A COMPARATIVE EVALUATION OF PUBLIC HOUSING

PROGRAMS IN THE LIBYAN ARAB REPUBLIC

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α	parameter
β	parameter
B_t^n	net tenant benefits
B_t^g	gross tenant benefits
FZ	family size
G	age of the head of the family
H	housing service
L_R	monthly land rent
MD	monthly depreciation
Pm	monthly payment for housing service when the loan to build the house is taken from the private capital market
Pp	monthly payment for housing service when the loan to build the house is taken from the Industrial and Real Estate Bank
Mp	monthly payment of the principal of the loan plus monthly interest charges
Mn	monthly maintenance expenditures
Ph	price of housing service
Px	price of Hicksian Composite good
Rm	market rent
Rp	project rent
S	tenant subsidy
U	parameter
X	Hicksian Composite good

Y income level that would allow the tenant to attain a level of satisfaction equal to that attained under the housing program

Y_o actual income of the tenant

CHAPTER I

INTRODUCTION

Housing is recognized as a basic demand of human beings. A major

objective of many governments is to supply its people with a reasonable

standard of dwelling units.

The Libyan Arab Republic like any other country is doing its best

in this field. It has initiated and adopted several housing programs to

meet this objective. These various programs differ in many ways. Even

though they were all designed to solve the same problem, they differ in

their institutional framework, and in the way they are implemented.

Different programs are designed to benefit members of different income

classes.

The main housing programs in the L.A.R. can be divided into these

following categories.

    (1)   Public housing program: under this program, the Libyan govern-

           ment builds houses at pre-determined locations, and with

           standard designs. Then it gives them to the poorest people in

           the economy.

    (2)   Interest free loans: under this program, the people who are

           in the income class from L.D. 50 to L.D. 99 per month[1]

           receive an interest free loan from the Real Estate and

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[1]Libyan Dinar = $3.37.

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Industrial Bank, a governmental bank. To get the loans from

the bank, these people have to own the building lot or at

least have an option on one to be purchased with the loan.

These loans are paid back over a 20-year period.

(3) Low interest rate loans: This program is designed to serve

the people who earn a monthly income in excess of L.D. 100.

Since these people are not eligible for interest free loans,

the government designed this program to provide them with sub-

sidized loans from the commercial banks at a 4 percent interest

rate.

(4) Rent allowance program: Under this program, the government

gives its employees a monthly allowance for rent. This allow-

ance is calculated as a percentage of the employee's monthly

salary. This percentage gets lower as the monthly salary gets

higher, and gets higher as the monthly salary gets lower, but

with a minimum and maximum limit. Then this allowance is just

added to the employee's monthly salary. The employees are not

required to prove that they spent this allowance as a rent. In

fact they do not even have to rent a house.

There are other government housing programs not mentioned here, but

they are related to one or another of these programs. These four

programs mentioned here constitute most of the governmental housing

policy.

The Nature of the Problem

The Libyan Arab Republic as other developing countries has had a

housing problem for a long time. Many houses and construction buildings

were lost during the wars, especially during the war for independence which lasted more than 30 years. The housing problem has become more acute and noticeable since 1960.

From 1951 when Libya got its independence to 1956, it was a very poor country, depending more heavily on foreign assistance and rent from foreign military bases. From 1956 to 1960 some foreign oil companies came in looking for oil and spent a lot of money which generated limited economic prosperity and job opportunities concentrated mainly in the two big cities, Tripoli and Benghazi. This, of course, was a very strong economic incentive for the rural population, especially the labor force, to move to the urban areas.

But the biggest change in the Libyan economy started with the beginning of oil exportation in 1961. Since that year oil revenue has accumulated rapidly. Economic activity and job opportunities grew rapidly year by year. The economy was transformed from a very weak and traditional agricultural economy to one depending more and more on the oil sector.

Another result was a rapidly increasing migration from rural areas to urban centers. This movement had created a lot of problems in both urban centers and the rural areas. The most important and urgent problem was thought to be the housing problem. The movement of rural population to urban centers is larger and faster than the urban housing sector can absorb. As a result, crowding in housing began to appear as a higher rate of persons per room. Slums and shanty towns increased every year around the two big cities. At this point, the government started to play its role in this field, and initiated some housing programs to solve the housing problem.

Purpose of the Study

The main purpose of this study is to compare the two main public housing programs, namely, interest free loans program, and the publicly-built housing program. This study will compare these two housing programs in terms of net tenant benefits they provide to their participants, net tenant benefit-tenant subsidy ratio, and in the way these net tenant benefits are distributed according to family characteristics such as family income, family size, and age of the head of the family. The main questions that are hoped to be answered in this study are:

(1) Do the two programs provide the same average monthly net tenant benefits and the same benefit-subsidy ratio?

(2) How are net tenant benefits in each program related to tenant's actual income?

(3) How are net tenant benefits in each program related to tenant's family size?

(4) How are net tenant benefits in each program related to the age of the head of the tenant's family?

The answers to these questions will shed light that will help show how these housing programs are working, and will provide policy makers with some guidelines. These guidelines will help the policy maker choose the right way and make the most economical decision to improve and increase the efficiency of these housing programs. Although this study is conducted within the framework of the Libyan economy, its results will be applicable to such problems in any economy.

Significance of the Study

This study is undertaken to evaluate and compare the two main housing programs in the Libyan Arab Republic, namely the publicly built housing program and the interest free loans program, in terms of the tenant benefits they provide to their tenants. It will also shed some light on the way these benefits are distributed according to family characteristics such as income, family size, and age of the head of the family.

The significance of this study stems from the following reasons:

(1) A careful and detailed review of related literature revealed that this study is the first one to be undertaken as far as evaluating public housing programs in the Libyan Arab Republic is concerned.

(2) Being the first in this area, it was thought that it would have a lot of credit for exploring this field for further valuable studies.

(3) By pointing out the tenant benefits in both programs and the way they are distributed according to the tenant's family characteristics, it will highlight the shortcomings of both programs so they can be adjusted and modified.

(4) It provides the policy makers with some evaluative criteria that would enable them to judge housing programs and to take the right decision where they are needed the most.

(5) Finally, the significance of this study is enhanced by the fact that these housing programs have been existing for more than 10 years and it is about time to see if they are going in the right direction in approaching their objectives.

Organization of the Study

The study is organized in the following way: This chapter is an introductory chapter. It gives some idea about the nature of the problem, purpose of the study, and significance of the study. It also presents the questions to be answered by the study and finally the organization of the study.

Chapter II deals with the economic and housing backgrounds of the problem. The economic background gives us a very clear picture of how the Libyan economy has been transformed, by oil production and exportation, from a very poor economy to a very rich one. The housing background sheds some light on the development of the housing sector from the time of independence up to now. It shows how housing requirements and housing supply were developing over that period of time. It also gives some facts about housing problems such as the shortage and the quality problems.

Chapter III is concerned with the housing programs and the housing institutions in the Libyan Arab Republic. It gives a good picture of these housing programs and the way they work. In addition to that, it shows how the institutional framework has changed after the revolution of September 1969.

Chapter IV cites the important related literature and introduces the analytical methodology of the study. It shows how tenant benefits from both programs can be estimated.

Chapter V focuses on the procedures used to collect the data, data analysis, and finally the results of the regression analysis.

Finally, in Chapter VI the study provides some concluding remarks and some guidelines or policy recommendations.

CHAPTER II

ECONOMIC AND HOUSING BACKGROUND

The purpose of this chapter is to present a brief outline of
economic and housing conditions in the Libyan Arab Republic before and
after the discovery and exportation of oil. This outline will help to
understand the reasons behind the initiation and adoption of the various
housing programs. The chapter is divided into two main sections, the
economic background and the housing background. Under the first section
changes in economic conditions and economic structure will be presented.
In the other section the discussion will be focused on the supply of
housing, demand for housing, housing requirements and housing problems.

Economic Background

At the time of independence, the 24th of December, 1951, Libya was
considered to be a typical example of an underdeveloped country. At
that time the majority of the population was living at a subsistence
level. Per capita income was extremely low, not exceeding L.D. 14, or
$45.

The economy was heavily dependent on a very traditional agricultural
sector, both in terms of production and employment. Other sectors
besides agriculture were essentially nonexistent; their contribution
both to gross national product (GNP) and to employment was negligible.

The future of industry at that time was considered to be very limited as compared with agriculture. Many factors contributed to this assessment, for instance:

1. Mining resources that could be used as a raw material for industrial production, such as coal, oil, electric power, were not developed or even known to exist at that time.

2. The level of skill of the Libyan labor force was very low. The number of businessmen who were originally Libyan, at that time, probably would not exceed the number of fingers on one hand.

3. The local market was smaller than the size of the market that would provide the effective demand necessary for an economic rate of industrial production. The smallness of the local market was due both to the smallness of the population, its dispersal, and to the low level of per capita income.

But, the economic situation in Libya has changed completely with oil exportation which started in 1961. From that year on, oil revenues have been accumulating at a very rapid rate. In 1962 this revenue was L.D. million 7.2. In 1969 this figure jumped to L.D. million 275, while in 1973 it rose to L.D. million 646.4. Oil revenues are surely higher now because of the increase in oil prices.

With these accumulated revenues the government has started a number of economic and social development programs. Economic activities and employment opportunities are both increasing at a rapid rate. Economic growth is rapid and incredible as Professor El-Mallakh of the University of Colorado said, "If the economic growth occurring today in Libya was to be described without identifying the country, it would be dismissed

most likely as an extremely hypothetical case, too dramatic to be
real."[1]

From this statement we can imagine the important role that oil has
played in changing the Libyan economy from one growing very slowly to
one that is growing very rapidly. It has changed the country from a
poor country to a rich one. GNP went up from L.D.M. 164.4 in 1962 to
L.D.M. 1298 in 1971, and per capita income increased from L.D. 14 in
1952 to L.D. 565.9 in 1971. It has transformed the country from a
relatively capital-scarce country to a relatively capital-abundant one.

The major transformation of the structure of the economy was from
one that depended more on agriculture to an economy that depends more
and more on oil. Both oil production and its percentage of the GNP have
been rising every year. The relative importance of the agricultural
sector in terms of employment and GNP has been declining over time.
This transformation of the economy is shown clearly in Table I. The
agricultural share of GNP has declined from 26.1 percent in 1958 to 9
percent in 1962, and again to 3 percent in 1971. On the other hand,
the oil share in GNP has been rising from 6.9 percent in 1958 to 23
percent in 1962, and again to 71 percent in 1971.

The other relevant pattern of change that came with the discovery
and exportation of oil is unbalanced regional growth, especially in terms
of economic activities and job opportunities. Even though there has
been growth in economic activities and employment opportunities all over
the country, this rate of growth has been much higher in the urban areas

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[1]R. El-Mallakh, "The Economics of Rapid Growth, Libya," Middle East
Journal, Vol. 23 (1969), p. 308.

TABLE I

G.N.P.: ABSOLUTE AND PERCENTAGE SHARES OF AGRICULTURE SECTOR AND PETROLEUM SECTOR
IN G.N.P. OVER THE PERIOD 1958, 1962 THROUGH 1971[*]

Year	1958	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
G.N.P.	52.0	164.6	240.7	306.5	435.6	559.7	648.5	881.4	1043.4	1101.8	1298
Agriculture, forestry, and fishing	13.57	14.9	15.1	16.7	25.2	27.3	30.9	33.4	37.4	34.6	32.9
Percent	26.1%	9%	6%	5%	6%	5%	5%	4%	4%	3%	3%
Petroleum mining	3.58	38.0	99.6	195.7	270.1	356.1	402.5	648.6	754.7	812.6	920.5
Percent	6.9%	23%	41%	64%	62%	64%	62%	74%	72%	74%	71%

[*]All numbers here are at the market prices, and are in millions of Libyan Dinars. Source of data--All the
numbers in this table are calculated from the National Accounts for the Libyan Arab Republic, 1962-1971,
October 1972; except for the year 1958, where its numbers were taken from document No. 3 of the planning
Documents, September, 13, 1971.

(especially Tripoli and Benghazi) than it has in the rural areas. The high concentration of economic activities and governmental departments in these two cities can be explained by the following factors:

1. These two cities were and still are the biggest cities in the country.

2. Most of the economic activities and governmental departments during the colonization periods were concentrated in these two cities.

3. Before the country was united in 1963, it was divided into three states, Tripolitania, Cyrenaica, and Fezzan. Tripoli and Benghazi were capitals of Tripolitania and Cyrenaica states, which also made them the centers of most economic activities.

4. Because of the existence of public facilities and infrastructure such as buildings, roads, ports, and others that were left in these two cities from the colonization time, they were picked up as the best places for the government and business activities.

5. The geographic and economic advantages that gave them economic importance were access to the cost and export markets, a large labor force, ports, airports, and roads. All of these factors have made them the best locations for most economic activities, which, in turn, increased their economics of agglomeration, which, in turn, increase their chance of growth over time.

This concentration of economic activities in urban areas (especially Tripoli and Benghazi) left the agricultural labor force in an increasingly disadvantageous situation over time. Push factors (in terms of low wages and high rates of unemployment) in the agricultural sector worked hand in hand with pull factors in the big urban centers (such as high wages and low rate of unemployment) to attract a large segment of

the population from the agricultural sector and the rural areas to the

urban areas. The population of Tripoli increased from 264,000 in 1954

to 406,000 in 1964, and to 709,000 in 1973. The population of Benghazi

increased from 134,000 in 1954 to 225,000 in 1964 and to 331,000 in

1973.[2] Net migration to both Tripoli and Benghazi from independence

to 1964 amounted to 92,451 persons.[3]

In addition to internal migration, the exportation of oil and the

intensive concentration of economic activities that accompanied it

resulted in a large inflow of migrants from neighboring countries,

especially Egypt and Tunisia. Some of these migrants were, in fact,

Libyans returning to the country after they had migrated because of the

war. But many of them, especially in the last five to six years, were

just workers seeking employment in Libya, or were entered by the Libyan

government or the private sector to help in implementing the development

programs and projects. Although no official data are available on this

process, there are some rough estimates of it. For instance, the number

of migrants into the country (return and non-return migrants) was

estimated to be about 54,000 persons during the period 1951 to 1963[4] and

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[2]The numbers for 1954 and 1964 were taken from the Statistical
Abstract, 1970, p. 10. The numbers for 1973 were taken from the draft
copy of the Ph.D. dissertation made by A. O. Toboli, Oklahoma State
University, Stillwater, Oklahoma, 1976. Note that these numbers rep-
resent the population of Tripoli and Benghazi regions, and not Tripoli
and Benghazi cities.

[3]Ministry of Planning and Development, Public Administration for
Economic and Social Affairs, Department of Regional Planning, Geographi-
cal Distribution of Economic Activities (Tripoli, June, 1968), p. 5.

[4]Government of Kingdom of Libya, Ministry of Planning and Develop-
ment, Housing in Libya, Vol. 1, Existing Conditions and Housing in
Libya, Vol. II, Problems, Policies, ... Programs (Athens, 1964), p. 269.

about 69,000 persons during the period 1964 to 1968.[5]

This migration to the urban centers was larger and faster than the
housing sector in those centers could readily absorb. Because of this
and some other factors discussed later, housing problems were and still
are serious. The housing situation even though much better than it was
10 or 15 years ago, still requires a lot of work and effort for improve-
ment as will be seen in the following sections where the housing situa-
tion is described.

Housing Background

The Housing Situation

The housing situation in Libya, as in most underdeveloped countries,
is characterized quantiatively and qualitatively by an utter inadequacy
for which demographic and socioeconomic factors are responsible. This
was, in general, true in Libya before the discovery and exportation of
oil. However, after the discovery of oil and especially after its
exportation, Libyan housing problems became more spatially concentrated.
They became more acute in the urban areas than in the rural areas.
Those problems had been accumulating over time as is clear from the
increasing number of shanty towns around the urban centers. The
provision of adequate housing is among the more difficult goals that the
Libyan government has to achieve. To better understand the housing
situation, information about housing requirements, demand for housing,

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[5]Libyan Arab Republic, Public Administration for Social and
Economic Planning, Economic Survey for the Libyan Arab Republic, 1964-
1968 (Tripoli, 1971), p. 32.

supply of housing, and housing problems will be explored and studied

before any examination of housing programs.

The housing situation can be explained by Figure 1, where the price

of housing (Ph) is on the vertical axes and housing services (H) are on

the horizontal axes. DD represents the demand for housing, SS represents

the supply of housing, and the vertical line Hq represents housing

requirements.[6] In Figure 1 the market quantity of housing (H_1) is not

as large as housing requirements (Hq), which results in a housing short-

age (as defined here). Keep in mind that the word shortage is used to

refer to an excess of housing requirements over the market quantity of

housing rather than to refer to an excess of quantity demanded over the

quantity supplied resulting from a price of housing lower than the

equilibrium price. In graphical terms the word shortage (as used here)

refers to the quantity H_1Hq.

Due to many factors both demand for housing and housing require-

ments increased. Some of these factors have increased demand more than

requirements, others have increased requirements more than demand, and

still others have increased both demand and requirements by an equal

amount. For these reasons the discussion of demand and requirements

in the next section will be unable to separate the two concepts with

precision.

The effects of an increase in demand and an increase in require-

ments on the price of housing and the housing shortage depend on the

elasticity of the long run supply of housing. Suppose the demand for

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[6]By housing requirements it is meant, houses that are required in
order for every family to have a house of its own. It has nothing to do
with demand for housing and should not be considered as quantity
demanded.
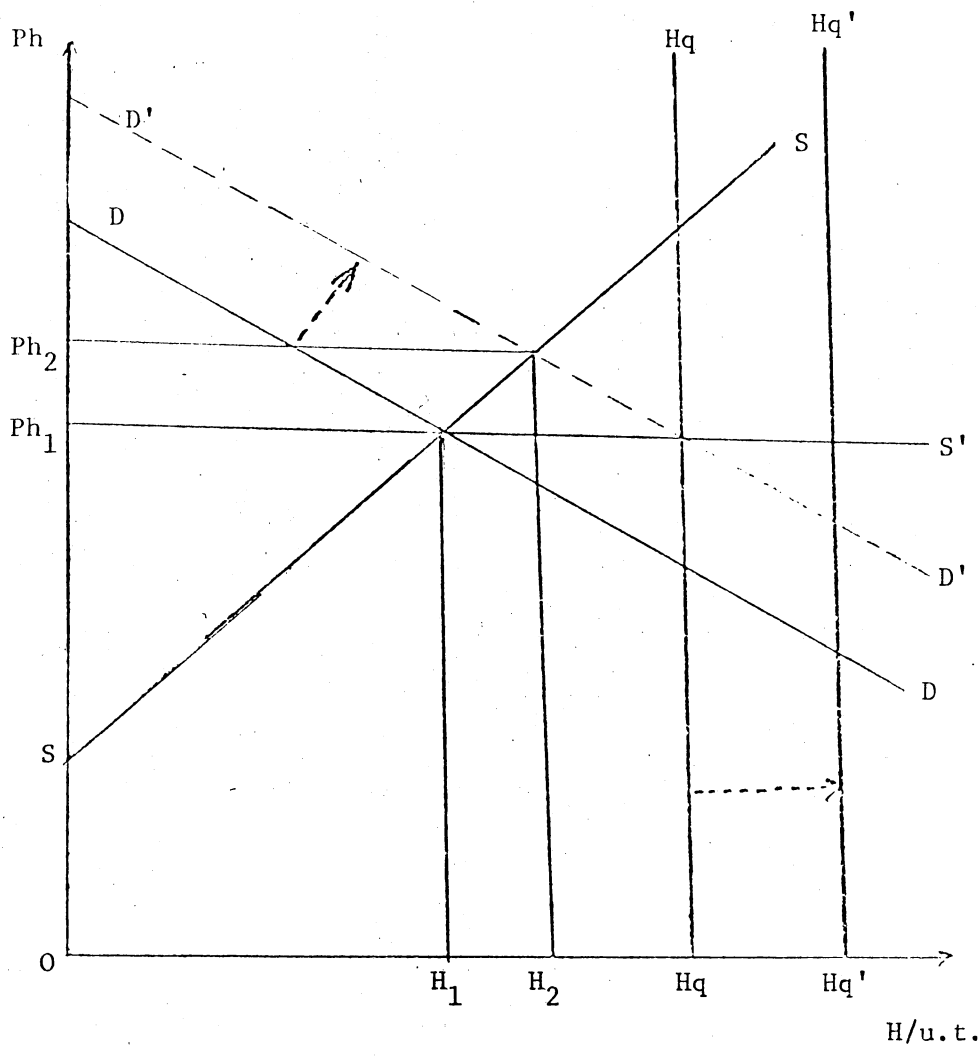
Figure 1.   Housing Supply, Demand for Housing and
Housing Requirements

housing increased as is shown in Figure 1 by the upward shift in the

demand curve from DD to D'D', and housing requirements increased from

OHq to OHq'. What effects will these increases have on the price of

housing and housing shortage? As indicated above, the effects depend

on the elasticity of the supply of housing. If the supply of housing

is infinitely elastic as can be represented by the horizontal line

(Ph_1S') in Figure 1, then these increases in demand and requirements

will have no effect on the price of housing, and will reduce the short-

age from H_1Hq to $HqHq'$.[7] If the supply of housing is less than

infinitely elastic as can be represented by SS in Figure 1, then the

price of housing will go up from Ph_1 to Ph_2, and the shortage of housing

will increase from H_1Hq to H_2Hq'.[8]

Due to many factors discussed later the long run supply of housing

in the Libyan Arab Republic is thought to be less than infinitely price

elastic.

