interest payments at 10 %	124	114	105	95	86	76	67	57
Principal repayment(10 year grace period)	95	95	95	95	95	95	95	95
TOTAL COSTS	219	209	200	190	181	171	162	152
Project Revenues(Sources of funds)								
Proceeds from loans(90% of project building costs)								
Revenues from sale of units								
down payments, 10%								
mortgage payments (25 years at 12%)	274	274	274	274	274	274	274	274
Subtotal								
TOTAL REVENUES	274	274	274	274	274	274	274	274
Net cash flow	55	65	74	84	93	103	112	122
Internal Rate of Return								
Net present value at 0%								
Net present value at 10%								
Net present value at 20%								
Net Present Value at 30%								

Table 17 (Continued)

Financial Cash Flow Analysis From Viewpoint of Housing Authority
(Constant Dollars)

Item	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30
Project Costs(Uses of Funds)						
Land acquisition						
On Site Infrastructure						
Road						
Electricity						
Water supply						
Waste disposal						
Subtotal						
Housing construction						
Type A						
Type B						
Type C						
Subtotal						
Project administration						
Marketing						
Interest payments at 10 %	48	38	29	19	10	0
Principal repayment(10 year grace period)	95	95	95	95	95	95
TOTAL COSTS	143	133	124	114	105	95
Project Revenues(Sources of funds)						
Proceeds from loans(90% of project building costs)						
Revenues from sale of units						
down payments, 10%						
mortgage payments (25 years at 12%)	274	274	240	171	102	34
Subtotal						
TOTAL REVENUES	274	274	240	171	102	34
Net cash flow	131	141	116	57	-3	-61
Internal Rate of Return						
Net present value at 0%						
Net present value at 10%						
Net present value at 20%						
Net Present Value at 30%						

Table 17a. Financial Cash Flow Analysis From Viewpoint of Housing Authority
(Current Dollars)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Project Costs(Uses of Funds)								
Land acquisition	0							
On Site Infrastructure								
Road	67	71	75					
Electricity	25	27	28					
Water supply	42	44	47					
Waste disposal	50	53	56					
Subtotal								
Housing construction								
Type A	438	464	492					
Type B	0							
Type C	0							
Subtotal								
Project administration	83	88	94					
Marketing		20	21	22	24			
Interest payments at 10 %	32	97	166	202	190	190	190	190
Principal repayment(10 year grace period)								
TOTAL COSTS	736	863	979	224	214	190	190	190
Project Revenues(Sources of funds)								
Proceeds from loans(90% of project building costs)	634	672	712					
Revenues from sale of units								
down payments, 10%	0	64	68	72	76			
mortgage payments (25 years at 12%)		37	112	192	277	320	320	320
Subtotal								
TOTAL REVENUES	634	772	892	264	353	320	320	320
Net cash flow	-102	-91	-87	39	139	130	130	130
Internal Rate of Return	0.275							
Net present value at 0%	2676							
Net present value at 10%	491							
Net present value at 20%	96							
Net Present Value at 30%	-19							

(Continued)

Table 17a. (Continued)

Financial Cash Flow Analysis From Viewpoint of Housing Authority
(Current Dollars)

Item	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
Project Costs(Uses of Funds)								
Land acquisition								
On Site Infrastructure								
Road								
Electricity								
Water supply								
Waste disposal								
Subtotal								
Housing construction								
Type A								
Type B								
Type C								
Subtotal								
Project administration								
Marketing								
Interest payments at 10 %	190	190	180	170	160	150	140	130
Principal repayment(10 year grace period)			101	101	101	101	101	101
TOTAL COSTS	190	190	281	271	261	251	241	231
Project Revenues(Sources of funds)								
Proceeds from loans(90% of project building costs)								
Revenues from sale of units								
down payments, 10%								
mortgage payments (25 years at 12%)	320	320	320	320	320	320	320	320
Subtotal								
TOTAL REVENUES	320	320	320	320	320	320	320	320
Net cash flow	130	130	39	49	59	69	80	90
Internal Rate of Return								
Net present value at 0%								
Net present value at 10%								
Net present value at 20%								
Net Present Value at 30%								

(Continued)

Table 17a. (Continued)

Financial Cash Flow Analysis From Viewpoint of Housing Authority
(Current Dollars)

Item	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24
Project Costs(Uses of Funds)								
Land acquisition								
On Site Infrastructure								
Road								
Electricity								
Water supply								
Waste disposal								
Subtotal								
Housing construction								
Type A								
Type B								
Type C								
Subtotal								
Project administration								
Marketing								
Interest payments at 10 %	120	109	99	89	79	69	59	49
Principal repayment(10 year grace period)	101	101	101	101	101	101	101	101
TOTAL COSTS	220	210	200	190	180	170	160	150
Project Revenues(Sources of funds)								
Proceeds from loans(90% of project building costs)								
Revenues from sale of units								
down payments, 10%								
mortgage payments (25 years at 12%)	320	320	320	320	320	320	320	320
Subtotal								
TOTAL REVENUES	320	320	320	320	320	320	320	320
Net cash flow	100	110	120	130	140	150	160	170
Internal Rate of Return								
Net present value at 0%								
Net present value at 10%								
Net present value at 20%								
Net Present Value at 30%								