Housing Demand and Housing Requirements

After Libya obtained independence in 1951, a large number of people

who had migrated to neighboring countries (Egypt and Tunisia) because of

the war started to return. Most of these return migrants settled in

Tripoli and Benghazi. This migration, plus the loss of an estimated

10 percent of the housing stock during the war resulted in relatively

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[7]Notice here that we have the increase in demand more than the in-
crease in requirements. But if the increase in requirements was greater
than the increase in demand, the shortage will be more than before.

[8]Once again, whether shortage increases, decreases, or stays the
same depends on whether the increase in demand is less than, more than,
or equal to the increase in housing requirements.

scarce housing. A shortage of housing began to appear in the housing market, especially in the urban areas. Effective demand was not sufficient to entice much additional supply. With economic conditions getting as bad as they were in Libya at that time, good housing was a luxury good. Who is going to pay for adequate housing when he is not even able to get something to eat? So the excess of housing requirements over housing supplies continued to grow. It has been intensified and aggravated by many factors that made it continue to grow even after 14 years of oil exportation and the accumulation of revenue. These factors are:

1. Foreign aid and revenue from military bases--Shortly after independence, foreign aid and revenue from foreign military bases started to improve economic conditions. They injected some money into the Libyan economy. Per capita income and wages began to increase in the urban areas where these military bases were located. Labor was attracted from the rural areas which, combined with military personnel and foreign experts and advisors, contributed to increased housing demand and housing requirements.

2. Search for oil--By 1956, the search for oil by foreign oil companies began. The number of oil companies and the number of foreign workers and employees with these companies has grown, increasing housing demand and housing requirements.

3. Oil exportation--With oil exportation, revenues to the government began to accumulate, and the government started large development projects. Those projects required a large number of skilled and semi-skilled laborers. Most of this labor came from abroad. Again housing demand increased, but housing requirements increased more because the

semi-skilled foreign workers probably did not have sufficient purchasing power to purchase adequate housing.

4. Increased oil production—Because of increases in oil production, per capita income has increased tremendously, which, in turn, increased the demand for replacing substandard dwelling units. Again housing demand and housing requirements increased.

5. Increased income—Due to the increases in income, educational level and modernization of life, the number of persons per household decreased, and the number of families increased, which increased housing requirements.

6. High rate of population growth—Even though the population of Libya is very small compared to most of the other countries in the world, its rate of growth is very high. The growth rate (as shown by population censuses of 1964 and 1973) was 3.7 percent during the period 1955 to 1964, and 4.1 percent during the period 1964 to 1973. A high rate of population growth implies a high rate of growth of housing requirements.

7. Government policy—The other factor that has contributed to the increase in housing requirements in Libya is government housing policy. These housing programs have increased requirements in many indirect ways such as:

a. They require that every family, in order to be able to get a publicly built house or an interest free loan, has to prove that it does not have a house, and that its income does not exceed a certain level. The problem with this requirement is that it is very hard to prove that the information shown in the application is right or wrong. Thus, many tricks have been played by some people. Some families, even though they

have a house, register that house under the name of one member of the family and apply for a publicly built house or interest free loan under the name of another member. With respect to the level of income reported, it is very hard to prove that it is lower than the family's actual income, especially for the families who are engaged in a free enterprise job and not as a public employee. It seems that there are some families who got either houses or loans but actually were not eligible for them.

b. The easiness of terms for getting a publicly built house or loans from the Real Estate and Industrial Bank has discouraged private investments in housing. Many people started to direct their savings to other things such as automobiles, televisions, more clothes, going abroad for trips, etc. They do not worry about improved housing because they think that they can (and probably can) get it if they just submit an application for either a house or a loan and wait for a while. They think that it is the government's responsibility to house them. It is not unusual to find some people in Libya who own one or two trucks but do not have a decent house, and who are either waiting for a house or an interest free loan. The person is eligible as long as he does not have a house and his reported income is within the required limits.

Because of all these factors, housing requirements have been increasing very rapidly as can be seen from the estimates presented in the following discussion.

Estimation of Housing Requirements

There are at least two methods available to estimate housing

requirements.[9] The first method is based on the relationship between the number of households and the number of houses. It assumes that every household, if it so desires, should be entitled to its own house. The problem with this method is that it does not indicate the distribution of these housing units by the number of rooms.

The second method of estimating housing requirements is based primarily on the relationship between the number of persons and the number of rooms. But even though this method avoids may pitfalls, and despite the fact that it is more appropriate, it has some disadvantages. The most important one is the difficulty of satisfying the generally accepted standard that each household should have its own dwelling unit if it so desires.

For this study there have been some estimates of housing requirements in the Libyan Arab Republic at different periods of time. These estimates were based on the first method of estimation discussed above. According to those estimates, housing requirements in 1964 were 251,450 housing units.[10] In 1971, they were 216,590 housing units,[11] and in 1973, the number was 203,800 housing units.[12] And for the period 1976 to 1985, housing requirements were estimated to be 286,000 housing units.[13] These estimates included the estimates of the following

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[9]United Nations, Housing for Africa (New York, 1965), p. 109.

[10]Libyan Arab Republic, Ministry of Planning, Three Year Plan, Proposal (Tripoli, 1972), p. 195 (in Arabic).

[11]Ibid., p. 195.

[12]Libyan Arab Republic, Ministry of Planning, Some Comments on Housing (Tripoli, 1973), pp. 2-4 (in Arabic).

[13]Libyan Arab Republic, Ministry of Planning and Scientific Research, Five Year Plan, Proposal (Tripoli, 1975), p. 6 (in Arabic).

housing requirements:

1.   housing required for the increase in families due to increase in population,

2.   housing required for replacement of dilapidated housing and unsuitable houses,

3.   housing required to reduce crowding, and

4.   houses required to house the migrants.

Supply of Housing

The data on the supply of housing in Libya during the period 1952 to 1964 is not available yearly. According to a housing study conducted in 1964, the shortage in housing at the end of that year was estimated to be 118,504 units. It was estimated that 70,200 units were required to house the families that were living in slums, tents, and caves. To replace dilapidated houses, 36,000 units were required, and 12,304 were required to meet the increase in the number of families due to the increase in population.[14]

In the period 1964 to 1972, only 45,000 housing units were built, with an annual average of 5,600 housing units. Twenty-one thousand were built by the public sector, and 24,000 were built by the private sector, either from their own savings or with loans from the Industrial and Real Estate Bank or from other commercial banks.[15]

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[14]Government of Kingdom of Libya, Ministry of Planning and Development, Housing in Libya, Vol. I, Existing Conditions and Housing in Libya, Vol. II, Problems, Policies, ... Programs (Athens, 1964), pp. 266-269.

[15]Libyan Arab Republic, Office of Prime Minister, Voice of Students Studying Abroad, Vol. 20 (September, 1970), p. 4 (in Arabic).

For the period 1972 to 1975, the three-year development plan showed that the government aimed to build 80,000 housing units in both the private and the public sector. According to this plan, this number was assumed to meet the annual requirements during the plan, provide for the increasing number of families, and allow the substitution of new for torn down old houses, which alone was estimated at 35,000 housing units. The remaining 45,000 housing units were planned to help in overcoming the housing shortage. As a result, it was expected that the accumulating deficit in housing would drop during the plan period from 190,000 housing units (in both the stable and unstable sectors of the population) at the end of the year 1971-72 to about 145,000 housing units at the end of 1975.

With regard to the period 1976 to 1985, the new plan estimated that housing requirements during this period will be around 286,000 housing units and they expect that this will be met by building 123,000 units during the first five years and 163,000 units during the last five years. We can see that even if this plan succeeds in the accomplishment of what was planned, the housing shortages will not be solved until 1985.

The supply of housing in Libya has not been able to grow faster than housing requirements or even as fast because:

1. Immediately after independence, construction activity was very badly constrained by the financial resources in the country.

2. The availability of building materials and the industries that produce them in Libya can be summarized in the following characteristics:

a. The production of local materials, in general, is inadequate to meet the local demand.

b. The production and consumption of key building materials, such as cement, wood, and iron, are unbalanced. Cement, for example, is only 40 percent supplied from the local production. It is not the unavailability of the raw materials necessary to produce cement, but rather the low capacity of the already existing factories which causes the limited local production.

c. Industries that can produce electrical equipment, sheet glass, or hardwood essentially do not exist.

d. The cost of local production is relatively high due to factors such as the scarcity of large scale operations, lack of technical and managerial skills, lack of skilled labor, lack of cheap and efficient transportation systems and so forth.

3. Most of the house designs and styles in Libya are western and highly dependent on the use of imported materials.

4. Because of the dependence of the housing industry in Libya on the imported materials, delays in the provision of these materials delay construction. The delay is intensified by the low capacity of the local ports.

5. Due to demand pressures and increases in population in the cities, price of land and the building materials increased, increasing the price of housing very rapidly. In 1954, for example, the cost of building a house of two rooms and facilities was estimated to be from 350 to 400 Libyan Dinars. The same house now costs at least 4,000 Libyan Dinars, which means the housing costs have increased 10 times within 21 years. In effect, the long-run supply of housing is very inelastic.

6. Another limiting factor is that the old streets in both Benghazi and Tripoli, as in any old city, are very narrow. They could not efficiently handle heavy traffic. When the government widened these streets, the widening process resulted in the destruction of many homes.

7. Slum clearance programs have also reduced the housing stock.

8. The use of some buildings, that were originally built for housing for non-housing purposes (such as using them as government departments or offices) had contributed to increase the gap between housing requirements and the supply of housing.

9. The other factor that, in my opinion, had contributed to the shortage problem can be called a house hunt. The way that the house hunt process had developed in Libya can be explained as follows: When the government decided to clear the slum areas and to give the people who used to live there houses or build them new ones, some people found their golden chance to get a house. Some members of the family, usually old members would just build a slum in the slum area and wait for a new house. This process had increased the number of slum houses every year.

Due to these factors and probably some others, we find that housing in Libya is still predicted to remain less than required, and that the long-run supply is thought to be less than infinitely price elastic.

Housing Problems

The Shortage Problem

It is clear from the previous analysis that the housing market in Libya is suffering from a very acute shortage in the number of houses compared to the requirements of them. As it was shown earlier, this

problem is not really new to the Libyan housing market. But the strange thing about this problem is that it seems to be intensifying every year, especially during the period that followed the discovery and exportation of oil.

As shown earlier the housing shortage has been evident for a long time in Libya, and it is still continuing to grow. It was estimated to be around 145,000 units by the end of 1975. The shortage problem can be explained by comparing the number of households to the number of houses that are available, or the ratio of households to the dwelling units combined with the average number of persons per room.

For the country as a whole, the density rate in 1963 was estimated to be 1.37 families per house or dwelling unit. This rate was obtained by estimating that the population of Libya in 1963 was 1,162,000 and that the average number of persons per household was 4.8 persons. This had resulted in 280,000 families which were living in approximately 189,000 housing units. According to this estimate, one out of four families would have no house of its own.

According to the 1973 census the number of households was 386,048, and the number of housing units was 345,836 which will result in a shortage of 40,212 units. If we add the slums and tents of about 73,255, and add the housing units that need to be replaced which, if estimated as 5 percent of housing stock, will come to more than 17,000 units, and add the number of housing units required to solve the crowding problem, 40,212 units, the shortage in houses will be 130,000 units. Even if these numbers were correct, and all the housing units were of standard condition, we still have a density ratio of about 1.11 families per housing unit, which is not a low ratio.

Additional information is available for Tripoli and Benghazi. A
1962 budget survey summarized in Table II shows that the situation in
Benghazi was a little bit better than it was in Tripoli. The average
number of rooms per household in Benghazi was 3.2, while in Tripoli it
was 2.6. Also, the average number of persons per room indicates that
the people in Benghazi are enjoying more housing services (assuming that
the housing quality and the preferences of the people are the same)
than the people in Tripoli. The figure for Benghazi was 1.93 percent
persons per room, and in Tripoli it was 2.2 persons per room.[16]

From another budget survey in Tripoli, taken in 1962, one discovers
that the average size of the household was 5.3 persons. For almost half
of the sample group, the density per room was as high as four persons.[17]
From all these numbers we can see how tough the shortage problem in the
housing market is.

The Quality Problem

The shortage problem is not the only one in the Libyan housing
sector. The other important one is the quality problem. By the quality
problem it is meant that not all of the available housing units are in
good standard condition. Some of these dwelling units are occupied just
because there is nothing better available. A considerable number of
them are just slums and shanties. A high percentage of them do not have
all or even some of the necessary facilities such as piped water,

[16]Libyan Arab Republic, Ministry of Planning, Census and Statistical
Department, Statistical Abstract (Tripoli, 1970), p. 72.

[17]Rawle Farley, Planning for Development in Libya: the Exceptional
Economy in the Developing World (New York, 1971), p. 58.

TABLE II

DISTRIBUTION OF HOUSEHOLDS AND THEIR NUMBERS BY SIZE OF THE HOUSEHOLD AND TOTAL
NUMBER OF ROOMS, AVERAGE NUMBER OF ROOMS PER HOUSEHOLD, AND AVERAGE NUMBER
OF PERSONS PER ROOM FOR VARIOUS SIZE OF HOUSEHOLD

Size of Household	Number of Households		Number of Persons		Number of Rooms		Average No. of Rooms per Family		Average No. of Persons per Room	
	Tripoli	Benghazi	Tripoli	Benghazi	Tripoli	Benghazi	Tripoli	Benghazi	Tripoli	Benghazi
1	24	23	24	23	38	38	0.6	1.7	0.6	0.61
2	75	48	150	96	125	116	1.7	2.4	1.2	0.83
3	83	46	249	138	179	141	2.2	3.1	1.4	0.98
4	72	60	288	240	197	172	2.7	2.9	1.5	1.40
5	106	71	530	355	252	197	2.4	2.8	2.1	1.80
6	106	71	636	426	278	227	2.6	3.2	2.3	1.88
7	96	55	672	385	282	171	2.9	3.1	2.4	2.25
8	72	53	576	424	231	193	3.2	3.6	2.5	2.20
9	47	44	423	396	135	158	3.3	3.6	2.8	2.51
10	37	36	370	360	120	152	3.2	4.2	3.1	2.37
11	41	46	515	576	149	208	3.6	4.5	3.5	2.76
TOTAL	759	553	4,433	3,417	2,004	1,773	2.6	3.2	2.2	1.93

Source: The Statistical Abstract (1970), p. 72.

electricity, sewage system and so on. The following data for 1964

provides some indication of housing quality in Libya. In 1964 (as can

be seen in Table III) only three percent of the total families lived

in villas or apartments, 52 percent lived in houses, 21 percent in

shanties, 20 percent in tents, 3 percent in caves, and 1 percent not

stated. At least 45 percent of the Libyan families in 1964 lived in

substandard housing units.

Many housing units do not have complete facilities. For instance,

as seen in Table IV, 34 percent of the dwelling units in cities over

20,000 were not supplied with piped water in 1963. Sixty-seven percent

were not connected with sewage system. Twenty-five percent of these

dwelling units were not supplied with electricity. This situation is

much worse with respect to the smaller size cities, villages, and farms

as can be seen in Table IV. Ninety-three percent of the dwelling units

in villages were not supplied with piped water, 99 percent were not con-

nected to sewage system, and 83.5 percent were not supplied with

electricity.[18]

With respect to Tripoli, the 1962 socioeconomic survey on 288

households showed that 36 percent of these households did not have

electricity in their homes and 33 percent did not have piped water.

The following information is available from a socio-economic survey

in Benghazi taken in 1970. Six percent of the housing units in the

sample were not connected with electricity, 32 percent did not have

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[18]The numbers in Table IV are for 1963, and may not represent what
is going on in Libya now. Since 1963 is only the third year in oil
exportation, housing in Libya, on the basis of my personal knowledge,
has improved. Data are not available to demonstrate it.

TABLE III

FAMILY HOUSEHOLDS BY SIZE AND TYPE OF DWELLING--1964

| Household Size | Type of Dwelling | | | | | | Total Family Households |
	Villa or Flat	House	Shanties	Tent	Cave	Not Stated	
1	845	9,014	5,880	3,011	724	529	20,003
2	1,824	23,865	11,665	8,933	1,718	523	48,528
3	1,936	25,954	11,995	10,467	1,929	492	52,773
4	1,936	26,618	11,723	10,408	1,861	467	53,040
5	1,354	24,759	10,161	9,647	1,674	314	47,909
6	831	20,966	7,996	7,865	1,291	241	39,190
7	512	15,622	5,245	6,090	941	157	28,567
8	375	10,301	2,975	4,049	579	88	18,367
9	252	6,351	1,451	2,186	219	44	10,503
10 & Over	424	8,347	1,151	2,862	250	76	13,110
TOTAL	10,316	171,797	70,242	65,518	11,186	2,931	331,990

Source: Libyan Arab Republic, Ministry of Planning, Census and
Statistical Department, Statistical Abstract, 1970, p. 31.

baths, and 3 percent did not have a private tap.[19]

TABLE IV

TYPE OF POPULATION SETTLEMENT AND PROVISION
OF FACILITIES--1963

Type of Settlement	Housing Unit Not Supplied With Piped Water %	Housing Unit Not Connected With Sewerage System %	Housing Unit Not Supplied With Electricity %
Cities over 20,000 population	34	67	25
Towns 5,000 to 20,000	51	95	33
Villages	--	--	83.5
Farms	--	--	91
Nomads	--	--	--

Source: Farley Rawle, Planning for Development in Libya, the Exceptional Economy in the Developing World, Praeger Publishers, Inc., 1971, p. 60.

With regard to small towns, there was a socio-economic survey about Agedabia, a small town, which may give us a clear picture about other small towns. According to that survey, 64 percent of the houses in Agedabia (in 1968) were without bath tubs or showers, 17 percent of them

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[19] Dr. S. Mukerji and A. Kataifi, "Socio-Economic Survey in Benghazi," The Libyan Economic and Business Review, Vol. VI, No. 2 (1970), p. 80.

were without bathrooms altogether, 40 percent of these houses were not connected with electricity, 95 percent did not have piped water, and 85 percent were without private gardens.[20]

Other Problems

There are some other problems facing the housing sector in the Libyan Arab Republic besides the shortage and quality problems. These problems can be summarized in the lack of adequate and efficient planning for growing cities and towns, lack of technical personnel and skilled labor, and the unstable sector of the population.

Summary

This chapter presented a brief outline of economic and housing conditions in the Libyan Arab Republic before and after the discovery and exportation of oil. From this outline the following conclusions can be drawn:

1. The exportation of oil has transformed the Libyan economy from one depending on agriculture to one depending on oil.

2. Due to the oil exportation, and to the concentration of economic activities in the urban areas (mainly Tripoli and Benghazi) there has been a large migration into these urban areas both from abroad and from the rural areas.

3. Due to many factors discussed, the supply of housing (especially in the urban areas) has not been able to grow as fast as housing

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[20]Althahir Abdujalil, "A Socio-Economic Survey of Agedabia," The Libyan Economic and Business Review, Vol. IV, No. 1 (Spring, 1968), p. 86 (in Arabic).

requirements; hence, a housing shortage has existed for a long time.

    4.   Besides the shortage problem, the Libyan housing sector also suffered from poor quality of housing units during the period that preceeded oil exportation.

CHAPTER III

HOUSING PROGRAMS AND HOUSING

INSTITUTIONS

When housing problems started to appear and accumulate very rapidly

in the housing market (especially in the urban areas) the government

decided to do something about them. It initiated and adopted various

housing policies and programs. For the period that preceded oil expor-

tations, the government's financial ability was very limited and

severely constrained by the backwardness of the economy and lack of

natural resources that could be used at that time. There were also some

top priority economic problems that had to be solved before the housing

problems, such as low level of infrastructure, education, health, and

unemployment. All these circumstances had forced housing problems to be

far down the list of priorities, both in the distribution of government's

attention and public investment. So the government's activity in the

housing sector was very limited and could hardly be recognized. It

started a housing project in 1954 which resulted in building 464 housing

units in Tripoli, 262 units scattered in five towns in Cyrenica, and 120

units in Wadi Caam in Elkhoms. At the same time it also started a slum

clearance program in Tripoli city, where a shanty town west of the city

was torn down and inhabitants were resettled in a more suitable site.[1]

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[1] The International Bank for Reconstruction and Development, The
Economic Development of Libya (Baltimore, 1960), p. 294.

These housing activities were neither well planned nor large enough to
ease housing problems. In fact, they may have enhanced it. The new
site of the slum clearance program, in just a few years turned out to be
more slummy than the first one. The small number of houses that were
built in Tripoli and Benghazi did more harm to the housing problem than
benefit. They increased the demand for public housing more than they
added to the supply. They probably strengthened the variables that
encouraged rural-urban migration.

With oil exportation in 1961, government revenue from that natural
resource began to accumulate very rapidly over time, and its financial
constraint became less severe. With those financial resources in its
hand the government felt that it could and should take more productive
actions toward the national problems. Since that time, housing problems
increasingly have gained more attention and financial resources. The
government had initiated much stronger and larger housing programs.
Housing, financial and construction institutions have been created and
encouraged very strongly. New housing policies, besides the revision
of old ones, have been adopted as frequently as possible.

In 1965, for example, the government started a very large housing
project called the "IDRIS Housing Project." According to this project,
100,000 housing units, costing approximately L.D. 400,000,000 were to be
built. Sixty percent of these housing units were planned to be destined
in rural areas, while 40 percent would be in the urban areas.[2] In 1965
also the government established the Industrial and Real Estate Bank

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[2] William C. Wedley, "Progress and Problems in the Economic Develop-
ment of Libya," Libyan Economy and Business Review, Vol. IV, No. 1
(1968), p. 31.

mainly to grant loans to the industrial and construction activities at
a very low interest rate. But in a few years the government had decided
to cancel the interest charges and give loans free of interest. Around
1964, the government initiated what could be called a "rent allowance" to
its employees to help them in renting houses.