(Continued)

Table 17a. (Continued)

Financial Cash Flow Analysis From Viewpoint of Housing Authority
(Current Dollars)

Item	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30
Project Costs(Uses of Funds)						
Land acquisition						
On Site Infrastructure						
Road						
Electricity						
Water supply						
Waste disposal						
Subtotal						
Housing construction						
Type A						
Type B						
Type C						
Subtotal						
Project administration						
Marketing						
Interest payments at 10 %	39	29	19	9	-2	-12
Principal repayment(10 year grace period)	101	101	101	101	101	101
TOTAL COSTS	140	130	120	109	99	89
Project Revenues(Sources of funds)						
Proceeds from loans(90% of project building costs)						
Revenues from sale of units						
down payments, 10%						
mortgage payments (25 years at 12%)	320	320	284	208	128	44
Subtotal						
TOTAL REVENUES	320	320	284	208	128	44
Net cash flow	180	191	164	99	29	-46
Internal Rate of Return						
Net present value at 0%						
Net present value at 10%						
Net present value at 20%						
Net Present Value at 30%						

Step 8. Analyze Financial Cash Flow and Feasibility of Project from Viewpoint of National and/or Local Government

Given the strictly limited government financial resources in many countries, the direct effect of the housing project on government receipts and expenditures may be a significant factor in evaluating a housing project. Like any other entity, the financial net cash flow of a housing project to the government treasury can be estimated by examining the government's costs and revenues generated by the project. Typically, governmental expenses related to a housing project will include some share of the costs of providing and maintaining basic infrastructure such as roads, electricity, water, and sewage systems; construction of community facilities, such as schools and other public areas; and technical assistance required to complete the project. If the government obtains a development loan from one of the international development credit institutions, the repayment of principal and interest will also be a project-related government cost.

The government's revenues from the housing project will usually consist of incremental sales, property and income tax revenues that are generated, and user fees for the infrastructure services provided. The property tax paid by the purchasers of the housing units will, in most cases, be entirely incremental tax receipts. There are two likely reasons for this. First, in many instances the purchasers of the new units may have come from households in the informal sector, where they did not have tenure and did not pay property taxes. Second, in most areas with a shortage

of housing, even if the purchasers of new units had been paying property taxes before, their old homes would be sold and would therefore remain in the overall tax base.

Income taxes from the project were already identified and estimated for the net cash flow analysis of the private developer and private bank. Their cash outflows should be recorded as revenues to the government.

If the government obtained financing from an international credit institution, then the proceeds of the loans should be entered as revenues or sources of funds for the years in which disbursements are made. The government's corresponding interest payments and principal repayments should be recorded as project costs.

An example of a financial cash flow analysis of a housing project from the viewpoint of a national and/or local government is shown in Tables 18 (constant) and 18a (inflated). The government was assumed to obtain an AID guaranty loan at 10 percent interest with a ten-year grace period for principal repayments. Maintenance on basic infrastructure was assumed to be 2 percent of construction costs. It was also assumed that annual property tax would be at the rate of 2 percent of the sales price per unit, and user fees for basic infrastructure services would be $15 per month per unit.

Economic Feasibility of a Housing Project

The economic analysis of a housing project usually can be prepared by making adjustments to costs and revenues estimated in the financial analysis. This section will

provide a step-by-step presentation of how to transform the financial analysis into an economic analysis, including how to identify which costs and benefits should be excluded or included, concepts underlying shadow pricing, and how to interpret the results of the economic analysis. First, the basic difference between financial and economic analysis in terms of point of view will be discussed.

In one sense, both the financial and economic analyses of a housing project have a similar objective -- to assess the value or worth of undertaking a housing construction activity. However, the financial and economic analyses are distinguished by the different perspectives under which the project is considered, the different items considered as project benefits and costs, and the different valuation of those items. The financial analysis of a housing project evaluates the monetary profit or return to a project participant, while the economic analysis measures the effect of the housing project on the economy as a whole. For instance, in the financial analysis it was assumed that some of the land required for the project was donated by the government, and since there was no corresponding cash transaction, there was no financial cost incurred by the project. However, the economic analysis would consider the alternative value or opportunity cost of the donated land, even though there was no financial transaction. In this sense, the economic analysis measures the cost of resources used by the project and the benefits in terms of value to society from the use of those resources relative to other alternative uses.

The following steps are required to transform the financial analysis of a housing project into an economic analysis.

Step 1. Identify and estimate project costs that were excluded from the financial analysis.

Step 2. Eliminate project financial costs that do not involve the use of resources.

Step 3. Adjust project costs for economic or shadow prices instead of financial or market prices.

Step 4. Estimate project benefits based on the imputed rental value of constructed housing units.

Step 5. Estimate the economic rate of return of the project.

The key consideration in undertaking each of these steps is to keep in mind the different perspectives of the financial and economic analyses, and the alternative uses of resources devoted to the housing project.

Step 1. Identify Project Costs That Were Excluded from the Financial Analysis

As stated earlier, the use of some resources for the project may not have a financial cost and would not have been included in the financial analysis, but does belong in the economic analysis. Donated land is one example of these excluded costs for a housing project. Other economic costs excluded from the financial analysis might be construction equipment and materials already owned by the national housing authority or by the private developer.

At this stage of the economic analysis, it is recommended that these items be valued based on unit costs expressed in financial terms and adjusted for economic valuation along with other project costs in Step 3.

Table 18. Financial Cash Flow Analysis From Viewpoint of National and Local Gov'
(Constant Dollars)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Project Costs(Uses of Funds)								
Land acquisition								
Basic infrastructure								
Road	1067	1067	1067					
Electricity	400	400	400					
Water supply	667	667	667					
Waste disposal	800	800	800					
Subtotal	2933	2933	2933					
Infrastructure maintenance	0	0	0	176	176	176	176	176
Interest payments at 10%	147	440	733	880	880	880	880	880
Loan repayment(10 year grace period)								
TOTAL COSTS	3080	3373	3667	1056	1056	1056	1056	1056
Project Revenues(Sources of funds)								
Proceeds from loans(100% of construction costs)	2933	2933	2933					
Beneficiaries property tax at 2%		122	244	366	378	378	378	378
Private developer's income tax, 30%		528	602	1591				
Private bank's income tax, 30%	30	24	61	96	164	159	152	144
Subtotal								
User fees at $15/month		112	225	337	360	360	360	360
TOTAL REVENUES	2963	3719	4065	2390	902	897	890	882
Project Net Income	-117	346	399	1334	-154	-159	-166	-174
Internal Rate of Return	-1.93							
Net present value at 0%	-7967							

Continued--

Table 18 (Continued)

Financial Cash Flow Analysis From Viewpoint of National and Local Gov't
(Constant Dollars)

Item	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
Project Costs(Uses of Funds)								
Land acquisition								
Basic infrastructure								
Road								
Electricity								
Water supply								
Waste disposal								
Subtotal								
Infrastructure maintenance	176	176	176	176	176	176	176	176
Interest payments at 10%	880	880						
Loan repayment(10 year grace period)			1034	1034	1034	1034	1034	1034
TOTAL COSTS	1056	1056	1210	1210	1210	1210	1210	1210
Project Revenues(Sources of funds)								
Proceeds from loans(100% of construction costs)								
Beneficiaries property tax at 2%	378	378	378	378	378	378	378	378
Private developer's income tax, 30%								
Private bank's income tax, 30%	135	125	113	100	85	67	46	54
Subtotal								
User fees at $15/month	360	360	360	360	360	360	360	360
TOTAL REVENUES	873	863	851	838	823	805	784	792
Project Net Income	-183	-193	-359	-372	-387	-405	-426	-418
Internal Rate of Return								
Net present value at 0%								

Continued--

Table 18 (Continued)

Financial Cash Flow Analysis From Viewpoint of National and Local Gov't
(Constant Dollars)

Item	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24
Project Costs(Uses of Funds)								
Land acquisition								
Basic infrastructure								
Road								
Electricity								
Water supply								
Waste disposal								
Subtotal								
Infrastructure maintenance	176	176	176	176	176	176	176	176
Interest payments at 10%								
Loan repayment(10 year grace period)	1034	1034	1034	1034	1034	1034	1034	1034
TOTAL COSTS	1210	1210	1210	1210	1210	1210	1210	1210
Project Revenues(Sources of funds)								
Proceeds from loans(100% of construction costs)								
Beneficiaries property tax at 2%	378	378	378	378	378	378	378	378
Private developer's income tax, 30%								
Private bank's income tax, 30%	38	30						
Subtotal								
User fees at $15/month	360	360	360	360	360	360	360	360
TOTAL REVENUES	776	768	738	738	738	738	738	738
Project Net Income	-434	-442	-472	-472	-472	-472	-472	-472
Internal Rate of Return								
Net present value at 0%								

Continued--

Table 18 (Continued)

Financial Cash Flow Analysis Froa Viewpoint of National and Local Gov t
(Constant Dollars)

Itea	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30
Project Costs(Uses of Funds)						
Land acquisition						
Basic infrastructure						
Road						
Electricity						
Water supply						
Waste disposal						
Subtotal						
Infrastructure maintenance	176	176	176	176	176	176
Interest payments at 10%						
Loan repayment(10 year grace period)	1034	1034	1034	1034	1034	1034
TOTAL COSTS	1210	1210	1210	1210	1210	1210
Project Revenues(Sources of funds)						
Proceeds from loans(100% of construction costs)						
Beneficiaries property tax at 2%	378	378	378	378	378	378
Private developer's income tax, 30%						
Private bank's income tax, 30%						
Subtotal						
User fees at $15/month	360	360	360	360	360	360
TOTAL REVENUES	738	738	738	738	738	738
Project Net Income	-472	-472	-472	-472	-472	-472
Internal Rate of Return						
Net present value at 0%						