After the revolution on September 1, 1969, the housing policies
were adjusted. Some new housing institutions were introduced. Some new
housing programs were adopted and still some others have been enlarged,
eliminated, or adjusted as can be seen in the following sections when
we deal mainly with these housing programs separately and try to show
how they developed over time in order to give a clear picture of the
role that has been played by the government in this field.

The housing programs in the Libyan Arab Republic can be put under
the following headings:

1. Publicly built housing program (or programs),

2. Interest free loans program (or programs),

3. Low interest rate loans program (or programs),

4. Rent allowance program.

Publicly Built Housing Program

This program was mainly designed to help the people whose incomes
are very limited and noticeably low; people who are living in shanty
towns and slum areas. The government thought that for these people, if
left without help, their housing needs probably will not be met by the
private housing sector. It was thought that the best way to solve
these people's housing problems was to set up a public housing institu-
tion to build and finance housing projects for them. So according to

this program, the government through its specific institution has to find the suitable land, finance, contract, and follow up the building process and so on. When the housing units are ready, they are distributed to those people according to a specified list of priorities. They were distributed either for rent or for ownership on easy terms in both cases. If it is for rent, then the rent will be set up according to some variables such as family income, family size, number of rooms, and age of the head of the family, but the rent of these houses is usually very low. If it is for ownership, then the percentage of the cost that has to be paid by the tenant also will vary according to some variables as income, and family size. The low income people pay as low as 10 percent of the total cost.

The first project of this sort was started in 1965, under the name of IDRID Housing Project.[3] As was mentioned before, 100,000 housing units costing approximately L.D. 400,000,000 were planned to be built. Sixty percent of these housing units were planned for the rural areas of the country and 40 percent were for the urban areas. The governmental institution responsible for the project up to 1969 was the Ministry of Public Works. Even though a lot of money was spent on the program from 1965 to 1969, and even though there was a lot of propaganda about it, all the available data about this project showed that not more than 15,000 housing units were built during the five-year period before the revolution. In fact, not even all of them were completely ready before the revolution. That project consisted of two different types of

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[3]It was under the name of the ex-king of Libya.

housing units or housing projects, the popular housing project or the economic housing project, and the middle or average housing project. The first kind of housing units were really designed for low income people and the people who were living in shanty towns. From 1965 to 1969, the project established 11,553 housing units of this type. With respect to the average or middle housing project, 3,332 housing units were built during that same period. Besides the fact that this number of housing units was much less than was needed, most of them, especially the economic housing type, were just slums after only one year of their occupation because they were badly constructed. Most of them are just two room houses, and very few of them had three rooms or more. The middle or average project houses were reasonable, but there were not many and most of them were not given to the people who were in big need of them.

Since the revolution the institutional framework of the publicly built housing program has changed. It is now planned, organized and set up by three different organizations or institutions. The three institutions are the Ministry of Housing, Housing Control Department, and the General Housing Corporation.

The Ministry of Housing generally determines the housing policies, such as the number of houses to be built, where they are going to be built, etc. The General Housing Corporation is in charge of finding the ways of building these housing units. It usually arranges the contracts, follows up the building process, checks all housing units when they are ready for the availability of all the amenities and public facilities that were specified in the contracts. It also handles the engineering process and all the payments to the contractors. When all

these processes are completed and the housing units are ready, the

General Housing Corporation hands them over to the Housing Control

Department.

Housing Control Department is the institution that handles the

distribution of the publicly built houses to the people who need them.

It receives the applications from the people, puts them in files,

and when it receives some housing units, it distributes them to eligible

applicants, following the rule first come, first served after the

applicant has satisfied the required conditions to be eligible for these

houses. These conditions are:

1. He has to be from the low income class. He is required to bring

a document to show his income.

2. He has to prove that he does not have a house, and has not

received a interest-free loan from the Industrial and Real Estate Bank.

3. He has to bring certificate to show the size of his family.

To see how this program has been working, and how it has developed

since the revolution, reports about the General Housing Corporation and

its activities in this field are thought to be the best way.

The General Housing Corporation was established on December 17,

1970. It was held responsible to do its best to overcome the housing

problems in the country. It has two objectives.[4]

1. The first objective was to complete all the government obliga-

tions remaining from the popular housing project. Concerning this

objective it paid L.D. 2,000,000 (unpaid money to the contractors), and

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[4]General Housing Corporation, _A Brief Report on the Housing Move-
ment in Libya_ (Tripoli, 1974), p. 1 (in Arabic).

completed 4,770 housing units of the 8,000 housing units planned for
the average or middle housing project started in 1966, at a cost of
L.D. 35,000,000.

2. The second objective was to implement new housing programs or
projects that the corporation either planned or participated in planning
such as the emergent housing program, the public housing program, the
investment housing program, and Sebha housing program. All of these
housing programs or projects were set up after the establishment of the
housing corporation and are explained below.

The following tables (V and VI) show what the general housing
corporation has done since it has been established. The corporation
started the emergent housing project in 1970 and completed it in 1973.
The number of housing units built in that project was 928 at a cost of
L.D. 3,214,000.

The corporation started the public housing project around the mid-
dle of 1971. The total number of housing units that were contracted to
be built within that project was 48,648 at a total cost of L.D.
418,000,000. Because of its size, it was thought that it would be
better if it was accomplished in four different stages, starting in 1971
and ending in 1975. In the following table (Table V), the number of
housing units contracted and received in each year during this period
are shown.

With regard to the investment housing project, the corporation
contracted 2,096 housing units to be built in Tajora town in Tripoli
and in Benghazi city, with all its amenities and facilities included in
the contracts. The total cost of those housing units was L.D.
35,178,180. This project was going to be financed by the Public

Corporation for Social Security. There were also 432 housing units

contracted to be built in Benghazi at a cost of L.D. 8,020,108 includ-

ing all of the amenities and facilities. These units were going to be

financed by the Industrial and Real Estate Bank. Sebha housing project

includes 10,000 housing units that have to be built in and around Sebha

city. The corporation contracted 8,626 housing units at a total cost

of L.D. 103,631,499.

TABLE V

NUMBER OF HOUSING UNITS CONTRACTED AND RECEIVED FROM
THE PUBLIC HOUSING PROJECT EACH YEAR DURING
THE PERIOD 1971-1975

Stage	Date of Contract	Number Housing Units Contracted	Number Housing Units Received
First	1971/72	10,828	9,544
Second	1972/73	19,513	15,538
Third	1973/74	14,748	2,907
Fourth	1974/75	3,559	-----
TOTAL		48,648	

Source: General Housing Corporation, A Brief Report on Housing Movement
in Libya.

Besides building and following up the building process of the pub-

licly built houses, the General Housing Corporation has been very active

in providing or contracting somebody to provide the necessary public

facilities to these housing projects (see the following table).

TABLE VI

VALUES OF AMENITIES AND PUBLIC FACILITES CONTRACTED
BY THE GENERAL HOUSING CORPORATION

Amenities and Public Facilities	Value in L.D.
A. and F. for average or middle H.P.	1,590,000
A. and F. for emergent H.P.	769,000
A. and F. for industrial H.P.	1,336,000
A. and F. for public H.P.	8,436,600
A. and F. for Sebha H.P.	7,250,000
Completion of public housing and public facilities	12,000,000
TOTAL	31,381,600

Source: General Housing Corporation, A Brief Report on Housing Movement
in Libya.

We can see from this analysis that the General Housing Corporation
has played a very important role in the development of the housing sector
both in building housing units and in the provision of amenities and
public facilities. The total number of housing units that were con-
tracted by the General Housing Corporation was 71,509 at a total cost
of L.D. 665,472,000.

Besides these activities the Corporation provides a lot of public
services to the other departments of the government especially to the
Department of Education, Health and Transportation. It does most of
the contracts concerning the establishment of schools, hospitals, roads,
and other services.

Comparing the development of the publicly built housing program before and after the revolution it is clear from Table VII that this program has been growing much faster since the revolution than before it. In terms of the number of houses contracted or built we find that 71,509 housing units contracted or built in period of four or five years after the revolution while this number before the revolution was 14,885. It also can be demonstrated that this program had received more attention from the revolutionary government than from the previous government, as can be seen from the devotion of much larger amounts of money than before. It can probably be argued that some of the increase in the amount of money spent on this program is just one indication of inflation rather than an indication of increase in production. This is true but it does not mean that all the increase in costs was to pay for inflation because even though costs increased by 13 times, production increased by five times, and it is argued that the quality of the publicly built houses after the revolution is much higher than it was before the revolution.

Interest Free Loans Program

This housing program is completely financed by the Industrial and Real Estate Bank, which was established in September, 1965.[5] The main purposes behind its establishment were to improve the financial resources available to the housing sector, especially for the people whose monthly incomes are in the range of L.D. 50 to L.D. 99, and to

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[5]Industrial and Real Estate Bank, Board of Directors Report on the Period September 1965, March 1970 (Tripoli, 1971), p. 7.

TABLE VII

COMPARISONS OF PUBLICLY BUILT HOUSING PROGRAMS
BEFORE AND AFTER THE REVOLUTION

Name of the Program	No. of Housing Units in Contract	Costs	No. of Housing Units Received
Before the Revolution			
Popular Housing Program	11,553	29,360,503	11,553
Average or Middle Housing Program	3,332	20,000,000	3,332
TOTAL	14,885	49,360,503	14,885
After the Revolution			
Average or Middle Housing Program	4,779	36,590,000	4,779
Emergent Housing Program	928	3,969,000	928
Popular Housing Program	48,648	418,129,000	27,989
Industrial Housing Program	6,000	57,336,000	---
Sebha Program	8,626	106,000,000	218
Investment Housing Program	2,528	43,198,000	---
Education Sector	49 Schools	9,669,170	---
First Stage of Janzor Electric Plant		253,522	---
TOTAL	71,509+ (49 Schools)	675,144,692	33,914

Source: General Housing Corporation, A Brief Report on Housing Move-
ment in Libya.

encourage the establishment of small industries by granting middle and long-term interest free loans.

The establishment of the bank was a very important opportunity for the low income people, especially after the government had decided that there would be no interest charges on the loans granted by this bank. Before that decision the bank used to take from 1.5 percent to 3 percent interest charges. This bank gave the people an opportunity to either upgrade their existing houses or to build new ones. But before the revolution only the people who were in high positions in the government or who were related to them could get those loans. In fact, very few loans were given to the people who really needed them. The majority of the people did not have an equal chance. Some people had to wait probably as long as two years to get a loan. After the revolution the role of this bank was enlarged. The bank was ordered to forget the old applications and receive new applications and to give more attention to the low income people and the people who did not have houses. The revolutionary government has been paying more attention to the bank every year by putting more financial resources under its disposal. As we can see from Table VIII the bank has been growing very fast in the last few years. It has been opening branches frequently all over the country. Its loans have been growing in number and in value, and are becoming more evenly distributed both among people and regions.

The following conditions have to be satisfied before the loan will be granted:

1. The applicant should prove that he does not own a house either under his name or the name of his wife or a son.

2. The applicant's income should not exceed L.D. 100 per month

TABLE VIII

DISTRIBUTION OF LOANS ACCORDING TO SHORT AND LONG TERMS
1966 TO 1972

Year	From 1 to 7 Years		From 8 to 10 Years		11 Years or More		Total	
	No.	Value	No.	Value	No.	Value	No.	Value
1967	569	1,736,463	166	696,083	869	3,557,818	1,604	5,990,364
1968	343	1,044,246	147	605,380	842	3,354,958	1,332	5,004,584
1969	178	575,015	225	800,690	570	2,168,504	973	3,544,090
1970	380	1,145,944	179	576,654	824	3,027,870	1,383	4,750,518
1971	279	381,215	101	206,250	2,827	9,504,060	3,207	10,091,525
1972	200	285,050	49	115,380	4,613	15,990,038	4,862	16,390,468
TOTAL	1,949	5,167,983	867	3,000,437	10,545	37,603,248	13,361	45,771,668

Source: Industrial and Real Estate Bank, Council Board Report 1972, Table No. 4.

which means priority should be given to the low income people. But I

have heard lately that this income level was increased to L.D. 150 in

order to have more people benefiting from these loans.

3. The applicant has to prove that he or she is married or is

responsible for a family, because loans are supposed to be given to

families.

4. The applicant must provide the land needed for the house him-

self. That is because the bank does not want to interfere in the land

business in order not to affect its prices.[6]

5. Loans are granted only for construction and not for commercial

purposes.

6. In order to avoid speculation in resale of homes provided by

the bank loans, the bank requires that the house should be mortgaged

to the bank, and cannot be sold unless all the loan is repaid.

7. The amortization periods of the loans range from 7 to 10 years

for small loans, and from 11 to 20 years for longer term loans.

8. The maximum amount of the loan originally could not exceed L.D.

5,000, but this was raised to L.D. 6,000 and then to L.D. 7,000 because

of the continuous increase in construction costs.

The repayments of the loans start after one year from receiving

the whole loan, and the monthly payments are fixed and take into con-

sideration the tenant's income, family size, and the total value of the

loan.

To see the housing activities that have been provided by this bank

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[6]There are some exceptional cases where the loan was for both buy
ing the land and building the house (especially before the revolution)
but these cases are very few.

and the very important contribution that it has already given to the housing sector to help solve its problems, the following two tables give good pictures as to what this bank had done.

From Tables VIII and IX it is clear that the Industrial and Real Estate Bank has contributed a lot to the housing sector. From 1966 up to 1972 it granted a total number of loans of 13,361 with a total value of L.D. 45,771,668. Both the number and values of loans have been growing very rapidly over time, but as could be seen, most of the growth has been in the years following the revolution. In the three years before the revolution, the annual average number of loans was 1,303, and the average value of these loans was L.D. 4,846,346 while during the three years after the revolution those averages were 3,151, and L.D. 10,410,837 respectively.

With respect to the regional distribution of those loans, it is clear from Table IX that it is becoming even more over time. The share of these loans that went to regions other than Tripoli and Benghazi has been increasing from about 7 percent in 1966/67 to 25 percent in 1969/70 up to 31 percent in 1972/73.

According to a declaration made by the general manager of the Industrial and Real Estate Bank to Alfager Algadid Newspaper, the Bank had granted during the period 1966 up to 31st of July 1975 a total of 32,000 loans for real estate and 709 loans for industry, and the total value of all these loans was 141.5 million of Libyan Dinars. He also said that the bank is now building 1,294 housing units in both Tripoli and Benghazi cities at a total cost of L.D. 22,207,979, which

TABLE IX

DISTRIBUTION OF REAL ESTATE LOANS AMONG REGIONS FROM 1966 TO 1973

Regions	1966/67		1967/68		1968/69		1969/70		1970/71		1971/72		1972/73		Total	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
Tripoli	548	2,000,001	634	2,327,089	332	1,115,661	418	1,040,518	1,063	3,042,740	2,025	6,514,898	2,185	7,843,000	7,205	23,883,907
Benghazi	940	3,588,063	417	1,728,095	385	1,504,237	617	2,678,750	1,562	5,238,080	1,710	5,865,050	2,067	7,022,000	7,698	27,624,275
Zowya	50	144,200	133	404,890	61	194,191	116	313,400	245	751,280	427	1,441,240	392	1,481,000	1,424	4,730,201
Gerian	4	10,000	36	110,560	43	136,720	79	206,600	124	396,350	150	518,690	275	1,054,000	711	1,088,390
Misreta	2	14,000	8	33,000	1	3,200	2	12,500	13	47,000	78	288,690	161	690,000	265	1,088,390
Alkhoms	5	18,600	8	19,000	12	38,650	15	43,000	51	169,250	132	467,400	199	771,000	422	1,526,900
Geble Akdar	35	143,500	62	211,250	82	297,200	85	272,750	14	48,300	141	529,100	386	1,740,000	805	3,242,100
Derna	10	39,600	13	83,000	23	110,500	17	58,900	109	297,575	162	620,500	268	1,195,000	602	2,405,375
Alkalige	9	29,400	19	74,000	9	25,350	27	90,600	9	28,500	25	96,600	176	763,000	274	1,112,850
Sebha	1	3,000	2	7,000	25	118,500	7	33,500	17	72,450	12	48,300	58	246,000	122	528,750
TOTAL	1,604	5,990,364	1,332	5,004,584	973	3,544,209	1,383	4,705,518	3,207	10,091,525	4,862	16,390,468	6,167	22,810,000	19,528	68,581,668

Source: Industrial and Real Estate Bank, Council Board Report (in Arabic), through 1970-72, Table No. 3. For the year 1972/73 was taken from the Statistical Abstract, 1972, p. 310.

are going to be completed by the end of 1977.[7]

<div align="center">Low Interest Rate Loans Program</div>

This program was mainly initiated to help the people whose monthly incomes are in excess of L.D. 100 because they are not eligible for interest free loans from the Industrial and Real Estate Bank. The commercial banks were asked by the government to grant loans to those people for the purpose of helping them build houses at a rate of interest of 4 percent and with a maximum amount of L.D. 6,500.

This program started around the end of 1965, but it has been growing very fast especially during the last three to four years. The allowances for this program have been increased four times during just one year (from October 1, 1973 to December 31, 1974). First it was increased from 40 million Libyan Dinars to 60 million Libyan Dinars, then to 80, and finally to 100 million Dinars. The maximum amount of the loan was also increased from L.D. 6,500 to L.D. 8,500 then to L.D. 10,500 and finally to 12,000 L.D. if the loan includes the price of the land needed.[8]

The number of loans that have been granted from all the commercial banks for this purpose and their values from 1965 up to September 1974 are presented in Table X. From the analysis of the table, the total number of loans has grown from 701 in 1965 up to 4,491 by the end of September 1974, their value also has grown from L.D. 5,413,000 up to L.D. 118,697,000 during the same period.

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[7]Alfager Algadid Newspaper (November 13, 1975, No. 996), p. 1.

[8]MASRAF ALGUMHOURIA, The Annual Report of the Board of Directors for the Period, October 1973 to December 1974 (Tripoli, 1974), p. 31.

TABLE X

NUMBER AND VALUE OF REAL ESTATE LOANS GRANTED BY THE
COMMERCIAL BANKS DURING THE PERIOD
1965 TO SEPTEMBER 1974

At the end of	Number of Loans	Value of Loans in L.D.
1965	701	5,413,000
1966	878	8,891,000
1967	1,021	10,773,000
1968	1,296	13,092,000
1969	1,068	15,562,000
1970	642	16,690,000
1971	690	18,791,000
March 1972	887	17,679,000
June 1972	836	18,495,000
September 1972	909	20,494,000
December 1972	1,292	23,954,000
March 1973	1,400	28,887,000
June 1973	1,898	34,538,000
September 1973	3,546	49,062,000
December 1973	2,438	55,156,000
March 1974	2,820	72,431,000
June 1974	3,798	78,706,000
September 1974	4,491	118,697,000

Source: Central Bank of Libya, Economic Bulletin, January, March 1975,
          Vol. 15, Statistical Tables, Table No. 12.

For the purpose of comparing the development of these loans and their values before and after the revolution it is clear from Table X that both the number and value of loans has been growing much faster after the revolution than before it. Up to 1969 the number of these loans was 1,068, with an annual average of 214; while during the five years after the revolution this number went up to 4,491, with an increase of 3,423 loans or at an annual average of 685 loans. With respect to the value of these loans, we find that it increased from L.D. 15,562,000 before the revolution up to L.D. 118,697,000 with an increase of L.D. 103,135,000; or at an annual average of L.D. 20,627,000.

But we have to keep in mind that in the last three to four years these loans were not just loans to the middle income class, but rather included the loans for housing corporations that were established since December 1973, and the loans for developing construction of commercial housing.

In December 1973, the government announced that housing corporations should be initiated, and that they will be helped by granting them loans at a very low rate of interest (2 percent), and in finding land for their members. These housing corporations are supposed to help their members in (1) getting the required money, (2) buying the land, (3) getting building materials at reasonable prices, (4) handling the building process, (5) receiving the houses from the contractors and giving them to their owners, and (6) managing the houses after they are ready in such things as collecting the monthly payments, maintaining the buildings, and providing the needed repairs for sewage, electricity, water pipes and others.

Also around 1973, the government announced that low interest rate loans would be available through the commercial banks for every one who wants to participate in solving the housing problems by building multi-house buildings for rent, under the condition that each building has to contain four suites or more. Those loans were granted at 5.5 percent interest rate and for a period of 10 years. Both of these events have contributed to the increase in both the number and the value of low interest rate loans program.

Rent Allowance Program

This program was initiated in 1964, and it was mainly for the government employees. According to this program every government employee regardless of his job is entitled to a rent subsidy or rent allowance. This subsidy is a percent of the employee's monthly salary. It was put in a way that this percentage gets higher as the monthly salary gets lower and vice versa. It ranges from 28 percent to 35 percent for unmarried, and from 56 percent to 100 percent for the married employees, with a minimum of L.D. 20 and a maximum of L.D. 43 for unmarried and L.D. 35 and L.D. 94 for the married employees.[9]

Even though this program was really helpful during the early period of its establishment, its value has been depreciated a lot because of high increases in rent especially in the last few years. Because of this increase in rent, it can hardly be said that government employees are in better housing conditions than before this program. They still

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[9]Libyan Arab Republic, Ministry of Planning, <u>Studies on Housing in L.A.R.</u> (Tripoli, May, 1974), p. 38.

need help in this field, either by increasing this subsidy or by build-

ing houses for them.

Summary

These are the housing programs in the Libyan Arab Republic. We

have seen how these programs have been developing over time, and how

each of them has been working to solve housing problems. From these

housing programs only the publicly built housing program and the

interest free loans program are going to be analyzed in terms of net

tenant benefits that they provide to their tenants and in the way these

benefits are distributed according to family characteristics such as

income, family size, and age of the head of the family. These two

programs are considered to be the most important because in terms of

the theory of consumer choice, they have different effects. Under the

publicly built housing program the participant has no freedom to select

his housing services, while under the interest free loans program he is

free to choose. The other housing programs do not have significant

distinguishing effects and can be classified as similar to the publicly

built housing program or to the interest free loans program.