Table 18a. Financial Cash Flow Analysis From Viewpoint of National and Local Govt
(Current Dollars)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Project Costs(Uses of Funds)								
Land acquisition								
Basic infrastructure								
Road	1067	1131	1199					
Electricity	400	424	449					
Water supply	667	707	749					
Waste disposal	800	848	899					
Subtotal	2933	3109	3296					
Infrastructure maintenance	0	0	0	210	222	236	250	265
Interest payments at 10%	147	449	769	934	934	934	934	934
Loan repayment(10 year grace period)								
TOTAL COSTS	3080	3558	4065	1143	1156	1169	1184	1198
Project Revenues(Sources of funds)								
Proceeds from loans(100% of construction costs)	2933	3109	3296					
Beneficiaries property tax at 2%		129	274	436	478	506	537	569
Private developer's income tax, 30%		637	833	2133				
Private bank's income tax, 30%	30	21	61	102	194	189	183	176
Subtotal								
User fees at $15/month		119	253	401	454	482	511	541
TOTAL REVENUES	2963	4015	4717	3072	1126	1177	1230	1286
Project Net Income	-117	457	652	1929	-30	8	47	88
Internal Rate of Return	4.486							
Net present value at 0%	20468							

Continued--

Table 18a. (Continued)

Financial Cash Flow Analysis From Viewpoint of National and Local Gov't
(Current Dollars)

Item	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
Project Costs(Uses of Funds)								
Land acquisition								
Basic infrastructure								
Road								
Electricity								
Water supply								
Waste disposal								
Subtotal								
Infrastructure maintenance	281	297	315	334	354	375	398	422
Interest payments at 10%	934	934						
Loan repayment(10 year grace period)			1097	1097	1097	1097	1097	1097
TOTAL COSTS	1214	1231	1412	1431	1451	1472	1495	1519
Project Revenues(Sources of funds)								
Proceeds from loans(100% of construction costs)								
Beneficiaries property tax at 2%	603	639	677	718	761	807	855	906
Private developer's income tax, 30%								
Private bank's income tax, 30%	168	159	148	136	122	106	88	132
Subtotal								
User fees at $15/month	574	608	645	683	724	768	814	863
TOTAL REVENUES	1345	1406	1470	1537	1608	1681	1757	1901
Project Net Income	130	175	58	106	156	208	262	383
Internal Rate of Return								
Net present value at 0%								

Continued--

Table 18a. (Continued)

Financial Cash Flow Analysis From Viewpoint of National and Local Gov't
(Current Dollars)

Item	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24
Project Costs(Uses of Funds)								
Land acquisition								
Basic infrastructure								
Road								
Electricity								
Water supply								
Waste disposal								
Subtotal								
Infrastructure maintenance	447	474	502	533	564	598	634	672
Interest payments at 10%								
Loan repayment(10 year grace period)	1097	1097	1097	1097	1097	1097	1097	1097
TOTAL COSTS	1544	1571	1599	1629	1661	1695	1731	1769
Project Revenues(Sources of funds)								
Proceeds from loans(100% of construction costs)								
Beneficiaries property tax at 2%	961	1019	1080	1144	1213	1286	1363	1445
Private developer's income tax, 30%								
Private bank's income tax, 30%	107	89						
Subtotal								
User fees at $15/month	915	969	1028	1089	1155	1224	1297	1375
TOTAL REVENUES	1982	2077	2107	2234	2368	2510	2660	2820
Project Net Income	438	506	508	604	706	814	929	1051
Internal Rate of Return								
Net present value at 0%								

Continued--

Table 18a. (Continued)

Financial Cash Flow Analysis From Viewpoint of National and Local Gov't
(Current Dollars)

Item	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30
Project Costs(Uses of Funds)						
Land acquisition						
Basic infrastructure						
Road						
Electricity						
Water supply						
Waste disposal						
Subtotal						
Infrastructure maintenance	713	755	801	849	900	954
Interest payments at 10%						
Loan repayment(10 year grace period)	1097	1097	1097	1097	1097	1097
TOTAL COSTS	1810	1852	1898	1946	1997	2051
Project Revenues(Sources of funds)						
Proceeds from loans(100% of construction costs)						
Beneficiaries property tax at 2%	1532	1623	1721	1824	1933	2049
Private developer's income tax, 30%						
Private bank's income tax, 30%						
Subtotal						
User fees at $15/month	1458	1545	1638	1736	1840	1951
TOTAL REVENUES	2989	3168	3359	3560	3774	4000
Project Net Income	1180	1316	1461	1614	1777	1950
Internal Rate of Return						
Net present value at 0%						

Step 2. Eliminate Project Financial Costs That Do Not Involve the Use of Resources

The financial analysis of a housing project normally includes several items that are merely financial transfers among project participants or between project participants and outside parties. For instance, taxes paid by the project developer, private bank, and project beneficiaries are financial transfers that do not involve the use of economic resources. Depreciation, while generally considered a cost for financial purposes, is not a true cost in economic terms.

Step 3. Adjust Project Costs for Economic or Shadow Prices

Economic or shadow prices measure the alternative or marginal costs of using an economic resource. They often differ from financial or market prices for several reasons. For example:

- Financial prices contain government imposed taxes or subsidies, and may be artificially controlled.
- There is often an oversupply of unskilled labor. The real economic cost of employing such labor is much less than the financial cost. Alternatively, there may be a scarcity of skilled labor that is not fully reflected in the wage rate, because of government price controls or other factors.
- Foreign exchange may be in short supply and its use regulated. Governments often supply foreign exchange for imports at local currency exchange rates well below the rates which would apply if the normal forces of supply and demand were allowed to interact.