The next chapter, in addition to citing the most important

literature about housing programs in general, will show us how these

two programs are related to consumer theory and develop the theoretical

background to estimate net tenant benefits from these programs in order

to be able to evaluate and compare them.

CHAPTER IV

THEORETICAL BACKGROUND

Public housing programs have attracted the attention of economists

for quite a lone time. There have been a lot of studies analyzing,

identifying, and sometimes trying to measure the benefits and costs of

public housing programs. Some studies have been completely devoted to

the analysis and measurement of the direct benefits to public housing

tenants; in other words, these studies were mainly concerned with the

increase in tenants' welfare as a result of having the opportunity to

consume a bundle of goods that could not be attained with their

unsubsidized budget constraints.[1] Other studies have looked only to

indirect effects such as the impact of public housing programs on

property values.[2] There are still some other studies that are mainly

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[1]R. L. Bish, "The Distribution of Housing Taxes and Subsidies and
Effects on Housing Consumption of Low Income Families" (unpub. Ph.D.
dissertation, Indiana State University, 1968). M. P. Murray, "An Econo-
metric Analysis of Tenant Benefits in Alternative Federal Housing
Programs" (unpub. Ph.D. dissertation, Iowa State University, 1974). R.
Muth, Public Housing, An Economic Evaluation, American Enterprise
Institute for Public Policy Research (Washington, D. C., 1973). E. O.
Olsen, "A Welfare Economic Evaluation of Public Housing" (unpub. Ph.D.
dissertation, Rice University, 1968). J. R. Prescott and E. O. Olsen,
An Analysis of Alternative Measures of Tenant Benefits of Government
Housing Programs (Santa Monica, 1969). J. R. Prescott, "The Economics
of Public Housing: A Normative Approach" (unpub. Ph.D. dissertation,
Harvard University, 1964).

[2]H. Nourse, "The Effects of Public Housing on Property Values in
St. Louis," Land Economics, 39 (1963), pp. 434-441.

concentrated on the cost side of public housing programs.[3]

This study is another effort on the direct benefit side of the public housing programs. Its purpose, as mentioned before, is mainly to compare the two main housing programs in the L.A.R.; namely, the publicly built housing program and the interest free loans program. The comparison will be in terms of the direct benefits they provide to their tenants and in the way these benefits are distributed according to the family characteristics in each program. This chapter will shed some light on the theoretical basis of these government programs. The characteristics of these programs will be discussed in some detail. Also the way they can be related to the consumer theory and their effects on consumer choice will be explained. Finally, the definition of the tenants' benefits and a method of their estimation will be introduced in this chapter.

The Characteristics of Public
Housing Programs

Most of the public housing programs are subsidies in kind and not in cash. That means the government either provides the goods directly, or helps the people get better access to the goods. They take different forms and serve different groups of the population.

Subsidies in kind have been subject to several general criticisms.

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[3]F. DeLeeuw, "The Section 23 Leasing Program," The Economics of Federal Subsidy Programs, Part 5, Housing Subsidies, A compendium of papers submitted to the Joint Economics Committee of the Congress of the United States (Washington, D. C., 1975). R. Muth, Public Housing, An Economic Evaluation, American Enterprise Institute for Public Policy Research (Washington, D. C., 1973).

Many economists have argued that the recipients of a subsidy in kind would be better off if they were given this subsidy in cash, given that both ways of giving the subsidy will result in the same cost to the government. While this seems to be undoubtedly correct, some recent studies have showed that this might not always be the case, and they emphasized that donors may have the opposite preference.[4] J. M. Buchanan in his article, "What Kind of Redistribution do We Want?", finds the use of consumer sovereignty to derive allocative norms inconsistent with the choice of social welfare functions to express distributional objectives.[5] Henry J. Aaron and George M. Von Furstenberg said, "If redistribution is a public good for transferors and not merely the result of coercion or 'taking' the preferences of donors help determine both the extent and the form of redistribution." They said, "Once interdependence of preferences is introduced and donors, though altruistic, are not indifferent to the recipient's spending pattern, Pareto-optimal redistribution can take forms other than cash."[6]

The main criticism that was directed to subsidies in kind is their "inefficiency." But Aaron and Furstenburg in their article, "The Inefficiency of Transfers in Kind: The Case of Housing Assistance," found

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[4]G. G. Daly and S. F. Giertz, "Efficient and Inefficient Transfers," paper presented at the Meeting of the American Academy of Arts and Sciences (Boston, 1969). E. O. Olsen, "A Normative Theory of Transfers," Public Choice, 6 (Spring, 1969), pp. 39-58.

[5]J. M. Buchanan, "What Kind of Redistribution do We Want?", Economica, 35 (May, 1968), pp. 185-190.

[6]Henry J. Aaron and George M. Von Furstenberg, "The Inefficiency of Transfers in Kind: The Case for Housing Assistance," Western Economic Journal, 9 (1971), p. 184.

out that inefficiencies in housing assistance is very small, and most of

it can be explained by the administrative cost side of these housing

programs.

The other justifications for public housing programs are the non-

competitiveness of the market, the existence of externalities which

cannot be internalized by purely individualistic action, and paternal-

istic altruism. With respect to the competitiveness of the market,

Edgar O. Olsen had analyzed all the conditions of competition in the

housing market and concluded that there is no empirical evidence to

support the noncompetitiveness argument. He said,

> Until an alternative theory of the housing market is developed
> which leads to an economic model that has more explanatory
> power than Muth's model, perfect competition is the best
> theory of the housing market available.[7]

With regard to the Libyan housing market there is no reason to

believe that it is not competitive. Ownership of houses is not con-

centrated in the hands of a few people. The rent market also is not

dominated by a single or few people or firms. From the supply side

point of view, the Libyan housing market is highly competitive. There

is no single firm or few firms that can be said has (have) a substantial

influence on either the price or the quantity of housing services

supplied.

With respect to the externalities argument or what sometimes is

called "social costs of slums," there are many studies which used this

argument as their base to justify public housing. In fact, even the

phrase itself has had various meanings in the literature depending on

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[7] Edgar O. Olsen, "A Welfare Economic Evaluation of Public Housing"
(unpub. Ph.D. dissertation, Rice University, 1968), p. 33.

the background of the writer. Probably, with only a few exceptions, the examples of social costs of slum living that were given in the literature cannot be considered as justification for public action in the sense of Paretian welfare economics, because the costs are incurred by the decision-making unit which has a complete control over the quantity of housing services consumed.[8] If the consumer of the substandard housing is the only one who is going to benefit from the improvement in his housing, then there will be no externality involved.

Some empirical studies infer causation from housing to physical, mental, and social disorders from simple correlation between two variables without appeal to theory.[9] The usual approach that is followed by these studies is to compare the incidence of physical, mental and social disorders by census tract with the characteristics of housing conditions in the tract. As an example, consider the case of housing and juvenile delinquency that was illustrated by the study of Bernard Lander. He found that "the juvenile delinquency rate is highly correlated with substandard housing and with residential overcrowding with partial correlation rates of r = +.69 and +.73 respectively."[10] But when Olsen eliminated the influence of some other variables studied, he found that "these correlation rates were reduced to +.0052 and .0079.

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[8] The exception is Jerome Rothenberg, _Economic Evaluation of Urban Renewal_ (Washington, D. C., 1967), Chapter X.

[9] Jay Rumney, "The Social Costs of Slums," _The Journal of Social Issues_, VII (1951), pp. 77-79, Surveys the results of a number of these studies, Wilner _et al._, _The Housing Environment and Family Life_, Chapter I is an excellent short review of the better studies in this field.

[10] Bernard Lander, _Towards an Understanding of Juvenile Delinquency_ (New York, 1954), p. 46.

Furthermore, when adjustment was made for the curvilinearity of the

data, these partial correlations are reduced in both cases to zero."[11]

Still other studies stress the benefits that will occur from the

improvement of housing conditions for low income families. They said

that these benefits will be in the form of better health, reduction in

fire incidence, and a lower crime rate. Probably the best example for

these studies is the study by Rothenburg.[12]

John C. Weicher, in a study trying to measure the effects of the

Hyde Parkkenwood Urban Renewal Project on the municipal expenditures

on some public services, found that the reduction in the expenditures

on these services ranges from 2 percent to 15 percent of project costs.

Based on his results he said:

> When the results of the present study are evaluated in con-
> junction with those of Rothenberg., Mao, and Ferrara, it
> appears that economic justification for urban renewal
> projects depends heavily upon their effects on the phenomena
> of slum-generated social costs (crime, fires, disease, and
> personality difficulties), which have so far been unmeasur-
> able.[13]

> Considering these social costs of slums, Edgar O. Olsen said:

> With respect to the tangible benefits that occur to some indi-
> viduals from the improved housing of others, it is not the
> quantity of housing service consumed by others which directly
> enters the preference functions of the indirectly benefitted
> individuals. Rather, it is their own consumption of health,
> fire protection, and police protection which the indirectly
> benefitted individuals value . . . The quantity of housing

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[11]Edgar O. Olsen, "A Welfare Economic Evaluation of Public Housing"
(unpub. Ph.D. dissertation, Rice University, 1968), p. 40.

[12]Jerome Rothenberg, Economic Evaluation of Urban Renewal (Wash-
ington, D. C., 1967), Chapter X.

[13]John C. Weicher, "The Effects of Urban Renewal on Municipal
Service Expenditures," Journal of Political Economy, Vol. 80, No. 1
(January, February, 1972), pp. 86-100.

services consumed by low-income families enters the prefer-
ence functions of high-income families as one of many inputs
in the production of final goods. So high income families
for which this is the case will have a derived demand for
housing service for low-income families . . . But, besides
the existence of this demand it should be of sufficient
magnitude so that high-income families place a value on the
consumption of an additional unit of housing service by a
low-income family beyond what the low-income family would
consume in the absence of the collective action . . . So,
to make a case for housing subsidies to low-income
families on the above grounds, it must be shown that high-
income families will benefit from the consumption of housing
service by low-income families beyond what these families
would consume in the absence of the collective action.[14]

With respect to the third justification, "Paternalistic Altruism,"

Olsen said that, "It is probably the primary motivation of active sup-

porters of public housing." What is meant by an altruistic person here

is the person who is willing to give up some goods in order to make

other people happier because he prefers the added well-being of others

to the goods that he could have purchased. To him well-being of others

is a good, the quantity demanded of it (as any other good) depends on its

price, income, and his tastes. So the optimal amount of transfers

justified by the altruism of individuals does not depend on the recip-

ients needs alone, but also on the prices to, incomes and tastes of the

givers.

But, suppose that altruism justifies transfers between individuals.

How can it justify a subsidy in kind such as public housing? To answer

this question, Olsen said that:

Some altruistic people prefer to give subsidy in kind rather
that in cash even though they realize that the recipient would
be better off with the cash. If this is the case, then a sub-
sidy in kind is the correct program even though the recipient

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[14]Edgar O. Olsen, p. 41.

would have been better off with the cash. More real-
istically, the donors may feel that the recipients would be
better off with the subsidy in kind than with the cash,
even though the recipients themselves would choose the cash
of the donors instead of the housing service. This attitude
on the part of the donor is commonly called paternalism. In
the case of public housing, the nature of the recipients
might seem to strengthen the argument for paternalism. Their
lack of education probably means not only that they are un-
productive but also less efficient maximizers within their
limited budget constraints. Paternalism does seem to be a
major aspect of reality. In real life we observe that most
charitable organizations give aid in kind rather than in
cash. If altruistic persons are paternalistic too, then
transfer programs should reflect this fact. If this paternal-
istic altruism involves a desire for low-income families to
consume more shousing services, then, we can safely say that
these altruists have a demand for housing services for low-
income households. Since there are many people who place
some value on the increased consumption of housing service
by low-income households, then it is a collective good, and
we cannot depend on the individualistic action operating
through the market to produce the correct amount of housing
services for poor families.[15]

From this analysis we can conclude that the most reasonable justif-

ication for public housing is the "paternalistic altruism." It seems

that this conclusion holds for the public housing programs in the Libyan

Arab Republic because: (1) the non-competitiveness of the market argument

will not hold as mentioned before because of the deconcentration of

houses ownership; (2) even though there is no empirical analysis of the

externalities associated with slum housing in Libya, the improvement

in the housing conditions of the poor does not seem to generate enough

external benefits to justify the public housing programs.

The Effect of Housing Programs

on Consumer Choice

Housing programs will directly affect a consumer's choice from the

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Ibid., p. 46.

set of goods and services that are available to him, and the relative

prices of these goods and services. From the point of view of the

participant in the housing programs, these programs give him the

opportunity to obtain housing at a lower rental outlay than if he were

to purchase the same housing services on the open market. As can be

seen from the real life, housing programs can provide different kinds

of subsidies to attain this purpose. But the important point is how

these programs can be classified in terms of the theory of consumer

choice.

Following DeSalvo's classification, two types of housing programs

can be recognized.[16]

Type I Housing Program: In this type of housing program, the con-

sumer has a free choice in the selection of housing services, design,

location and so forth. The interest free loans program in the L.A.R.

can be classified under this type of housing program. The participants

in this program have the freedom of selecting the design, location, num-

ber of rooms, and so on. There is no government interference with the

consumer choice except for the assurance that the loan has been spent on

the house.

Type II Housing Program: Under this type of housing program, the

consumer has no freedom to choose. He has to live in the house that is

specified and determined by the housing authority, or otherwise not

participate in the housing program. In other words, the participant in

the housing program has to accept what is offered by the housing

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[16]J. DeSalvo, "A Methodology for Evaluating Housing Programs,"
Journal of Regional Science, 11 (1971), pp. 173-185.

authority if he wants to be a participant. He cannot select the type of house he wants or its location. The publicly built housing program in the L.A.R. could be easily classified under this type of housing program. Under this program the housing authority in the L.A.R. chooses the location, specifies the design, builds the houses, and then offers them to the needy families at a below market rent without giving the individual consumer the freedom to choose.

To see the effects of type I housing program on the participant, consider Figure 2. In this figure, the individual consumer is confronted with the budget line with the equation $Y = P_x X + PhH$ (shown as I_1 in Figure 2). Where Y represents the consumer fixed income, P_x is the fixed price of the composite nonhousing good X, and Ph is the fixed price of the composite housing good H.

If there is no housing program, and the consumer is facing free market conditions, he will be maximizing his utility at the point A, where his indifference curve U_1 is just tangent to his budget line I_1, ending up buying OX_1 units of other goods and OH_1 units of housing, which will require rent of $r_1 = PhH_1$. Next, suppose that the consumer is a participant in a housing program that enables him to get housing at less than market rent. For example, assume that a housing unit which commands a market rent equal to $r = PhH$, is offered to the participant in the housing program only for αr where $0 < \alpha < 1$.

According to this assumption, the consumer will be facing a new budget line with an equation $Y = P_x X + \alpha PhH$ (shown in the figure as the line I_2). The maximum utility point in this case will be point B where the indifference curve U_2 and the budget line I_2 are tangent to each other. The optimum combination of goods comes up to be OH_2 units of
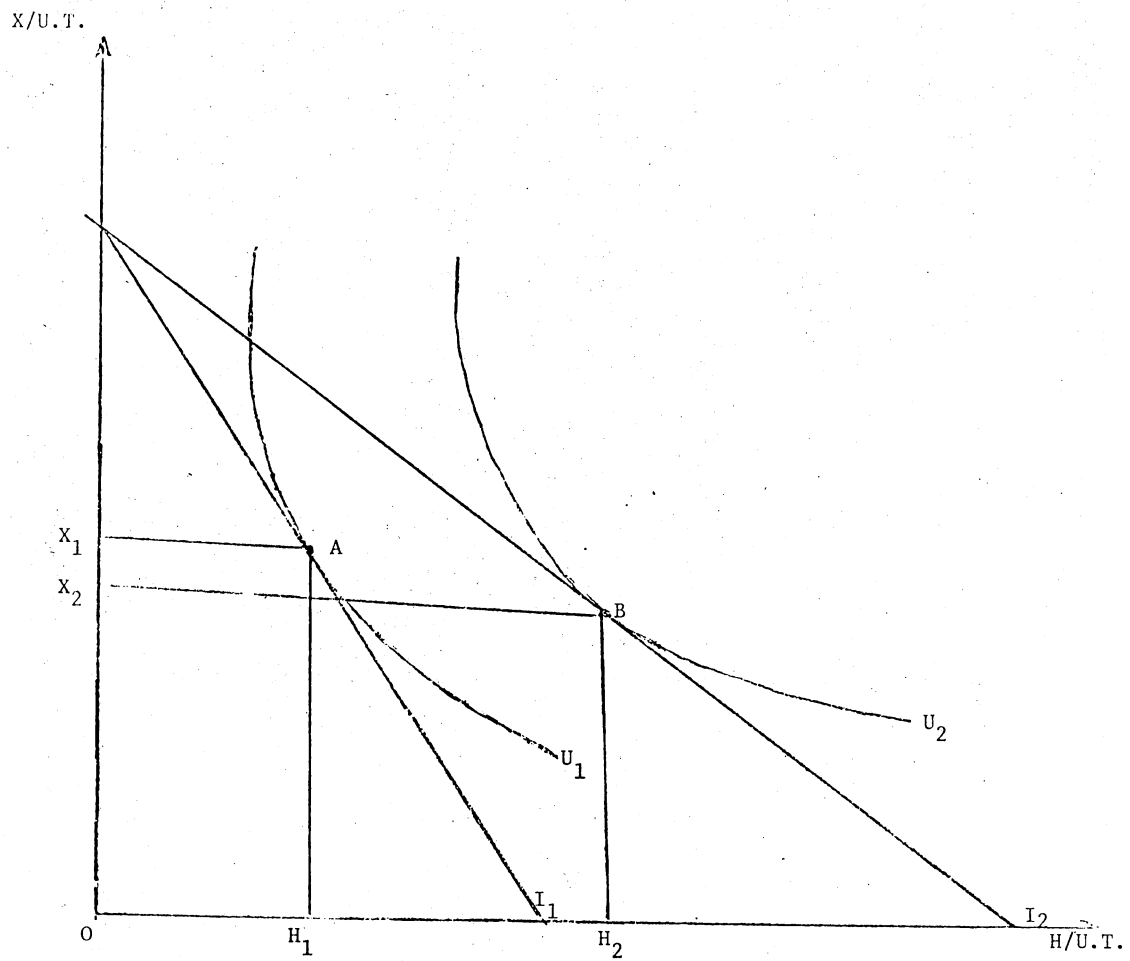
Figure 2. Model of Consumer Choice and Participation in Type I
Housing Program

housing and OX_2 units of other goods. It can be noticed that since α

is less than 1, the budget line rotates out to the right. The result

of this reduction in the prices of housing to the participant is making

him better off, by helping him reach a higher indifference curve U_2,

consuming a higher quantity of housing H_2, and paying only αPhH_2 for

them which is less than PhH_2, the amount he would pay if he purchased

the quantity at the market price.

The Effect of Type II Housing Program

As was mentioned before, under this type of housing program, the

participant does not have the choice of selecting the type of housing

he wishes, neither does he have the choice of selecting the location

or the design. In fact, he either accepts the type of housing that is

offered to him by the housing authority or does not participate in the

program at all.

To see what kind of impact this type of housing program has on

its participants, consider Figure 3. The vertical line at H_2 represents

the fixed amount of housing the tenant must purchase under this type

of housing program. The tenant will pay for this quantity of housing

the amount of αPhH_2, where, as in type I housing program, $0 < \alpha < 1$. If

instead he were to buy this quantity on the housing market he would

have to pay the amount PhH_2 (which is greater than αPhH_2, since $\alpha < 1$).