In this case, in order to calculate true economic costs for traded goods, a premium needs to be added to all costs with external sources.

- Interest rates are often lowered artificially by government controls or officially subsidized credit. Consequently, the official interest rate may not reflect what borrowers are willing to pay (and, often, actually have to pay on the private market), based on the profitability of the investments open to them.

For the economic analysis of a housing project, the analyst will likely require an estimate of the shadow price of foreign exchange, skilled and unskilled labor, capital (the interest rate), and possibly land. Naturally, these shadow prices are country-specific.

Since shadow prices are by definition economy-wide, rather than specific to the housing sector, it is often possible to make use of shadow prices developed for other analysis. Ideally, the set of shadow prices to be used in evaluating AID-funded projects in a particular country should be developed by the mission's program economist (or equivalent officer) to ensure consistency across projects. If such a set is not available to the analyst, the best alternative sources are generally:

- National planning agencies or investment authorities that regularly perform project analyses for donor-funded projects

- International donors or other institutions that have previously examined the economic use of inputs for that country (often shadow prices can be found in a recent project appraisal)

As a last resort, the analysts may be forced to develop shadow prices for themselves. The procedures for doing so are spelled out in detail in the standard texts on project evaluation. If time and data do not permit using these methods, recourse may be made to rules of thumb, such as the following:

- Foreign exchange - The average of the official rate and the black market rate (weighted by the share of trade moving through each channel)
- Unskilled labor - Half the rural wage, for cases where underemployment is believed to be widespread
- Interest rates - The free market rate, if observable, or a weighted average of the interest rate in the most important markets (ideally, including the informal or open market)

Use of broad rules of thumb can be a dangerous practice, however, lending an appearance of rigor to what is actually a very rough and ready estimate. Particularly when the preliminary calculations indicate that small changes in important prices (such as the wage rate) have a very large effect on the apparent profitability of the project, it is often preferable to limit the corrections to the removal of any taxes and subsidies that can be identified, rather than constructing an elaborately shadow priced analysis on shaky foundations.

Table 19 presents a summary of the project costs in economic prices for the illustrative example referenced in the financial analysis. For this example, land costs for both government-donated and developer-purchased land were

Table 19. Project Costs in Economic Prices by Project Component

Project component	Foreign currency cost			Local currency cost					
	Materials and equipment	Labor and consultants	Subtotal	Import duties & other taxes	Materials and equipment	Labor			Total cost
						Skilled	Unskilled	Subtotal	
Land acquisition								4556	4556
Total Infrastructure									
Road	700		700		1800	740	666	3206	3906
Electricity	263		263		675	278	250	1202	1465
Water supply	438		438		1125	463	416	2004	2441
Waste disposal	525		525		1350	555	500	2405	2930
Housing Construction									
Type A	230		230		591	364	146	1101	1331
Type B	656		656		1688	1041	416	3144	3801
Type C	525		525		1350	833	333	2516	3041
Technical assistance & project admin.		1750	1750			1250		1250	3000
Marketing						375		375	375
Total Costs	3336	1750	5086		8578	5897	2726	21758	26844

valued using the market or financial prices. This assumes that the market price of the land has fully and accurately taken into account its alternative economic value.

Project costs requiring foreign currency were valued at a shadow price 1.75 times greater than financial prices, reflecting the scarcity of foreign exchange in the economy. Import duties and other taxes were eliminated from project costs, as they do not involve a use of economic resources. Skilled labor was valued at 1.25 times the market rate, while unskilled labor was valued at only 0.75 times the market rate, reflecting their relative supply in the economy.

Step 4. Estimate Project Benefits Based on Imputed Rental Value of Constructed Housing Units

Perhaps the clearest way to identify economic benefits of a project is to consider benefits as the incremental outputs being produced with the resources or inputs required for the project.[1] In the case of a housing construction project, there is little doubt that the incremental outputs being produced consist of the constructed dwellings. The key question is how the benefits of these additional dwellings should be measured and valued.

It is recommended that the project analyst view the economic benefits of a housing unit as the value of service provided over the life of the unit. In an economy with

---

1. For some projects, economic benefits might also consist of producing the same level of output but at cost savings. These cost savings would then represent the economic benefit of the project.

little or no distortion in markets, the economic benefit would be determined by the rental value of the unit. However, in many areas, particularly those with housing shortages, rent controls and other market distortions result in market rents that do not represent the scarcity value of housing. When these conditions are present, the project analyst will have to estimate an imputed rental value of the unit.

One method of estimating this value is to use the expected sales price of the unit and to compute an annual rental payment over the life of the project similar to a mortgage calculation.[1] This annual payment may be then taken as a proxy for the expected rental value of the unit. In areas characterized by a shortage of housing this cost-based annual rent will often represent the minimum rental value or economic benefit of the unit.