Before participating in the program the consumer's budget line is

represented by I_1 in Figure 3. He maximizes his utility at point a

(the tangency point of his budget line I_1 and his indifference curve

U_1). At that point he consumes X_1 units of the composite good X and H_1
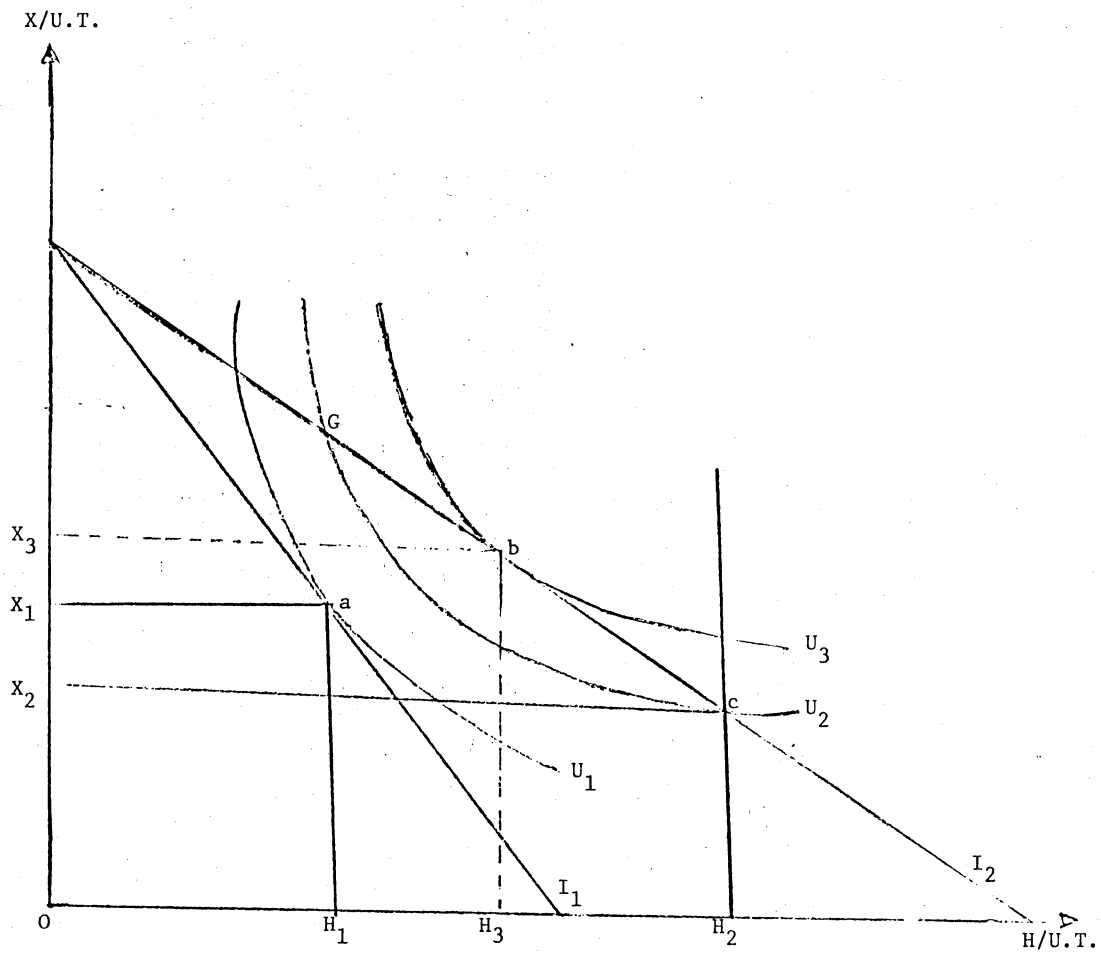
Figure 3. Model of Consumer Choice and Participation in
Type II Housing Program

units of housing. If he participates in this housing program, his

budget line will be I_2. Assuming that H_2 units of housing have to be

purchased, and αPhH_2 has to be paid for it as a rent, the participant

will end up with the combination of H_2 of housing and X_2 of other

goods.

If the consumer was free to choose along the budget line I_2, he

would have chosen point (b), where he could enjoy a higher level of

utility (U_3). He could do that by giving up some housing to be traded

for some of the other goods X. It has to be clear here that drawing

the vertical line at H_2 was arbitrarily. It could be drawn in such a

way that the participant would end up at the same point (b) which is

his choice at the free market. Also, it might be drawn in such a way

that H_2 would be so low, that the participant would be willing to trade

off some units of the composite good (x) for some units of housing (H).

As for example at point G where $MRS_{H,x}$ is $> \dfrac{Ph}{P_x}$ and in this case the

consumer will be willing to trade off some x's for more housing. It can

even be possible to choose the quantity H_2 so large, that the

participant would be worse off with the program than without it. What

has been shown in Figure 3 is probably the most realistic case. It

showed that the participant has to purchase more housing units than he

prefers at prices P_x and αPh, but not enough for him to prefer not to

participate.

Tenant Benefits from Housing Programs

It was explained above that housing programs help their tenants

reach a higher level of utility than was possible for them before the

participation in these housing programs. In other words housing

programs really do benefit their tenants or participants. The most

important point here is how these tenant benefits can possibly be

assessed or measured. One possible way is to find the amount of money

that will make the consumer as well off without the program as with it.

There are several ways to do this, all of them are based on the notion

of consumer's surplus. Some studies have used the Marshallian measure

of consumer's surplus, or other measures which can be viewed as good

approximations to the Marshallian measure, such as the difference

between the tenants pre-participation rent and his program rent, or the

difference between the market rent of the subsidized unit and the

subsidized rent or the program rent.[17] Other studies have used the

price equivalent variation version of Hicksian measure.[18]

Marshall defined consumer's surplus as the excess of the price

which the consumer would be willing to pay rather than go without the

thing over what he actually pays for that thing. According to him this

excess would be equal to the area under the demand curve to the left of

the quantity purchased, minus the payment for the commodity (subject to

the important assumption that the marginal utility of money be constant).

This measure assumes that the quantity of the commodity picked up

by the consumer will be represented by a point on the consumer's demand

curve. But in some housing programs this quantity is specified by the

housing authority (not by the consumer) and there is no assurance that

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[17]See the studies made by Michael P. Murray, Edgar O. Olsen, and
James R. Prescott, Bish and others.

[18]See the studies made by Henry J. Aaron and George M. Van
Furstenberg, Joseph S. DeSalvo and others.

this quantity will be a point on the consumer's demand curve.

According to Murray,

> Marshall's measure, then purports to be the amount of money
> we could take from a person to leave him no better off than
> he was prior to entering the program. This measure is, in
> itself, uninteresting from a policy point of view, because
> there is no interest in 'taxing' participants in this
> fashion. However, the Marshallian measure would be of
> interest if it offered a reliable, simple approximation of
> a more policy oriented benefit measure.[19]

According to the Hicksian measure of consumer's surplus, the direct

tenant benefits would be defined as the increase in income that if given

to the consumer in the absence of the housing program will make him as

well off as the program does.[20] This study will use this version of the

Hicksian measure because the Marshallian measure is often criticized on

the following grounds.

1. It is criticized on the assumption of constant marginal util-

ity of money.

2. It is not as robust as the Hicksian measure in cases off the

demand curve.

On the other hand, the Hicksian measure was supported because of

many reasons, such as:

1. It tells us in an intuitively appealing way how much better

off participants are made.

2. It tells us how much it would cost to improve the lot of

tenants just as much as the program does, if we were to forego affecting

their consumption pattern.

_____

[19]M. P. Murray, p. 19.

[20]This is what is called price equivalent variation version of con-
sumer's surplus measures.

3. It allows us to compare the participants' actual consumption of

housing with what they would consume if given an equivalent cash

grant.[21]

This measure has been used by many studies, such as Henry J. Aaron

and George M. Von Furstenberg, who used this measure as a standard to

estimate or assess the ineffieicncy of some existing housing programs.[22]

Using constant elasticity of substitution (CES) utility functions,

which always imply unitary income elasticities but allow variation in

the price elasticities of demand, they were able to simulate the inef-

ficiency of subsidies in kind associated with utility functions with

different elasticities of substitution, and with different rates of

subsidies. They found the inefficiency or the waste in subsidies to be

equal to the difference between the subsidy paid by the government under

the housing program and the required increased income that should be

given to the tenant in order for him to get the same utility as under

the program given that he now pays the market rent for housing. In terms

of graphs this could be shown in Figure 3 as the difference between bH_3

and the income increase (parallel upward shift in I_1) required to

maximize u along the indifference curve U_3. They concluded that even a

very small benefit to the non-recipients of the public housing subsidy

[21]Murray, p. 19, and James R. Prescott and Bakir Abukishk, "Some
Evaluative Aspects of Alternative Housing Subsidies," (a paper prepared
for Special Issues on Housing), Journal of Economics and Business
(October, 1974), p. 12.

[22]Aaron and Von Furstenberg, "The Inefficiency of Transfers in
Kind: The Case for Housing Assistance," Western Economic Journal, 9
(June, 1971), pp. 184-191.

could very easily justify this type of housing program. In fact they
said,

> Because of quantity constraints, the inefficiencies may be
> lower even if no external benefits are attached specifically
> to the increased consumption of better housing. If there
> are large inefficiencies in federally assisted housing, they
> will have to be found empirically on the cost side, to the
> extent the administration of particular programs involves
> detailed federal regulations of the conditions of supply.[23]

Michael P. Murray on the other hand used this measure to estimate

the direct tenant benefits of several housing programs in the U.S.A. He

used both the Cobb-Douglas and the generalized CES type of utility func-

tion to estimate tenant benefits.[24] Then he ran a regression analysis

to see how these benefits were distributed according to family character-

istics, race, and residence for these programs using both the Cobb-

Douglas and the generalized CES utility functions.

All the previous studies that were mentioned above assumed that the

direct tenant benefits came solely from the consumptive satisfaction

that was experienced by family members within the subsidized housing

unit. There are some other sutdies cited by James R. Prescott and Bakir

Abu Kishk, in their paper, "Some Evaluative Aspects of Alternative

Housing Subsidies."[25] These studies claim that additional productivity

effects should be distinguished in studies attempting to evaluate the

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[23]Ibid., p. 189.

[24]The generalized CES utility function that he used is in the form
$u = (aH^b + E^c)^d$ where H and E are the quantities of housing and non-
housing goods consumed respectively, u is the level of utility, and a,
b, c, and d are parameters (d is an arbitrary scale factor). This form
has the CES as a special case and the Cobb-Douglas as a limiting case.

[25]Prescott and Abu Kishk, p. 15.

effects of subsidized housing programs. The increase in the quantity

and quality of housing services will surely have a very significant

effect on the environment of the dwelling unit, which in turn affects

the work and leisure attitudes of all family members.

All of this, of course, has a major effect on the productivities

of the family members in the economic activities outside the dwelling

unit. In this case they said, "The money cost of the government

subsidy underestimates the income impacts on the subsidized family."

The first study they cited was the study made by Leland S. Burns,

Robert G. Healey, Donald M. McAllister, and B. Khing Tjise. It was

concerned with the estimation of health and educational benefits

attributable to improved housing for low-income families. They analyzed

controlled groups at six international locations. Workers were studied

before and after entering the public housing project. Absenteeism,

output measures, and total production data were available from factory

records for a period of six months following re-housing. The educa-

tional benefits due to improvement in housing conditions were estimated

from absenteeism data collected on the children of re-housed families

from local schools and personal interviews with school administrators.

The health effects of the project were studied by examining out-patient

and in-patient hospital records for both a control and test group for a

period of one year before and after re-housing.

Pine Ridge housing project, South Dakota, was the only site

analyzed in the United States. They summarized the results of the Pine

Ridge study as the following.

> For the average worker, output per hour increased by 21% in
> the period immediately following re-housing and the number
> of hours worked increased 6%. (The local factory combined

an hourly wage with a piece-work bonus plan, so workers could
more flexibly adjust their work effort than under a straight
time rate with no provisions for overtime.) These productiv-
ity gains lasted for only 27 weeks, however, after which
sharp declines in output per hour occurred; at least one
explanation of this effect is the threat of expulsion due to
excessive earnings. The absentee data for school children
seems less conclusive due both to the small sample (9 cases)
and a substantial variation within this group. Mean absentee-
ism actually rose by one day per year after re-housing and
interviews with teachers revealed a wide range of opinions.
The health effect appears to be more substantial for com-
parisons of 50 families in both the control and test groups,
in-patient visits declined 31.7% and out-patient visits rose
17.6% in the test cases compared to control families.[26]

The consumer's surplus as used in this study (or the Hicksian

measure of tenant benefits) is the increase in income that if given to

the consumer in the absence of the housing program will put him on the

same indifference curve that he attains under the housing program (or

in other words, it is the cash grant which would make the participant

as well off as the program does) given that he pays the market prices

for the other goods he buys and the market rent for the housing he

consumes. This measure of tenant benefits appears to be very attractive

and important to the policy makers, because it can be used for

comparisons and it is relatively easy to calculate.

To find this required increase in income, assume an individual

consumer who is not a participant in a housing program. He has a given

income, and he is in a two commodity world, these two commodities are

housing services, H, and non-housing goods, X. The market prices of

these two goods are Ph and Px respectively. Faced with these con-

straints, the consumer (as can be seen in Figure 4) will maximize his

utility at the point D, where his indifference curve Uo is just tangent

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[26]Ibid., p. 15.
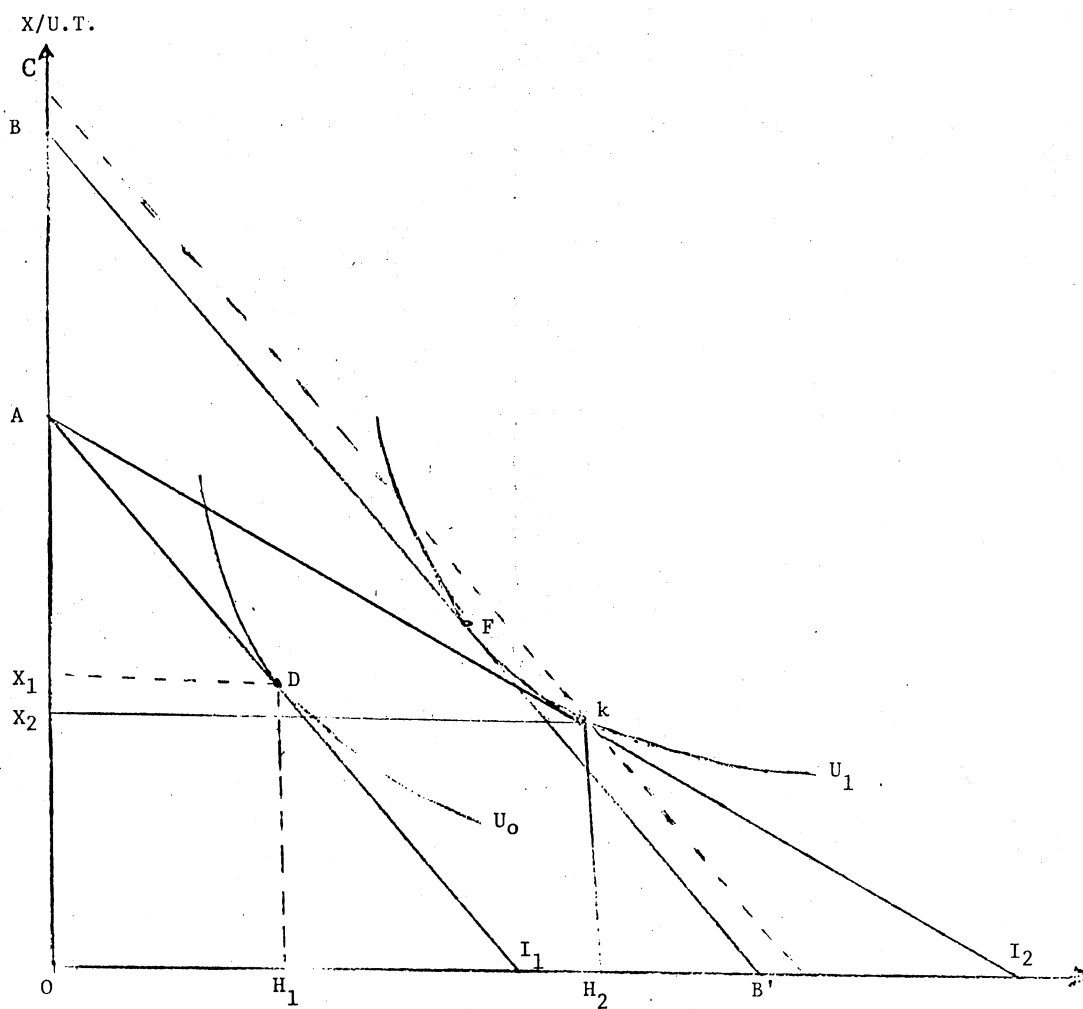
Figure 4. Model of Consumer Choice with Consideration of
Net Tenant Benefits from Housing Programs

to his budget line I_1, or where his marginal rate of substitution between the two goods is just equal to their price ratio. At that point he will consume H_1 units of housing services and X_1 units of other goods, and he will enjoy the level of utility that is given by the indifference curve Uo. Now suppose that our individual consumer becomes a participant in a housing program and as a result of that he ended up consuming the combination of housing and other goods that is indicated by the point (k) on the indifference curve U_1. From Figure 4, it is clear that the consumer is enjoying a higher level of utility since he is now on a higher indifference curve U_1 than before the program Uo. It is also clear that he is now paying less for his housing as can be seen from the slope of his new budget line AI_2. What will be the increase in income that will make the consumer get the same level of satisfaction U_1, given that he pays the market rent for his housing? To get the level of satisfaction given by the indifference curve U_1 and paying the market rent for his housing, the consumer needs an income represented by the line BB' (in the figure) which is tangent to the indifference curve U_1 at the point F, and parallel to the old budget line I_1, to indicate that both Ph and Px are the same as before the program. We can represent this income by Y and the consumer's actual income by Yo. Then the increase in income that will make the consumer as well off as under the program will equal Y - Yo. Since we defined the tenant benefits according to the Hicksian measure of consumer's surplus as the increase in income that will make the consumer as well off as under the program, then the net tenant benefits will be equal to:

$$B_t^n = Y - Yo. \tag{1}$$

The gross tenant benefits are defined to be the sum of the net tenant benefits and the project rent (Rp) that is paid by the tenant,[27] so:

$$B_t^g = B_t^n + Rp = Y - Yo + Rp. \qquad (2)$$

It has to be noticed here that both gross and net tenant benefits are not directly measurable since the income necessary to obtain the level of satisfaction given by the indifference curve U_1 is not directly observable; therefore, we have to have a method to estimate B_t^n from the observed data. This method is introduced in the next section.

Estimating Tenant Benefits

We have to assume a particular form of the utility function in order to get the theoretically correct measure of tenant benefits discussed above. There have been a lot of arguments about the type of utility function that should be used and which is most suitable for the analysis and estimation of tenant benefits. Most of the previous studies, including DeSalvo's, have utilized the Cobb-Douglas utility function as the specific form, with the implication that both income and price elasticities of demand for housing are unity.

The exception to these studies are the study made by Aaron and Von Furstenberg and the study made by Murray. Aaron and Von Furstenberg utilized a CES-type utility function with the property that only the income elasticity of demand for housing is constrained to be unity.

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[27]The gross tenant benefits measure the value of the housing program to the participant. It shows us how much the housing program is really worth to the participant consumer.

The price elasticity of demand for housing was assumed to vary, because they said that there is more agreement on the income elasticity of demand for housing to be unity than on the price elasticity. They used this function (as was mentioned before) to calculate the inefficiencies of transfers in kind under alternative assumptions regarding the elasticity of substitution between housing and non-housing goods.

Murray, in his study estimating the direct benefits to tenants in some public housing programs in the U.S.A. and the distribution of these benefits according to the family characteristics, used both Cobb-Douglas and the generalized CES type of utility functions. He tested the hypothesis, whether the Cobb-Douglas utility function is the true function or the generalized CES is the true one. According to his analysis he found that the generalized CES utility function is superior to the Cobb-Douglas utility function. In terms of estimating the gross and net tenant benefits, Cobb-Douglas utility function is a very good approximation of the generalized CES utility function. But in terms of the distribution of benefits according to the family characteristics, the Cobb-Douglas utility function must be used with caution. In this study, because of the lack of the data needed by the generalized CES, only the Cobb-Douglas utility function is used to estimate tenant benefits.

Estimating Tenant Benefits from the

Publicly Built Housing Program

(Using Cobb-Douglas Utility

Function)

To estimate tenant benefits using the Cobb-Douglas utility

function,[28] assume that the individual consumer has a utility function
of the form:

$$U = H^{\beta}X^{1-\beta} \quad \text{where} \quad 0 < \beta < 1 \tag{3}$$

and his budget constraint is:

$$Y = PxX + \alpha PhH \tag{4}$$

where:

H = housing services per unit time

X = units of other commodities per unit time

αPh = the project rent of units of housing

Px = the price of other commodities

Y = the tenant's income

β = the consumer's rent-income ratio

α = 1 when the consumer is not a participant in the housing
program and less than 1 when he is a participant.

The assumed utility function implies (as mentioned before) unitary
price and income elasticities of the demand for housing and non-housing
goods. In other words if income is constant, expenditures on housing
and all other non-housing goods remain constant as prices change, and
for a given price, expenditures on both goods change proportionally to
changes in income. But the most important point here is the price and
income elasticities of the demand for housing. With respect to this

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[28]The methodology used here is based on the methodology developed
by J. DeSalvo in an article, "A Methodology for Evaluating Housing
Programs," Journal of Regional Science, 11 (1975), pp. 173-185.

point, there are some studies that tested the empirical implications

of the Cobb-Douglas utility function. With respect to the income

elasticity of demand for housing, DeLeeuw found that income elasticity

of rental housing ranges from 0.8 to 1.0.[29] From the standpoint of the

price elasticity, Muth indicated that it is around unity.[30] Based on

these studies, the assumed utility function is consistent with the

empirical evidence. The estimation of the tenant benefits from the

above equations will be as the following.

Using the lagrangian multiplier technique to maximize the utility

function subject to the budget constraint results in the following

demand equations:

$$\text{Max. } \ell = H^{\beta}X^{1-\beta} + \lambda(Y - P_xX - \alpha PhH) \tag{5}$$

$$\frac{\partial \ell}{\partial H} = \beta H^{\beta-1}X^{1-\beta} - \lambda \alpha Ph = 0 \rightarrow \lambda = \frac{H^{\beta-1}X^{1-\beta}}{\alpha Ph} \tag{6}$$

$$\frac{\partial \ell}{\partial X} = H^{\beta}(1 - \beta)X^{-\beta} - \lambda P_x = 0 \rightarrow \lambda = \frac{H^{\beta}(1 - \beta)X^{-\beta}}{P_x} \tag{7}$$

From equations (6) and (7):

$$\lambda = \frac{\beta H^{\beta-1}X^{1-\beta}}{\alpha Ph} = \frac{H^{\beta}(1 - \beta)X^{-\beta}}{P_x} \tag{8}$$

$$\rightarrow \frac{\beta X}{\alpha Ph} = \frac{H(1 - \beta)}{P_x} \tag{9}$$

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[29] F. DeLeeuw, "The Demand for Housing: A Review of Cross-Section Evidence," Review of Economics and Statistics, 53 (1971), pp. 1-10.