Economic benefits estimated on this rental value basis should be adjusted for the historical tendency of housing values to appreciate faster than the rate of inflation. This appreciation reflects a real increase in the rental value over the life of the units, usually reflecting the scarcity of housing. Similarly, the residual value of the housing unit at the end of the project should be estimated as a means of approximating the future rental value of the unit.

---

1. In calculating this annualized rental payment, the project analyst should use the expected useful life of the unit and the shadow rate of interest. The shadow rate of interest will generally be in the range of three to four percentage points higher than the anticipated rate of inflation.

Table 20 presents an example of the estimated economic benefits and costs of a housing project. In this example, economic benefits were estimated based on the imputed rental value of the constructed units. An annualized rental payment based on the sales price of the unit, a useful life of 50 years, and an interest rate of 15 percent were used. Rental values were adjusted for appreciation at a one percent annual rate. It should be noted that the residual value represents the complete appreciated value of all construction, as the project costs allow for maintenance of the units and infrastructure at an annual rate of 2 percent.

Step 5. Estimate Economic Rate of Return of Project

The net annual stream of economic benefits of the project can be obtained by subtracting the annual estimated project benefits from the project costs. Once the annual net economic benefits are determined, the economic internal rate of return of the housing project can be calculated. If the economic rate of return of the project is greater than the opportunity cost of capital, the project is economically acceptable.

It is often useful to compare the economic rate of return of alternative project designs as a means of determining the most economically feasible alternative. For example, if two alternative project designs have the same financial cost, but one alternative relies more heavily on the use of imported materials, the economic rates of return of the alternative designs will differ. This is due to the estimation of project costs using the shadow price of foreign exchange and its proper weighting in project costs.

Table 20. Economic Analysis of A Housing Project

	Project costs				Project benefits				
					Imputed Rental Value of Units				
Year	Land acquisition	Construction costs	Maintenance cost	Total costs	Type A	Type B	Type C	Total direct benefits	Net benefits
1	4556	7429	149	12134	0	0	0	0	-12134
2		7429	297	7727	90	482	344	916	-6810
3		7429	446	7875	181	963	689	1833	-6042
4			446	446	271	1445	1033	2749	2303
5			446	446	361	1459	1044	2864	2419
6			446	446	365	1474	1054	2893	2447
7			446	446	369	1489	1065	2922	2476
8			446	446	372	1504	1075	2951	2505
9			446	446	376	1519	1086	2981	2535
10			446	446	380	1534	1097	3010	2565
11			446	446	384	1549	1108	3040	2595
12			446	446	387	1565	1119	3071	2625
13			446	446	391	1580	1130	3102	2656
14			446	446	395	1596	1141	3133	2687
15			446	446	399	1612	1153	3164	2718
16			446	446	403	1628	1164	3196	2750
17			446	446	407	1644	1176	3228	2782
18			446	446	411	1661	1188	3260	2814
19			446	446	415	1678	1200	3292	2847
20			446	446	419	1694	1212	3325	2880
21			446	446	424	1711	1224	3359	2913
22			446	446	428	1728	1236	3392	2946
23			446	446	432	1746	1248	3426	2980
24			446	446	436	1763	1261	3460	3015
25			446	446	441	1781	1273	3495	3049
26			446	446	445	1799	1286	3530	3084
27			446	446	450	1817	1299	3565	3119
28			446	446	454	1835	1312	3601	3155
29			446	446	459	1853	1325	3637	3191
30			446	446	463	1872	1338	3673	3227
Residual value		-34770		-34770					34770
								IRR	0.095

VI. USING THE ECONOMIC ANALYSIS AS A TOOL TO IMPROVE PROGRAMMING IN THE HOUSING SECTOR

In an ideal world, several alternative project designs would be developed and economic analyses of each performed as the basis for selecting the best design. This approach is rarely, if ever, practical, since resources do not permit the design and costing of several alternatives. This does not imply, however, that the economic analysis must become a sterile exercise serving only to meet a formal approval requirement. It simply changes the way economic analysis is used during and after design. This chapter is intended to help the economist and the non-economist to make the best use of the project's economic analysis.

As the discussion that follows should make clear, the purpose of the economic analysis is not simply to determine the project's internal rate of return. On the contrary, a project-wide rate of return may not even be useful if the project includes components with hard-to-quantify benefits such as policy analysis and tenure reform. The potential usefulness of the economic analysis derives not from the results of the analysis but instead from the interpretation of these results, which, properly and carefully done, can provide extremely valuable information to improve the

design, implementation, and evaluation of housing projects and to support better programming in the sector as a whole.

What Can Economic Analysis Tell Us?

Economic analysis of housing projects serves five basic purposes:

- It provides the information needed to decide whether a project should be funded
- It helps in identifying areas where the project design needs to be strengthened
- It indicates where project success is sensitive to delays or changes during implementation, serving as an aid in project monitoring and evaluation
- It provides information that can be used to determine the feasibility of applying the project strategy on a larger scale
- It suggests areas where current policy is detrimental to the development of the housing sector, supporting the policy dialogue and other mission activities in the housing sector

Using the Analysis to Improve Housing Project Design and Implementation

Making the Go - No Go Decision on a Project

The main purpose for completing an economic analysis is to indicate whether the project is sufficiently profitable to justify its implementation. As a practical matter, however, few projects are cancelled after reaching final design because of a marginal IRR. By jiggling the figures,

a project economist can nearly always turn a marginal rate of return into an acceptable one, and still look himself in the mirror the next day. This situation is due in part to the difficulty of measuring costs and benefits in economic terms, which leaves a large margin for professional judgment. But it is also due to the ability of economists and non-economists to recognize a poor design without formal analysis: major design flaws are usually found and corrected long before the project has progressed to the point of finalizing the design and completing the economic analysis, and unsalvagable designs are dropped.

Sometimes, however, an unprofitable project design will not be corrected or weeded out through this process. This is especially likely to happen if there are major changes during the final design that greatly increase the cost or decrease the benefits, such as a large increase in the price of a major input. In this situation, the project economic analysis becomes important, and may be valuable in helping the project sponsors to recognize that a once-attractive concept is simply not going to work out. The comparatively low cost of an economic analysis is justified if it enables donors to catch the one in twenty or one in fifty projects reaching final design that simply should not go forward.

Using the Analysis to Improve the Design

For most projects, however, the main purpose of the economic analysis is to help the project designers to recognize points where improvement is needed and to identify factors that are critical to project success. For example, the analysis may indicate that an attractive return for the

housing developer depends critically on being able to sell all units within the first two years. This information may suggest parts of the design where modification would be appropriate to widen the margin for error or to ensure that the sales program gets off to a fast start.

If the analysis is to serve this purpose, it must clearly be done before the design is finalized. In other words, calculation of the project economic return should begin before the budget is finalized, not afterwards, even though only the final set of calculations will appear in the project document. The sooner the project economist begins to "run the numbers," the more likely that the exercise will be of practical use to the design. Even though the budget will change numerous times in response to the evolution of the design, rough cuts at the economic analysis should begin as soon as there are some numbers to work with.

The iterative approach to economic analysis, long advocated as an ideal, has now become practicable through the widespread use of computerized spreadsheet programs. This procedure makes it much more likely that the implications of an important design change, such as a large increase in unit costs, will be recognized while there is still time to make corrections or, if necessary, cancel the project.

Using the Analysis in Implementation and Evaluation

As noted at the beginning of this chapter, the usefulness of the economic analysis lies not in the numerical results but in how these results are interpreted and used in project design and implementation. Properly done, the

economic analysis will indicate the points where the projects's success is sensitive to changes in the economic environment or to deviations from the design, delays, and increases in cost.

This information can alert the project officer to those factors deserving especially close attention during project implementation and suggest areas that should be explored during project evaluation. For example, if the economic analysis reveals that the return to the developer depends critically on rapid sale of the housing units, then the project officer may wish to monitor the sales program to identify and overcome problems that might delay sales if not corrected. Similarly, the project evaluation team may wish to examine the housing sales performance to determine whether there were delays and, if so, whether they had a serious impact on the developer's rate of return.

In theory, it would be desirable to recalculate the project's rate of return midway through implementation and again after the project is completed, to verify that the project has had the results intended. In practice, resources rarely permit this analysis to be performed, and the potential benefits from redoing the analysis may not merit the effort, once the project has been completed. Two important exceptions should be noted to this principle, however:

- The economic analysis should be repeated if a major redesign becomes necessary during implementation. If, for example, a change in construction costs forces the number of units to be cut in half, the economics of the project should be reexamined before making a decision to proceed with the project.

The validity of the initial economic analysis should be reconfirmed before expanding or extending the project or beginning a follow-on project.

Applying the Analysis to Support Housing Sector Programming

The design of a housing project entails a concentration of analytic resources on the housing sector. Since such an allocation of resources is rarely possible outside the context of the design process, it is important that the opportunity be used to gain as much benefit for the total sector program as possible. The economic analysis for the housing project can provide much information that is useful to other elements of the mission's housing sector program, particularly if this potential is recognized during the planning of the design and preparations are made to take advantage of it.

Gauging the Broader Applicability of the Project Approach

In some cases, a housing sector assessment will have been completed before the project design begins. Such an assessment generally includes an examination of the fiscal and financial feasibility of various strategies to meet the nation's housing needs. It may then be presumed that the housing project under design follows one of the strategies identified as financially feasible for the nation as a whole, especially if the project is intended to serve as a pilot or demonstration project.

Where such a strategic analysis has not been completed, however, the project economic analysis can provide much

information useful to housing sector planners in considering alternatives for future programming in the sector. For example, in the hypothetical case presented in the previous section, the analysis revealed that the project will have a significant fiscal cost to the government in the form of recurrent costs for infrastructure services that are not recovered from tax revenues. This may suggest a need to find ways to lower infrastructure costs or increase cost recovery, so that the fiscal constraint does not become a limiting factor on expansion of the housing supply in the future.

Using the Economic Analysis to Support the Policy Dialogue

The project economic analysis can potentially be very useful as a support to mission policy dialogue, both in the housing sector and in related macroeconomic issues. For example, the case presented in the previous section demonstrated that the four-point spread between the rate of interest charged by the bank and the interest rate it must pay for funds is not profitable, given the delay between outlay and repayment, even without allowing for default or administrative costs. Such a concrete example can be extremely helpful in demonstrating the need for action on macro-issues such as interest rate policy.