[30] R. F. Muth, "The Demand for Non-Farm Housing," in A. C. Harberger (Ed.), The Demand for Durable Goods (Chicago, 1960), pp. 29-96.

$$X = \frac{H(1 - \beta)\alpha Ph}{\beta Px} \qquad (10)$$

By substitution of equation (10) into the budget line equation, we get the following:

$$Y = Px\left[\frac{H(1 - \beta)\alpha Ph}{\beta Px}\right] + \alpha PhH \qquad (11)$$

$$Y = H\left[\frac{(1 - \beta)\alpha Ph}{\beta}\right] + \alpha PhH \qquad (12)$$

$$Y = H\left[\frac{(1 - \beta)\alpha Ph}{\beta} + \alpha Ph\right] \qquad (13)$$

$$Y = H\alpha Ph\left[\frac{1 - \beta}{\beta} + 1\right] \qquad (14)$$

$$Y = H\alpha Ph\left[\frac{1}{\beta}\right] \qquad (15)$$

$$\beta Y = H\alpha Ph \qquad (16)$$

$$H = \beta Y/\alpha Ph \qquad (17)$$

This is the demand curve equation for housing services. It shows that the quantity of housing services demanded depends upon preferences, income, relative prices.

By substituting for H into equation (10) the demand equation for the other goods X will be:

$$X = \frac{\beta Y/\alpha Ph \ [(1 - \beta)\alpha Ph]}{\beta Px} \qquad (18)$$

$$X = (1 - \beta)Y/Px \qquad (19)$$

which means that the demand for other goods X is equal to the share of

the tenants income spent on them divided by their price.

Suppose that the consumer participates in the housing program (which means now that α is less than 1) and obtains H_1 units of housing, and X_1 units of other goods X with an income equal to Y_0. The utility level associated with these amounts will be:

$$U_1 = H_1^{\beta} X_1^{1-\beta} \tag{20}$$

To estimate the benefits he gets from the participation in the housing program, we need to know how much income is necessary for the consumer to obtain the level of utility U_1, given that he is required to pay the market rent for the housing services. This income can be found by substituting the demand equations with ($\alpha = 1$) into the utility function after setting $U = U_1$ and then we solve for Y. In other words what we are after is the level of income (Y) that solves the following equation:

$$\left[\frac{Y_0 - \alpha PhH_1}{Px} \right]^{1-\beta} [H_1]^{\beta} = \left[\frac{(1-\beta)Y}{Px} \right]^{1-\beta} \left[\frac{\beta Y}{Ph} \right]^{\beta} \tag{21}$$

By taking Y in the right hand side out of the parentheses, we get the following:

$$\left[\frac{Y_0 - \alpha PhH_1}{Px} \right]^{1-\beta} [H_1]^{\beta} = \left[\frac{1-\beta}{Px} \right]^{1-\beta} [Y]^{1-\beta} \left[\frac{\beta}{Ph} \right]^{\beta} [Y]^{\beta} \tag{22}$$

Moving the constant terms in the right hand side into the left side results in:

$$\left[\frac{Y_o - \alpha PhH_1}{Px}\right]^{1-\beta} [H_1]^{\beta} \left[\frac{Px}{1-\beta}\right]^{1-\beta} \left[\frac{Ph}{\beta}\right]^{\beta} = Y \qquad (23)$$

or

$$Y = \left[\frac{PhH_1}{\beta}\right]^{\beta} \left[\frac{Y_o - \alpha PhH_1}{1-\beta}\right]^{1-\beta} \qquad (24)$$

Knowing that $PhH_1 = Rm$ (the market rent) and $\alpha PhH_1 = Rp$ (the project rent), the above equation can be written as:

$$Y = \left[\frac{Rm}{\beta}\right]^{\beta} \left[\frac{Y_o - Rp}{1-\beta}\right]^{1-\beta} \qquad (25)$$

Defining net tenant benefits as the difference between the income that will make the tenant as well off without the program as with it (Y), and his actual income (Y_o), then the net tenant benefits will be equal to:

$$B_t^n = Y - Y_o \qquad (26)$$

or

$$B_t^n = \left[\frac{Rm}{\beta}\right]^{\beta} \left[\frac{Y_o - Rp}{1-\beta}\right]^{1-\beta} - Y_o \qquad (27)$$

This is the amount of money which if added to the consumer's income would lead him to attain a level of utility U_1 equal to that attained under the housing program. This is the net tenant benefits. The gross tenant benefits can be defined as the sum of the net tenant benefits and the project rent, or

$$B_t^g = B_t^n + Rp \tag{28}$$

so by estimating Y we can estimate B_t^n, and by adding Rp to it, we get B_t^g.

Tenant subsidies in this program will be equal to

$$S = Rm - Rp. \tag{29}$$

Estimating Tenant Benefits from the Interest Free Loans Program (Using Cobb-Douglas Utility Function)

According to this program, the people whose monthly incomes are within the range of 50 to 99 Libyan Dinars, have the opportunity to get interest free loans from the Industrial and Real Estate Bank, provided that the individual has the land to build the house on. These loans are paid back in equal monthly payments which cover the principal of the loans only. The payment period ranges from 7 to 10 years. So, this program is a price subsidy program since it enables its tenants to get houses at prices less than what they would be paying had they got these loans from the private capital market at the market interest rate.

If they had those loans from the private market they would be paying a monthly price that should cover the monthly payment of principal of the loan, the monthly interest charges, monthly maintenance expenditures, monthly land rent, and monthly depreciation.

Let us call this market price Pm, so

$$Pm = Mp + Mn + L_R + M_D \tag{30}$$

where

    P_m = the price the tenant would pay given that he had the loan from the private capital market

    M_p = monthly payment of the principal of the loan plus monthly interest charges

    M_n = monthly maintenance expenditures

    L_R = monthly land rent

    M_D = monthly depreciation.

But under this program the price the tenants will pay will be lower than the market price (P_m) by the amount of interest charges. Let us call this monthly payment (P_p) the program price. Following this reasoning the program price would be:

    P_p = P_m - monthly interest charges.

The monthly tenant subsidy in this program will be equal to the monthly interest charges the tenant did not pay which is:

$$P_m - P_p. \tag{31}$$

To estimate tenant benefits from this program using Cobb-Douglas utility functions, assume the individual consumer in this program has a utility function of the form:

$$U = H^\beta X^{1-\beta} \tag{32}$$

where

    $0 < \beta < 1$

and his budget constraint is:

$$Y = P_x X + \alpha P_h H \qquad (33)$$

where:

  H = housing services per unit time

  X = units of other commodities per unit time

  αP_h = the program price of housing service

  P_x = the price of other commodities

  Y = the tenant's income

  β = the consumer's housing monthly payment/income

    ratio

  α = 1 when the consumer is not a participant and less 1 when

    he is a participant in the housing program.

Maximizing the utility function subject to the budget constraint

results in the following demand equations:

$$H = \beta Y / \alpha P_h \qquad (34)$$

and

$$X = (1 - \beta) Y / P_x.^{31} \qquad (35)$$

Suppose that the consumer participates in the housing program

(which means that α is less than 1) and obtains H_1 units of housing and

X_1 units of other goods X with an income equal to Y_o. The utility level

associated with these amounts will be:

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[31] For complete analysis of finding these demand equations see pages
80, 81 and 82 in this chapter.

$$U_1 = H_1^\beta X_1^{1-\beta}. \tag{36}$$

To estimate the benefits the consumer gets from the participation in the housing program, we need to know how much income is necessary for the consumer to obtain the level of utility U_1, given that he is required to pay the market price for the housing services. This income can be found by substituting the demand equations with ($\alpha = 1$) into the utility function after setting $U = U_1$ and then solving for Y. In other words, what we are after is the level of income (Y) that solves the following equation:

$$\left[\frac{(1-\beta)Y_o}{Px}\right]^{1-\beta}\left[\frac{\beta Y_o}{\alpha Ph}\right]^\beta = \left[\frac{(1-\beta)Y}{Px}\right]^{1-\beta}\left[\frac{\beta Y}{Ph}\right]^\beta \tag{37}$$

which if we take the Y's in the right hand side out of the parentheses turns out to be:

$$\left[\frac{(1-\beta)Y_o}{Px}\right]^{1-\beta}\left[\frac{\beta Y_o}{Ph}\right]^\beta = \left[\frac{1-\beta}{Px}\right]^{1-\beta}Y^{1-\beta}\left[\frac{\beta}{Ph}\right]^\beta Y^\beta. \tag{38}$$

If the constant terms in the right hand side are taken to the left hand side we get the following:

$$\left[\frac{(1-\beta)Y_o}{Px}\right]^{1-\beta}\left[\frac{Px}{1-\beta}\right]^{1-\beta}\left[\frac{\beta Y_o}{\alpha Ph}\right]^\beta\left[\frac{Ph}{\beta}\right]^\beta = Y \tag{39}$$

$$Y = Y_o/\alpha^\beta \tag{40}$$

or

$$Y = Y_o \alpha^{-\beta} = Y_o \left(\frac{Pp}{Pm}\right)^{-\beta}. \tag{41}$$

Since net tenant benefits are defined (as in the publicly built housing program) as the difference between the income that will make the tenant as well off without the program as with it (Y), and the tenant's actual income (Y_o), then net tenant benefits will be equal to:

$$B_t^n = Y - Y_o \tag{42}$$

$$= Y_o \alpha^{-\beta} - Y_o . \tag{43}$$

$$= \left[\left(\frac{Pp}{Pm}\right)^{-\beta} - 1 \right] Y_o \tag{44}$$

which can be written as:

$$B_t^n = \left[\left(\frac{Pm}{Pp}\right)^{\beta} - 1 \right] Y_o \tag{45}$$

where

B_t^n = net tenant benefits

Pm = the market price of the housing service per month given the loan was taken from the private capital market

Pp = the program price of the housing service per month

Y_o = the tenant's actual income

β = the consumer's housing monthly payment/income ratio.

The gross tenant benefits will be equal to:

$$B_t^g = B_t^n + Pp \tag{46}$$

or

$$B_t^g = \left[\left(\frac{Pm}{Pp}\right)^\beta - 1\right] Y_o + Pp. \qquad (47)$$

It was thought before that the monthly mortgage payment which the tenant pays to the Industrial and Real Estate Bank could be used to estimate the program price for the housing service (Pp). But then it was found out that this payment does not in fact represent all that the tenant pays for the housing service under this program. It only represents the monthly payment for the principal of the loan which is only a fraction of what the tenant pays for the housing service. In addition to it the tenant still has to pay maintenance expenditures, pay for the land, and depreciation. So it was figured that these other payments have to be added to the monthly mortgage payment to the Industrial and Real Estate Bank in order to get an estimate to the tenant's actual monthly payment for his housing unit under this housing program.

Now that the equations for estimating the tenant benefits from both types of housing programs are set out, the next important thing to con-sider is the necessary information and the required data to estimate these benefits.

From the analysis it is clear that the required data for the publicly built housing program is:

1. The actual rent of the program unit, or the rent that is paid by the tenant when he is a participant in the housing program (Rp).

2. The second item needed is the tenant's actual income (Y_o).

3. The third item is the market rent of the program unit, or the rent the program unit will command if it was rented in a free market condition (Rm).

4. The fourth item is the parameter (β), or the rent-income ratio, that means the fraction of the tenant's income which has to be spent on housing when he is not a participant in the housing program.

For the interest free loans program the required data is:

1. Pm or the monthly payment for the housing when the loan to build it was taken from the free capital market.

2. β or the monthly housing payment/income ratio.

3. Y_o or the tenant's actual income.

4. Pp or the monthly payment for the housing unit under the program.

How can this kind of data be found? For the publicly built housing program, the first two variables are observable and can be obtained from the data available in the applications to this program.

The other two, the market rent and the parameter (β) are not directly observable and so they have to be estimated.

With respect to the market rent (Rm) of the housing unit, there are some alternative ways to estimate it. Perhaps the easiest way, as mentioned by DeSalvo, is to ask someone with good knowledge and experience with the housing market in which the program operates, to estimate the market rents of the program units. The other alternative approach which was also mentioned by DeSalvo is to make rent a function of housing characteristics and estimate the rent function to be used for estimating

the market rents for the program units.

In the case of this study, a sample from the private housing market was taken, and information about rent, income, family size, and number of rooms in the housing units was collected. From this information, a rent function is calculated, where rent is a function of the number of rooms. The estimated rent equation is

$$Rm = 2.33262712 + 11.20944310 \; NR.$$
$$(9.81549)$$
$$R^2 = 0.4957$$

where Rm is the market rent and NR is the number of rooms. This function is used to estimate the market rent for the housing units in the two housing programs.

With regard to the tenant's rent-income ratio (β) it was suggested that it is better not to use the tenant's currently observed rent-income ratio to estimate the parameter (β), because it was thought that the consumer's patterns of expenditures when he is a participant in a housing program will be different from his expenditure patterns when he is not a participant. An alternative way to explain the ratio is either to take the average rent-income ratio of people in the private rental market, or to estimate a relation between rent expenditures and family characteristics such as income, family size, etc. Then this relationship could be used to estimate (β) for a particular tenant. For this study the average rent-income ratio of people in the private market is used because when a relation between rent expenditures and family size was tried, family size turned out to be not significant.

With regard to the data required for estimating tenant's benefits

from the interest free loans program, the following procedure is used:

1. With respect to Y_o or the tenant's actual income, it is (as in the publicly built housing program) observable and obtained from the applications to this program.

2. With respect to Pm; there is no data available about this variable. To estimate it, Rm (or the market rent of the housing unit) was calculated in the same way as in publicly built housing program, and used as an estimate of Pm.

3. With regard to β; since Rm is used instead of Pm and β = Rm/income, the same β is used for both programs or that β = average β in the private market.

4. Pp was calculated by subtracting the monthly interest charges from Pm; that is, Pp = Pm – monthly interest charges.

5. Monthly interest charges on the loan were calculated using interest tables, based on the loan period and on 7 percent compound interest rate.[32]

As it was mentioned before, a Cobb-Douglas utility function implies that both price and income elasticities of the demand for housing are unity. If Cobb-Douglas is the true utility function for the participants in public housing programs, then our estimates of the direct tenant benefits are correct and there will be no bias. If the true utility function is not the Cobb-Douglas, but some other form of utility function, what will happen to our estimates of the direct tenant

[32]This is considered to be the most appropriate rate of interest for this kind of loan. See Central Bank of Libya, Economic Bulletin, Statistical Tables, Table No. 22 (January-March, 1975).

benefits?[33] The answer to this question will depend on the value of price and income elasticities implied by that function. Suppose the "true" function implies a unit income elasticity but not a unit price elasticity. What will happen to the estimates of the direct tenant benefits compared to that under the Cobb-Douglas? If its price elasticity is less than one, the results are shown in Figure 5. In this figure, the ray Icc represents the income consumption curve for both functions, which reflect the implication of unity income elasticity for both functions. The horizontal line Pcc represents the price con-sumption curve for the CD function which reflects the unitary price elas-ticity implication of that function. The price consumption curve of the other function is the line Pcc' which reflects the assumption that its price elasticity is less than unity. The solid curves in the figure rep-resent the consumer's indifference curves when Cobb-Douglas is his util-ity function. The dotted curves represent his indifference curves where the other function is his utility function. Before the housing program the consumer is maximizing his utility subject to his budget constraint at point (E) according to both utility functions. After paricipating in the housing program, his point of maximum utility depends on the form of the utility function. If it is Cobb-Douglas, he will maximize his utility at point (G). If it is the other function, then his point of utility maximization will be point (k). The direct tenant benefits were defined as the increase in the consumer's income that will enable him to get the same level of satisfaction as the program does. Under

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[33]The analysis in the rest of this section is developed through a group discussion among Ronald L. Moomaw, Jakie Earl Adams, and the author. For further investigation see Jakie E. Adams, "Low Rent Public
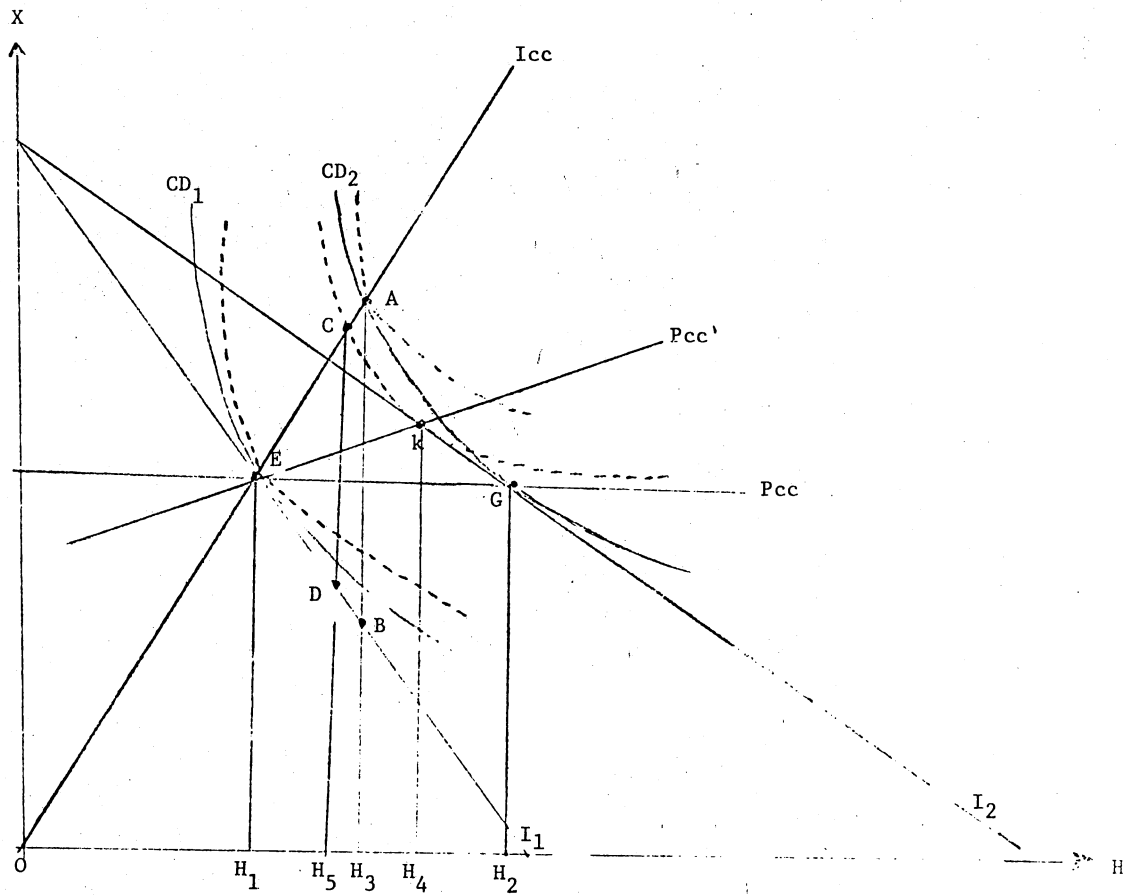
Figure 5. A Theoretical Model of the Overestimate of Net Tenant Benefits when the Price Elasticity of Demand for Housing Service is Less than Unity

the Cobb-Douglas utility function, this will be estimated by the vertical distance (AB). Under the other utility function, it will be estimated by the vertical distance (CD), which means that in this case, Cobb-Douglas utility function will over-estimate the direct tenant benefits. On the other hand, if the other utility function has a unit income elasticity and price elasticity of more than one, then Cobb-Douglas function will under-estimate the direct tenant benefits.