BIBLIOGRAPHY

Araud, C., G. Boon, V. Urquidi, and P. Strassman, 1973. Studies on Employment in the Mexican Housing Industry. Employment Study Series, No. 10. OECD, Paris France.

Bloomberg, Laurence, 1964. "Housing Demand Analysis in Developing Countries." Proceedings of the Social Statistics Section. American Statistics Association.

Currie, Lauchlin, 1974. "The 'Leading Sector' Model of Growth in Developing Countries." Journal of Economic Studies, Vol. , No. 1.

Gittinger, J. Price, 19--. Economic Analysis of Agricultural Projects (Second Edition). World Bank, The Johns Hopkins University Press, Baltimore, MD.

Grebler, Leo, David Blank, and Louis Winnick, 1956. Capital Formation in Residential Real Estate: Trends and Prospects. Princeton University Press, Princeton, NJ.

Grimes, Orville F., 1976. Housing for Low-Income Urban Families: Economics and Policy in the Developing World. World Bank, Washington, D.C.

Katsura, Harold, 1984. Economic Effects of Housing Investment. Urban Institute, Washington, D.C.

Kravis, Irving, Alan Heston, and Robert Summers, 1982. World Product and Income: International Comparisons of Real Gross Product. World Bank, The Johns Hopkins University Press, Baltimore MD.

Kuznets, Simon, 1946. National Product Since 1869. National Bureau of Economic Research, New York.

Little, I. and Mirrlees, J., Project Appraisal and Planning for Developing Countries, Heinemann, London, 1974.

Mishan, E.J., Cost-Benefit Analysis, 2nd Edition, Allen & Unwin, London, 1975.

Morton, J.E., 1956. Urban Mortgage Lending: Comparative Markets and Experience. Princeton University Press, Princeton, NJ.

Musgrove, Philip, 1978. Consumer Behavior in Latin America. The Brookings Institution, Washington, D.C.

Previous Page Blank

Renaud, Bertrand, 1984. Housing and Financial Institutions in Developing Countries: An Overview. World Bank Staff Working Paper, Number 658, World Bank, Washington, D.C.

Robert R. Nathan Associates, Inc. and The Urban Institute, Housing Needs Assessment Methodology, USAID Office of Housing and Urban Programs, April 1984.

Strassman, W. Paul, 1985. "Employment in Construction: Multicountry Estimates of Costs and Substitution Elasticities for Small Dwelling." Economic Development and Cultural Change, Vol. 33, No. 2.

Squire, L. and Vandertak, H. Economic Analysis of Projects, John Hopkins University Press, Baltimore, 1975.

_____, 1976. "Measuring the Employment Effects of Housing Policies in Developing Countries." Economic Development and Cultural Change, Vol. 24, No. 3.

Tjioe, B. Khing, and Leland S. Burns, 1966. "Housing and Productivity: Causality and Measurement." Proceedings of the Social Statistics Section. American Statistical Association.

_____, AID Housing Needs Assessment Model: Users Manual. USAID Office of Housing and Urban Programs, June 1984.

World Tables, 1980 (Second Edition). World Bank, The Johns Hopkins University Press, Baltimore, MD.

APPENDIX
A

Appendix A. Essential Elements of Financial and Economic Analysis of Housing Projects

Element of analysis	Information of data required
Financial analysis	
Identify and estimate project costs and sources of funding	Land acquisition cost, infrastructure improvement costs, housing, construction costs by type of unit, marketing costs and contingencies. Project costs expressed in current dollars, including estimates of inflation.
Estimate expected sales price by type of unit	Estimate of developer's mark-up or profit, estimates of project administration expenses, contingencies.
Estimate target household's affordable investment and compare to expected sales price of units	Estimates of average household income, income available for housing finance, average downpayment amounts, lending terms and conditions.
Analyze financial cash flow from perspective of a private developer	Timing of construction and cash outlays, loan terms and conditions, timing of revenues from sale of units.
Conduct sensitivity analysis	Test critical assumptions, including share of income available for housing finance, overall project costs, interest rates, sales price of units inflation estimates.

Continued

Appendix A. (continued)

Element of analysis	Information of data required
Economic analysis	
Identify project costs that use resources of society	Estimate opportunity cost of donated land, excluding taxes and transfers. Project costs expressed in constant dollars, excluding inflation estimates.
Estimate project costs at economic or shadow prices	Divide project costs in foreign and local currency requirements. Differentiate skilled and unskilled labor. Use shadow prices for foreign exchange, labor, and capital (interest rates).
Estimate project benefits based on imputed rental value of constructed housing units	Expected rental value of alternative units, projected appreciation of units, estimates of salvage value at end of project analysis period.
Estimate economic feasibility of project in terms of annual net economic benefits	Calculate economic rate of return, net present value and cost-benefit ratios.
Conduct sensitivity analysis	Test critical assumptions, including imputed rental value estimates, project costs, alternative designs of units, shadow price estimates.