With respect to the income elasticity, assume that the other function has a unit price elasticity and an income elasticity greater than one. This case is illustrated in Figure 6. In this figure, the line Pcc is the price consumption curve for both functions. The line Icc is the income consumption curve for the Cobb-Douglas, and Icc' is the income consumption curve for the other function. The maximum utility position of the consumer before the housing program is at the point (H) for both functions. After the program the consumer will maximize his utility at the point (M) for both functions also. But the benefits (or increase in the consumer's income that will make him as well as the program) will be different from one function to another. Under Cobb-Douglas, it will be the distance (A_2B_2), but under the other function, it will be the distance (C_2D_2). If we draw two lines, one through the point (A_2) and the other through the point (C_2), and both parallel to the budget line (I_1), we find that the line that goes through the point (C_2) cuts the vertical axis at a higher level than the line which goes through the point (A_2), which means that the direct tenant benefits is

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Housing in Oklahoma: Case Studies of Benefits and Costs in Selected City Sizes" (unpub. Ph.D. dissertation, Oklahoma State University, 1975), pp. 74-78.
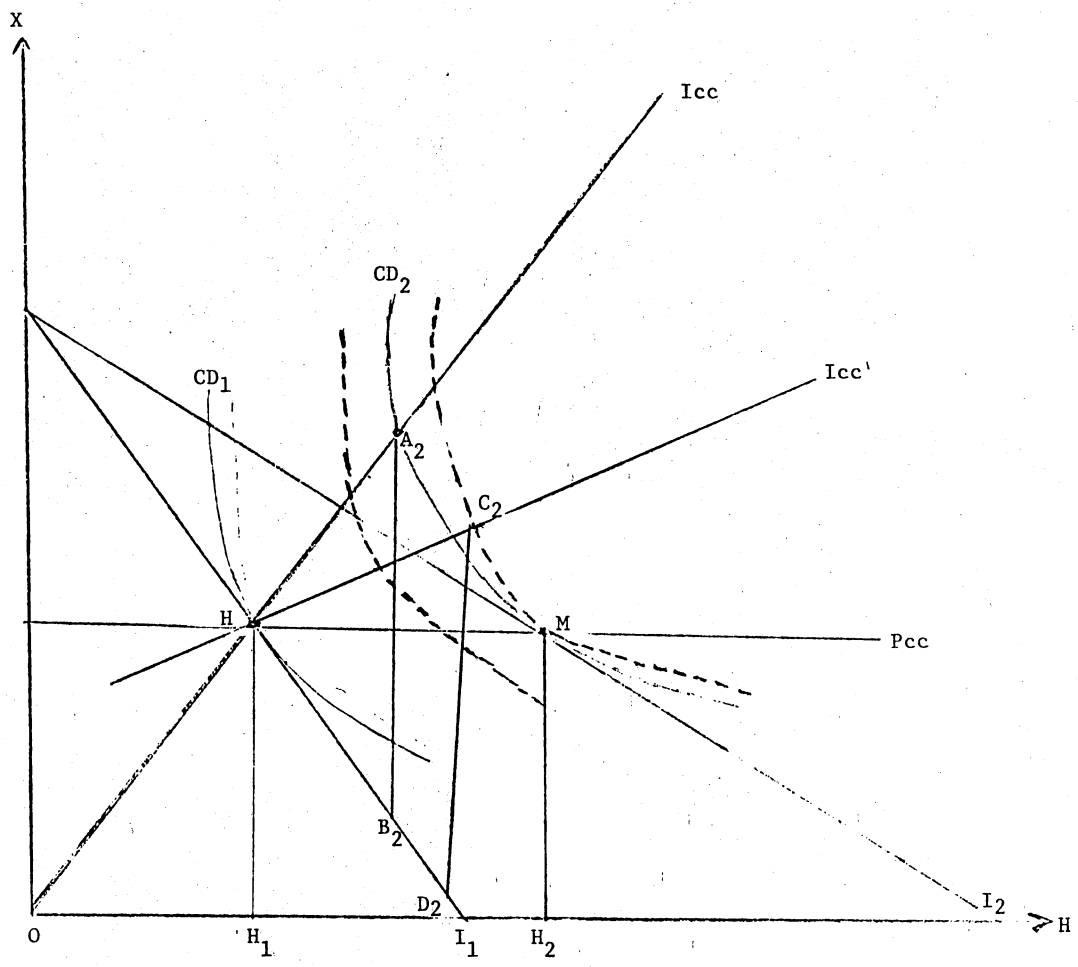
Figure 6. A Theoretical Model of the Underestimate of Net
Tenant Benefits when the Income Elasticity
of Demand for Housing is Greater than Unity

larger under the other function than under Cobb-Douglas (under the above assumptions). This is the same as saying that if the true consumer function has a unit price elasticity and an income elasticity greater than one, then using Cobb-Douglas function to estimate direct tenant benefits will result in an underestimation of these benefits. If the consumer's utility function has a unit price elasticity but less than unity income elasticity, then using Cobb-Douglas will result in an over-estimation of tenant benefits (this case is not shown in the figure).

CHAPTER V

DATA COLLECTION AND ANALYSIS

This chapter represents the empirical part of this study. It explains the procedures that were used to collect the data, and how the samples were designed. Utilizing the research methodology presented in Chapter IV it provides us with an example calculation of net tenant benefits in each program. The way of calculating tenant subsidies is also presented. Using the sample observations based on case-study data, the discussion also includes the distribution of net tenant benefits among tenant families in each program according to income, family size, and age of the head of the tenant family. A linear regression analysis correlating net tenant benefits to family income, family size and age of the head of the family is also introduced in this chapter. Finally, using the regression analysis results, answers to the study questions are presented.

Data Collection

Because most of the data needed for this study is available only in the files of the tenants and not published anywhere, the author had to go on a field trip back to Libya to collect the data himself.

Data collection process took about four and one-half months, from April 16 to August 28, 1975. Using a random numbers table, a random sample from the files of each program was taken after assigning each

file a serial number.[1] Each sample consists of at least 8 percent of

the total files of the tenants in Tripoli city.[2]

The sample from the publicly built housing program contains 608

observations from a total of 5,535 which is 11 percent of the tenants

who are living in rented publicly built housing units in Tripoli city.

With respect to the interest free loans program, 640 observations were

included in the sample which represents 8.3 percent of the total 7,644

interest free loans granted to tenants in Tripoli city.

The information taken from the files of the publicly built housing

program were: tenant monthly income, tenant family size, age of the

head of the family, number of rooms, and the monthly program rent of the

housing unit.

With respect to the interest free loans program, the information

taken was the same except for the monthly mortgage payment instead of

the program rent.

As was mentioned before, both the market rent of the housing unit

(Rm), and the tenant rent-income ratio (β) in the absence of the

program are not observed but they were estimated.[3]

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[1]In both programs, not all the files were given a serial number.
For the publicly built housing program, some of the files were either
arranged alphabetically or given serial numbers at each different
project. With respect to the interest free loans program, the files
were assigned different numbers but the files of the tenants in Tripoli
city were not separated from other cities. They have to be separated
and assigned new numbers in order to be able to take the sample from
them.

[2]The samples were taken from the tenants of these two housing
programs in Tripoli city, only.

[3]To see how they were estimated see pages 91 and 92 in Chapter
IV.

Data Analysis

Since the samples were quite large, all observations cannot be printed here, but the most important empirical results of data analysis will be presented. The focal points of the discussion here are: (1) information on the economic and social characteristics of tenant families in both samples, (2) net tenant benefits and subsidies, (3) a sample calculation of net tenant benefits from each program, (4) the distribution of net tenant benefits among tenant families by income, family size, and age of the head of the family, and (5) the results of regressing net tenant benefits in each program against tenant's income, family size and age of the head of the family.

Economic and Social Characteristics
of Tenant Families

The following discussion considers the social and economic characteristics of tenant families in both samples. As was mentioned before both samples include several informative characteristics of tenant families in both programs. These characteristics are summarized in Table XI. From that table we find that the mean monthly tenant income in the sample from the publicly built housing program is L.D. 57.299. Tenant monthly income varies from as low as L.D. 8.00 to as high as L.D. 205.00. Family size varies from two persons to 14 persons with a mean of 5.7 persons per family. The number of rooms in the housing units in the sample varies from two to five rooms with a mean of 3.83. Age of the head of the family ranges from 20 years to 81 years with a mean of 43.7 years.

TABLE XI

ECONOMIC AND SOCIAL CHARACTERISTICS OF TENANT FAMILIES

Subject	Sample from Publicly Built Housing Program	Sample from Free Interest Loans Program
Total number of tenant families	608	640
Total monthly income	34838.08	46078.70
Mean monthly income	57.299	71.998
Highest monthly income	205.000	150.000
Lowest monthly income	8.000	25.000
Mean family size	5.7	5.2
Largest family size	14	18
Smallest family size	2	1
Highest number of rooms	5	6
Lowest number of rooms	2	3
Mean number of rooms	3.83	3.97
Oldest family head	81	80
Youngest family head	20	22
Mean age of the family head	43.7	38.8

With respect to the sample from the interest free loans program, the following characteristics are observed. The tenant monthly income varies from L.D. 25.00 to L.D. 150.00 with a mean of L.D. 71.998. The family size ranges from one person to 18 persons with a mean of 5.2. The age of the head of the family varies from 22 years to 80 years with a mean of 38.8 years. The number of rooms varies from three to six with a mean of 3.97. If we compare the tenants in both programs with each other we find that tenants of the publicly built housing program are on the average have a significantly lower monthly income ($Z = 11.902$, $P < .001$), have a significantly larger family size ($Z = 3.737$, $P < .001$), have a significantly older family head ($Z = 7.623$, $P < .001$), and have a significantly lower number of rooms ($Z = 5.029$, $P < .001$) than tenants of interest free loans program.

Benefits and Subsidies

In addition to illustrating how net tenant benefits are calculated using the research methodology presented in Chapter IV, the following discussion will provide us with monetary values of totals and means of monthly net tenant benefits and monthly tenant subsidies in each program. A comparison between total annual net tenant benefits and total annual tenant subsidies and tenant benefits-tenant subsidies ratio in each program are also presented.[4]

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[4]Table XII (page 108) in this chapter shows the means, and totals for monthly net tenant benefits and monthly tenant subsidies in each program.

A Sample Calculation of Net Tenant Benefits

from the Publicly Built Housing Program

As it was pointed out in Chapter IV, net tenant benefits consist of the amount of money that if added to the tenant's actual income will make him as well off as the program does.[5] A sample calculation of net tenant benefits, based on the assumption of unitary price and income elasticities of demand for housing service, is the subject of this discussion. The example here is based on a tenant residing in a publicly built house in Tripoli city.

The level of Y is not observable; however, by using the methodology shown in equation (25) in Chapter IV, it is possible to estimate it for the tenant. This income estimate of Y would allow the tenant to attain a level of satisfaction equal to that attained under the housing program. Equation (25), which is stated as:

$$Y = \left(\frac{Rm}{\beta}\right)^{\beta} \left(\frac{Y_o - Rp}{1 - \beta}\right)^{1-\beta}$$

in Chapter IV, yields the money estimate of Y, where the variables are

Rm = the market rent for public housing service,

β = the tenant's rent-income ratio,

Rp = the program rent for public housing service,

Y_o = the tenant's actual income.

A tenant residing in publicly built housing unit in Tripoli city had an actual monthly income (Y_o) of L.D. 60.00, and a rent-income ratio

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[5]This is a price-equivalent variation measure of consumer's surplus.

(β) of 0.36485973. The particular dwelling unit in the program had a

monthly program rent (Rp) of L.D. 1.50, and the monthly market rental

value of the particular unit was L.D. 47.1704. The monthly money esti-

mate of Y was solved by

$$Y = \left(\frac{47.1704}{0.36485973}\right)^{0.36485973} \left(\frac{60 - 1.50}{1 - 0.36485973}\right)^{1-0.36485973}$$

which is equation (25). The money estimate of Y is, therefore, L.D.

104.2897 per month. In order to get the net tenant benefits, the actual

monthly income (Y_o) of the tenant is subtracted from Y. Consequently,

Y (L.D. 104.2897) minus Y_o (L.D. 60.00) equals net tenant benefits (B_t^n).

Thus, monthly net tenant benefits are estimated to be L.D. 44.2897.

The total monthly net tenant benefits for the sample from the publicly

built housing program were obtained by adding the individual monthly net

tenant benefits together.

A Sample Calculation of Net Tenant

Benefits in the Interest Free

Loans Program

As was mentioned in Chapter IV, even though this program differs

somewhat from the publicly built housing program, it is like the other

program in the sense that it is a price subsidy program. Net tenant

benefits in this program also consist of the maount of money that if

added to the tenant's actual income will enable him to attain the same

utility level as under the program. In the following discussion

a sample calculation of net tenant benefits from this program, based

on the assumption of unitary price and income elasticities of demand

for housing service will be presented.

The example here is based on a tenant who had an interest free loan from the Industrial and Real Estate Bank and built a house with that loan in Tripoli city.

It is the same with this program as the other one, the level of Y is not observable; however, by using the methodology shown in equation (41) in Chapter IV, it is possible to estimate it for the tenant.

This income estimate of Y would allow the tenant to attain a level of satisfaction equal to that attained under the interest free loans program. Equation (41) which is stated as

$$Y = Y_o \left(\frac{Pp}{Pm}\right)^{-\beta}$$

in Chapter IV, yields the money estimate of Y where the variables are

Pm = the monthly payment for the housing services if the tenant had the loan from the private capital market,

Pp = an estimate of housing monthly payment under the program,

β = monthly payment-income ratio,

Y_o = the tenant's actual income.

This tenant in our example had a montly income of L.D. 85.00, and with a monthly payment-income ratio of 0.36485973. The particular housing unit he had would cost him L.D. 47.1704 monthly if he had the loan in the private capital market (Pm), and would cost him L.D. 33.4883 (Pp) monthly under the program. The monthly money estimate, Y, was solved by

$$Y = 85.00 \left(\frac{33.4883}{47.1704}\right)^{-0.36485973}$$

which is equation (41). The money estimate of Y is therefore L.D. 96.3167 per month. Net tenant benefits have been defined to be equal to Y minus Y_o. Consequently, the monthly net benefits for this particular tenant will be equal to L.D. 96.3167 minus L.D. 85.00 = L.D. 11.3167.

The total monthly net tenant benefits for the sample from the interest free loans program were obtained by adding the individual monthly net tenant benefits together.

Net Tenant Benefits from the Publicly
Built Housing Program

As it was mentioned before the total monthly net tenant benefits from the publicly built housing program are calculated by adding up the individual monthly net tenant benefits together for the tenants in the sample. This benefit amounted to L.D. 22353.8583. The mean monthly net tenant benefits came up to be L.D. 36.7662. The total annual net tenant benefits will be equal to L.D. 22353.8583 x 12 which is L.D. 268246.2996.

Net Tenant Benefits from the Interest
Free Loans Program

The total monthly net benefits for the people in the sample from this program are obtained by adding up the individual monthly net benefits together. This number came to L.D. 6101.2206 and the mean monthly net tenant benefits is L.D. 9.5332. The total annual net tenant benefits are L.D. 6101.2206 x 12 which is L.D. 73214.6472.

Tenant Subsidies

The individual tenant subsidy for each consumer of low-rent public

housing is conceptually shown as the distance (AC) in Figure 4 in

Chapter IV. Also, equation (29) in Chapter IV shows that the tenant

subsidy (S) is market rent (Rm) minus project rent (Rp). Once the

market rental value of a unit is estimated, as was done with net tenant

benefits, the project rent of that unit is subtracted from the market

rental value. For example, if the market rent is L.D. 47.1704, and the

project rent is L.D. 1.5, then the individual monthly tenant subsidy (S)

is L.D. 47.1704 minus L.D. 1.5, or L.D. 45.6704. The individual tenant

subsidies were summed to obtain estimates of the total monthly tenant

subsidies. This came up to be L.D. 24343.8438.

With respect to the interest free loans program, the tenant subsidy

also can be represented either by the distance (AC) in Figure 4 in

Chapter IV, or by the equation number (31) in the same chapter. Accord-

ing to that equation tenant subsidy is equal to monthly payment for the

housing unit if the loan was taken from the private capital market (Pm)

minus its monthly payment under the program as where the loan is taken

from the Industrial and Real Estate Bank (Pp).[6] Once again, if the

market monthly payment for the housing unit is estimated, the tenant

subsidy can be easily obtained by subtracting the program monthly payment

from the market monthly payment. Suppose, for example, that the market

monthly payment for a housing unit is L.D. 58.3798 and its program

monthly payment is L.D. 50.7744, then the individual monthly tenant

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[6]The monthly tenant subsidy is equal to the monthly interest
charges on this loan.

subsidy (S) is L.D. 58.3798 minus L.D. 50.7744 or L.D. 7.6054. The

total monthly subsidy is obtained by summing up all individual monthly

subsidies, and it came up to be L.D. 8483.4285.

Comparing net tenant benefits with tenant subsidies in each program

we get the following results. As can be seen from Table XII, the total

monthly net tenant benefits for the sample from the publicly built

housing program added up to L.D. 22353.8583, while the total monthly

subsidy amounted to L.D. 24343.8438. On an annual basis, net tenant

benefits would be L.D. 268246.2996, and tenant subsidies would be L.D.

292126.1256. The ratio of tenant benefit subsidies would be L.D.

264246.2996/L.D. 292126.1256, which is 0.918255.

TABLE XII

MONTHLY NET TENANT BENEFITS AND MONTHLY
TENANT SUBSIDIES

Subject	Sample from Publicly Built Housing Program	Sample from Free Interest Loans Program
Total number of observations	608	640
Net tenant benefits		
Total net tenant benefits	L.D. 22353.8583	L.D. 6101.2206
Mean net tenant benefits	L.D. 36.7662	L.D. 9.5332
Tenant subsidies		
Total subsidies	L.D. 24343.8438	L.D. 8483.4285
Mean subsidies	L.D. 40.0392	L.D. 13.2553
Net tenant benefits-tenant subsidies ratio	L.D. 0.91825	L.D. 0.71919

With regard to the interest free loans program, the total monthly net tenant benefits are L.D. 6101.2206, and the total monthly subsidies are L.D. 8483.4285. On an annual basis they will be L.D. 73214.6472, and L.D. 101801.142, respectively. The ratio of tenant benefits to tenant subsidies would be L.D. 73214.6472/L.D. 101801.142 or 0.71919.

From the above analysis it is clear that net tenant benefits in both programs are less than tenant subsidies. This means that additional benefits must occur in order for these two housing programs to be justified. Taking net tenant benefits-tenant subsidies ratio as an efficiency criteria, we can say that the publicly built housing program is more effective than the interest free loans program since its ratio is approximately 0.92, while the interest free loans program ratio is only 0.72.

Distribution of Monthly Total Net Tenant
Benefits from the Publicly Built Housing
Program Within Tenant's Income Classes

The distribution of total monthly net tenant benefits from the publicly built housing program within tenants of different income classes is shown in Table XIII. From that table we find the following.

1. People with monthly incomes less than or equal to 25 Libyan Dinars constituted 1.81 percent of total number of tenants in the sample. They got 0.60 percent of the total monthly income and received 1.34 percent of the total monthly net tenant benefits.

2. People with monthly incomes greater than 25, but less than or equal to 50 Libyan Dinars constituted 40.46 percent of the total number

TABLE XIII

DISTRIBUTION OF MONTHLY NET TENANT BENEFITS FROM THE PUBLICLY BUILT
HOUSING PROGRAM WITHIN TENANT'S INCOME CLASSES

Income Classes	Total No. of Observations	Percentage of Total No. of Observations	Total Monthly Net Tenant Benefits in L.D.	Percentage of Total Monthly Net Tenant Benefits	Total Monthly Income	Percentage of Total Monthly Income
Total sample	608	100%	22353.8583	100%	34838.080	100%
Tenants with income $\leq$ 25	11	1.81%	299.7629	1.34%	209.000	0.60%
Tenants with 25 < income $\leq$ 50	246	40.46%	9275.7545	41.50%	10163.500	29.17%
Tenants with 50 < income $\leq$ 75	273	44.90%	11171.5166	49.97%	16425.000	47.15%
Tenants with 75 < income $\leq$ 100	45	7.40%	1354.2922	6.06%	3947.500	11.33%
Tenants with income > 100	33	5.43%	252.5321	1.13%	4093.080	11.75%

of tenants in the sample. They had 29.17 percent of the total monthly

income, and received 41.50 percent of the total monthly net tenant

benefits.

3. Tenants whose monthly incomes are higher than 50 and less than

or equal to 75 Libyan Dinars constituted 44.90 percent of the total num-

ber of tenants in the sample, had 47.15 percent of the total monthly

income and received 49.97 percent of the total monthly net tenant

benefits.

4. Tenants with monthly incomes higher than 75, but less than or

equal to 100 Libyan Dinars constituted only 7.40 percent of the total

number of tenants, had 11.33 percent of the total monthly income and

received only 6.06 percent of the total monthly net tenant benefits.

5. Finally, tenants with monthly incomes that were higher than 100

Libyan Dinars represented only 5.43 percent of the total number of

tenants in the sample, had 11.75 percent of the total monthly income,

and received only 1.13 percent of the total monthly net tenant benefits.

From Table XIII we find also that 92.81 percent of the total

monthly net tenant benefits goes to tenants with monthly incomes equal

to or less than 75 Libyan Dinars, and only 7.19 percent of the total

monthly net tenant benefits goes to tenants with monthly incomes higher

than 75 Libyan Dinars. In terms of the percentage of participation

we find that tenants with monthly incomes equal to or less than 75

Libyan Dinars constituted 87.17 percent of the total participants of

the program; while tenants with monthly incomes higher than 75 Libyan

Dinars represented only 12.83 percent of the total participants.

According to these statistics we can say that the publicly built housing

program does serve its objective of paying more attention to the people

with relatively low incomes than people with relatively high incomes

both in terms of participation and benefits received.

Distribution of Total Monthly Net Tenant
Benefits from the Publicly Built
Housing Program According
to Family Size

The classification of tenants in the publicly built housing program

according to their family sizes and the distribution of benefits among

different family sizes are shown in Table XIV. From that table we find

that both percentage of participation and percentage of benefits

received increase as family size increases until family size of six is

reached. After that family size both percentages start to decrease.

For tenants with family size of six or less they represent 66.94 percent

of the total participants and receive 67.52 percent of the total

monthly net tenant benefits. The tenants with family sizes of more

than six, represent 33.06 percent of the total number of participants

in the housing program, and receive 32.48 percent of the total monthly

net tenant benefits received from this housing program.

The Distribution of Total Monthly Net Tenant
Benefits from the Publicly Built Housing
Program Among Tenants According to the
Age of the Head of the Family

This distribution is shown in Table XV. From that table we find

that tenant families headed with persons with age of less than 30 years

represented 12.99 percent of the total number of families that

TABLE XIV

DISTRIBUTION OF MONTHLY NET TENANT BENEFITS FROM THE PUBLICLY BUILT
HOUSING PROGRAM SAMPLE ACCORDING TO FAMILY SIZE

Family Size	No. of Observations	Percentage of Total No. of Observations	Total Monthly Net Tenant Benefits in L.D.	Percentage of Total Monthly Net Tenant Benefits	Total Monthly Income in L.D.	Percentage of Total Monthly Income
All sample	608	100%	22353.8583	100%	34838.0800	100%
FZ = 2	39	6.41%	1345.7296	6.02%	2106.8300	6.05%
FZ = 3	71	11.68%	2530.1009	11.32%	4161.5000	11.95%
FZ = 4	94	15.46%	3468.2610	15.52%	5439.7500	15.62%
FZ = 5	100	16.45%	3668.3510	16.41%	5641.5000	16.19%
FZ = 6	103	16.94%	4080.0731	18.25%	5464.5000	15.69%
FZ = 7	68	11.18%	2504.5247	11.20%	3799.7500	10.91%
FZ = 8	57	9.38%	2071.0116	9.27%	3498.2500	10.04%
FZ = 9	37	6.09%	1397.8906	6.25%	2119.0000	6.08%
FZ = 10	25	4.11%	816.7732	3.65%	1622.0000	4.66%
FZ = 11	6	0.99%	160.3286	0.72%	461.0000	1.32%
FZ = 12	5	0.82%	177.8883	0.80%	385.0000	1.10%
FZ = 13	2	0.33%	81.1187	0.36%	60.0000	0.17%
FZ = 14	1	0.16%	51.8069	0.23%	79.0000	0.22%

TABLE XV

DISTRIBUTION OF MONTHLY NET TENANT BENEFITS FROM PUBLICLY BUILT
HOUSING PROGRAM AMONG TENANTS ACCORDING TO AGE CLASSES

Classification	No. of Observations	Percentage of Total No. of Observations	Total Monthly Net Tenant Benefits in L.D.	Percentage of Total Monthly Net Tenant Benefits	Total Monthly Income in L.D.	Percentage of Total Monthly Income
All sample	608	100%	22353.8583	100%	34838.080	100%
People with age ≤ 30	79	12.99%	2666.6549	11.93%	4983.000	14.30%
People with 30 < age ≤ 40	192	31.58%	7024.5786	31.42%	11329.830	32.52%
People with 40 < age ≤ 50	167	27.47%	6118.5157	27.37%	9573.000	27.48%
People with 50 < age ≤ 60	103	16.94%	4029.3314	18.03%	5379.500	15.44%
People with age > 60	67	11.02%	2514.7777	11.25%	3572.750	10.26%

participated in the housing program and received 11.93 percent of the

total monthly net tenant benefits received by all tenants.

Families headed by individuals with age higher than 30 and less

than 40 years represented 31.58 percent of the total families

participating and received 31.42 percent of the total monthly net tenant

benefits received from this housing program.

Families headed by tenants with age higher than 40 but equal or

less than 50 represented 27.47 percent of the total number of tenants

in this housing program and received 27.37 percent of the total monthly

net tenant benefits received by the tenants in the sample from this

housing program.

Families headed by tenants with age higher than 50 but equal to or

less than 60 years represented 16.94 percent of the total number of

tenants in the sample and received 18.03 percent from the total monthly

net tenant benefits attained by all the tenants in the sample.

Families headed with individuals with age higher than 60 years

represented 11.02 percent of the total number of participants in the

sample, and received 11.25 percent of the total monthly net tenant ben-

efits received by all participants in the sample.

From these statistics we can say that the distribution of total

monthly net tenant benefits is in favor of tenant families headed with

relatively older people which means that older tenants are getting more

attention and benefiting more in this housing program than relatively

younger ones.

Distribution of Total Monthly Net Tenant

Benefits from the Interest Free Loans

Program Among Tenants of Different

Income Classes

This distribution is shown in Table XVI. In that table the tenants
are divided into four income classes: (1) tenants with monthly incomes
less than or equal to 50 Libyan Dinars, (2) tenants with monthly
incomes greater than 50 but less than or equal to 75 Libyan Dinars,
(3) tenants with monthly incomes greater than 75 but less than or equal
to 100 Libyan Dinars, and (4) tenants with monthly incomes greater than
100. According to these income classes the distribution of tenant's
total monthly net tenant benefits, and the total monthly income are
provided.

From Table XVI we find the following:

1. Tenants with monthly incomes less than or equal to 50 Libyan
Dinars represented 20.16 percent from the total number of tenants in
the sample, they had 12.0 percent of the total monthly income, and
received 10.51 percent of the total monthly net tenant benefits.

2. Tenants with monthly incomes greater than 50 and less than or
equal to 75 Libyan Dinars represented 32.19 percent of the total number
of tenants, had 28.02 percent of the total monthly income, and received
29.12 percent of the total monthly net tenant benefits.

3. Tenants with monthly incomes greater than 75 and less than or
equal to 100 Libyan Dinars represented 42.34 percent of the total number
of tenants, had 51.68 percent of the total monthly income, and received
51.89 percent of the total monthly net tenant benefits.

TABLE XVI

DISTRIBUTION OF TOTAL MONTHLY NET TENANT BENEFITS FROM THE INTEREST FREE
LOANS PROGRAM SAMPLE AMONG INCOME CLASSES OF TENANTS

Income Classes	No. of Observations	Percentage of Total No. of Observations	Total Monthly Net Tenant Benefits in L.D.	Percentage of Total Monthly Net Tenant Benefits	Total Monthly Income in L.D.	Percentage of Total Monthly Income
All samples	640	100%	6101.2206	100%	46078.7000	100%
Income 25 → 50	129	20.16%	641.2712	10.51%	5531.0000	12%
Income 50 → 75	206	32.19%	1776.7305	29.12%	12910.2500	28.02%
Income 75 → 100	271	42.34%	3165.5775	51.89%	23810.7500	51.68%
Income 101 and more	34	5.31%	517.6414	8.48%	3826.7000	8.30%

4. Tenants with monthly incomes greater than 100 Libyan Dinars represented 5.31 percent of the total number of tenants, had 8.30 per- cent of the total monthly income, and received 8.48 percent of the total monthly net tenant benefits.

From these numbers we can say that monthly net tenant benefits are positively correlated with monthly tenant incomes, as incomes increase net tenant benefits increase. As we can see from the table the income class that has the highest percentage of income also has the highest percentage of net tenant benefits.

From Table XVI, also, we can judge this program in terms of serving the income classes that it was mainly designed for. As was mentioned before, this program was designed mainly to serve people with monthly incomes within the range of 50 to 100 Libyan Dinars. From the analysis in Table XVI we find that these people represented approximately 74.53 percent of the total number of tenants, and received 81.01 percent of the total monthly net tenant benefits. Based on these numbers, we can say that the interest free loans program had fairly well served the in- come classes it was designed for.

Distribution of Total Monthly Net Tenant

Benefits from the Interest Free Loans

Program According to Family Size

This distribution is shown in Table XVII. Even though the distribu- tion in the table is made for all family sizes, separately we are going to add up all the families with sizes less than or equal to six in one group and all the families with sizes greater than six in another group and compare these two groups with each other.

TABLE XVII

DISTRIBUTION OF TOTAL MONTHLY NET TENANT BENEFITS FROM THE INTEREST FREE
LOANS PROGRAM ACCORDING TO FAMILY SIZE

Classification	No. of Observations	Percentage of Total No. of Observations	Total Monthly Net Tenant Benefits in L.D.	Percentage of Total Monthly Net Tenant Benefits	Total Monthly Income in L.D.	Percentage of Total Monthly Income
Total sample	640	100%	6101.2206	100%	46078.7000	100%
FZ = 1	15	2.34%	134.8471	2.21%	1134.5000	2.46%
FZ = 2	72	11.25%	778.7381	12.76%	5399.0000	11.72%
FZ = 3	92	14.37%	938.3827	15.38%	9666.6000	15.12%
FZ = 4	96	15.00%	954.0092	15.64%	7083.0000	15.37%
FZ = 5	90	14.06%	864.4175	14.17%	6457.5000	14.01%
FZ = 6	83	12.97%	694.6474	11.39%	5612.2500	12.18%
FZ = 7	73	11.41%	674.4914	11.06%	5193.3500	11.27%
FZ = 8	53	8.28%	470.7418	7.72%	3743.7500	8.13%
FZ = 9	38	5.94%	340.6482	5.58%	2554.5000	5.54%
FZ = 10	19	2.97%	168.0539	2.75%	1300.7500	2.82%
FZ = 11	5	0.78%	42.4566	0.69%	303.5000	0.66%
FZ = 12	3	0.47%	27.0222	0.44%	205.0000	0.45%
FZ = 18	1	0.16%	12.7645	0.21%	125.0000	0.27%

Following this classification we find that families with six members or less represent 69.99 percent of the total number of participating families, had 70.86 percent of the total monthly income, and received 71.55 percent of the total monthly net tenant benefits attained by all participating families in the sample.

Families with more than six members represented 30.01 percent of the total number of participating families, had 29.14 percent of the total monthly income, and received 28.45 percent of the total monthly net tenant benefits received by all families in the sample.

From these statistics there appears to be an indication that the distribution of net tenant benefits in this program among tenant families of different size is favoring smaller size families to larger size ones. However, a Z test showed this difference not to be significant ($Z = 0.6135$, $p > .05$).

Distribution of Total Monthly Net Tenant
Benefits from the Interest Free Loans
Program According to the Age of the
Head of the Family

For the purpose of this analysis tenants are divided into five classes of families: (1) families headed by persons with age less than or equal to 30 years, (2) families headed by persons with age greater than 30, but less than or equal to 40 years, (3) families headed by persons with age greater than 40, but less than or equal to 50 years, (4) families headed by persons with age greater than 50, but less than or equal to 60 years, and (5) families headed by persons with age greater than 60 years.

The distribution of total monthly net tenant benefits according to this classification is shown in Table XVIII. From that table we find the following statistics:

1. Families headed with persons with age less than or equal to 30 years represent 21.88 percent of the total number of participating families, had 23.58 percent of the total monthly income, and received 24.65 percent of the total monthly net tenant benefits.

2. Families headed by persons with age greater than 30 and less than or equal to 40 years represent 42.34 percent of the total number of participating families, had 43.83 percent of the total monthly income, and received 43.86 percent of the total monthly net tenant benefits.

3. Families headed by persons with age greater than 40, and less than or equal to 50 years represented 22.34 percent of the total number of participating families, had 21.15 percent of the total monthly income, and received 20.60 percent of the total monthly net tenant benefits.

4. Families headed by persons with age greater than 50, and less than or equal to 60 years represented 9.06 percent of the total number of participating families, had 7.72 percent of the total monthly income, and received 7.44 percent of the total monthly net tenant benefits.

5. Families headed by persons with age greater than 60 years represented 4.38 percent of the total number of participating families, had 3.72 percent of the total monthly income, and received 3.45 percent of the total monthly net tenant benefits.

TABLE XVIII

DISTRIBUTION OF MONTHLY NET TENANT BENEFITS FROM THE INTEREST FREE
LOANS PROGRAM AMONG AGE CLASSES

Classification	No. of Observations	Percentage of Total No. of Observations	Total Monthly Net Tenant Benefits in L.D.	Percentage of Total Monthly Net Tenant Benefits	Total Monthly Income in L.D.	Percentage of Total Monthly Income
All sample	640	100%	6101.2206	100%	46078.7000	100%
Age $\leq$ 30	140	21.88%	1504.0558	24.65%	10863.5000	23.58%
30 < age $\leq$ 40	271	42.34%	2675.6749	43.85%	20195.5000	43.83%
40 < age $\leq$ 50	143	22.34%	1257.0161	20.60%	9745.4500	21.15%
50 < age $\leq$ 60	58	9.06%	454.0525	7.44%	3558.2500	7.72%
Age > 60	28	4.38%	210.4213	3.45%	1716.0000	3.72%

From these statistics it can be noticed that tenant families headed by relatively younger persons are in more favorable conditions in terms of net tenant benefits than tenant families headed with relatively older tenants.

Regression Analysis and its Results

Regression Analysis

After the total and average monthly net tenant benefits from both housing programs were calculated, a linear regression analysis was applied to both housing programs to help answer the questions. In that regression analysis, net tenant benefits were put as a function of tenant's actual monthly income, tenant's family size, and age of the head of the tenant's family. The function was of the following form:

$$B = f(Y_o, FZ, G)$$

where

B = net tenant benefits,

Y_o = tenant's actual income,

FZ = tenant's family size, and

G = age of the head of the family.

The regression equations are of the form:

$$B = a_0 + a_1 Y_o + a_2 FZ + a_3 G + E$$

where

a_0 = constant

a_1 = income coefficient

a_2 = family size coefficient

a_3 = age coefficient

and E is the error term.

Results of the Regression Analysis for the Sample from the Publicly Built Housing Program

The results of this regression are shown in the upper part of Table XIX, equations 1 through 3. Equation (1) shows the results of relating monthly net tenant benefits to monthly tenant's actual income, tenant's family size, and age of the head of the family, when all tenants in the sample are included.

From that equation we find that net tenant benefits are negatively related with income, and positively related with both family size and age. Results which tend to correspond to most people's expectations of this type of housing programs. Most people would expect that tenants with relatively lower income should benefit more from public housing programs than tenants with relatively higher income. Also, no one probably will object if larger families benefited more by public housing programs than smaller families, since it seems logical to help larger families more than smaller families, our results in equation (1) seem to go along with these reasonings. With respect to the relationship between net tenant benefits and age of the head of the family the results in equation (1) support the idea that senior citizens should receive more support from public housing programs than relatively younger citizens.

TABLE XIX

REGRESSION EQUATIONS FOR THE SAMPLES FROM BOTH
HOUSING PROGRAMS[6]

Sample from the Publicly Built Housing Program

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(1) Benefit = 48.36 − 0.24* income + 0.18 FZ + 0.027 Age
             (−13.01)   (1.01)   (0.77)
                                              $R^2 = 0.226$

(2) Benefit = 27.397 + 0.15* income + 0.56 FZ* + 0.029 Age***
             (11.62)   (6.37)   (1.799)
                                              $R^2 = 0.245$

(3) L Benefit = 2.43 + 0.25 L income* + 0.085 L FZ* + 0.038 L Age**
               (14.73)   (6.96)   (1.99)
                                              $R^2 = 0.33$

Sample from the Interest Free Loans Housing Program

---

(4) Benefit = 0.2535 + 0.142 income* − 0.059 FZ − 0.015 Age
             (23.52)   (−1.01)   (−1.12)
                                              $R^2 = 0.493$

(5) L Benefit = −2.563 + 1.175 L income* − 0.043 L FZ − 0.055 L Age
               (26.82)   (−1.43)   (−0.88)
                                              $R^2 = 0.558$

---

[6]The numbers in parentheses are the t ratios.

*Significant at the 0.01 level.

**Significant at the 0.05 level.

***Significant at the 0.10 level.

Equation (2) shows the relationship between net tenant benefits, tenant's actual income, tenant's family size, and age of the head of the family, when tenants with rent allowance are excluded from the sample.[7] As can be seen from Table XIX the results in equation (2) are different from the results in equation (1) in the following respects:

1. The income coefficient has changed its sign from negative to positive, indicating that net tenant benefits are positively related with income (which means that tenants with relatively higher incomes are benefiting more from this housing program than tenants with relatively lower incomes). This result will not go with what most of the people would expect and it needs to be explained.

2. Even though the coefficients of family size and age came with the same signs as in equation (1) they appeared to be more significant in the second case than in the first one.

Equation (3) is the log form of equation (2). As we can see, using the log form has increased the significance of all variables, especially the income variable as it is clear from comparing the t ratios (the number in parentheses). It also resulted in a relatively higher R^2.

Results of Regression Analysis for the Sample from the Interest Free Loans Program

These results are shown by equations (4) and (5) in the lower part

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[7] There are 52 tenants with rent allowances in the sample from the publicly built housing program.

of Table XIX. Equation (4) shows the results of relating net tenant

benefits from the interest free loans program to tenant's actual

income, tenant's family size, and age of the head of the family.

Equation (5) gives the same relationship in the log form.

From equation (4) we can notice the following:

1. Income came out with a positive coefficient indicating that

tenant benefits are positively related with tenant's income. In other

words, tenants with relatively higher income tend to benefit more from

interest free loans than tenants with relatively lower income.

2. On the other hand, both family size and age of the head of the

family came out with negative coefficients indicating that net tenant

benefits seem to decline as family size and age of the head of the

family increases. This means that larger families tend to benefit less

from interest free loans than smaller families, and families headed by

older tenants benefit less than families headed by younger tenants.

From equation (5) we notice that all variables came out with the

same sign as in equation (4) except that they became more significant.

Also, in equation (5) we find that R^2 is higher than it was in equation

(4).

The Questions and Their Answers

As it was mentioned in Chapter I, one of the main purposes of this

study was to provide answers to the following questions:

1. Do the two programs provide the same average monthly net tenant

benefits, and the same benefit-subsidy ratio?

2. How are the net tenant benefits in each program related to

tenant's actual income?

3. How are net tenant benefits in each program related with tenant's family size?

4. How are net tenant benefits in each program related to the age of the head of the tenant's family?

The answers to these questions are not as simple as the questions themselves, and even more sadly, they are not entirely clear cut with the exception of question one.

With respect to question number one, it is clear from our calculations of net tenant benefits that publicly built housing program offers higher average monthly net tenant benefits than does the interest free loans program. According to the calculations the average monthly net tenant benefits from the publicly built housing program is equal to L.D. 36.7662 while the average monthly net tenant benefits from the interest free loans program is equal to L.D. 9.5332. It is clear that the average monthly net tenant benefits from the publicly built housing program is approximately four times the average monthly net tenant benefits from the interest free loans program. In terms of net tenant benefits-tenant subsidy ratio, the publicly built housing program is also better than the interest free loans program, its ratio is 0.92 while the interest free loans program's ratio is only 0.72.

The answer to the second question is not very clear cut. It is very hard to be assured whether net tenant benefits are positively or negatively related with the tenant's actual income. As can be seen from the regression equations in Table XIX, two possible answers can be given to that question. Considering equation (1) we say that net tenant benefits are negatively related with the tenant's actual income. On the other hand if we base our answer on the other equations, we say that

the net tenant benefits are positively related with the tenant's actual

income. In all cases the coefficient of the income term is highly

significant at the 0.01 level. There are no priori bases to support

whether net tenant benefits should be positively or negatively related

with the tenant's actual income. To find the reasons behind the changes

in the sign of income term, the following explanations are developed:

1. In regression equation (1) the program rent for the tenants

with rent allowance is the rent allowance itself. As it was explained

in Chapter III, this rent allowance is formulated in such a way that it

increases as income increases. This means that the program rent for

this group is positively related with their income. The higher the

income, the higher the program rent. As program rent increases,

other things equal, tenant subsidy and tenant benefits decline. Net

tenant benefits for this group are negatively related with their actual

incomes. This probably had affected the result for the whole sample,

and forced income to come out with a negative sign.

2. The program rent for the other tenants in the sample is not

proportional to their incomes. It does not increase as income in-

creases. It is based on the number of rooms and probably family size

and not on income. Most of the tenants in the publicly built housing

program are roughly paying the same program rent. So, if tenants with

roughly the same family size and same number of rooms, but with dif-

ferent incomes were charged the same program rent, then it is logical

to find that the tenant with relatively higher income benefited more

than the tenant with relatively lower income.

To make sure that families with lower incomes receive higher

benefits, other things equal, the program has to impose higher program

rents on higher income families, that means program rent has to increase
as income increases. This is not the way in the case of the publicly
built housing program in the Libyan Arab Republic (with the exception
of tenants with rent allowance). A regression of the program rent (Rp)
against income and constant showed that (Rp) is hardly correlated with
income.

3. With respect to the case of the interest free loans program,
the explanation for the positive sign of the income term is that tenants
with relatively high income have more opportunity to get bigger loans
than tenants with relatively lower income because they can afford higher
monthly payments. Since the subsidy is the interest charges on the
loan, then bigger loans offer higher subsidies and then higher benefits.

The answer to the third question differs from one program to
another. With respect to the publicly built housing program, as can be
seen from equations (1), (2) and (3) in Table XIX, net tenant benefits
are positively related with family size. That means net tenant benefits
increase as family size increases. In equations (2) and (3), the coef-
ficient of the family size term is significant at the 0.01 level, but
in equation (1) it is not significant at the conventional levels. With
respect to the interest free loans program, on the other hand, net
tenant benefits are negatively related with family size as it is clear
from equations (4) and (5) in Table XIX. Considering the significance
level we find that the coefficient of the family size term in both
equations is not significant at the conventional levels.

The answer to the fourth question is also not clear and depends on
whether we are talking about the publicly built housing program or the
interest free loans program. In the publicly built housing program,

net tenant benefits seem to be positively related with the age of the head of the tenant family as it is clear from equations (1), (2) and (3) in Table XIX. In equation (1) the coefficient of the age term is not significant at the conventional levels. In equation (2) it is significant at the 0.10 level, and in equation (3) it is significant at the 0.05 level.

With regard to the interest free loans program, net tenant benefits appear to be negatively related to the age of the head of the family in both equations (4) and (5) in Table XIX. In both equations, the coefficient of the age term is not significant at the conventional levels.

To test for the milticollinearity between the variables (tenant's income, family size, and age of the head of the family) a correlation matrix for each program is produced in Table XX. From these correlation matrices there is no sign of multicollinearity between these variables.

Summary

This chapter has provided estimates of net tenant benefits and tenant subsidies from the two main housing programs in the Libyan Arab Republic, namely the public built housing program and the interest free loans program. Totals and means of the net tenant benefits and tenant subsidies from each program were calculated. A comparison between the two programs in terms of mean monthly net tenant benefits and net tenant benefits-tenant subsidy ratio showed that the publicly built housing program offers higher mean monthly net tenant benefits and higher net tenant benefits-tenant subsidy ratio than the interest free loans program. The distribution of net tenant benefits among the tenants by income, family size, and age of the head of the family was

TABLE XX

CORRELATION MATRICES FOR BOTH SAMPLES

	Income	FZ	Age	Benefit
	Correlation Matrix for the Sample from the Interest Free Loans Program			
Income	1.000000	-0.098689	-0.255199	0.699901
	0.0000	0.0125	0.0001	0.0001
FZ	-0.098689	1.000000	0.495262	-0.119396
	0.0125	0.0000	0.0001	0.0025
Age	-0.255199	0.495262	1.000000	-0.229308
	0.0001	C.0001	0.0000	0.0001
Benefit	0.699901	-0.119396	-0.229308	1.000000
	0.0001	0.0025	0.0001	0.0000
	Correlation Matrix for the Sample from the Publicly Built Housing Program			
Income	1.000000	0.008955	-0.109664	0.427002
	0.0000	0.8331	0.0097	0.0001
FZ	0.008955	1.000000	0.080396	0.245769
	0.8331	0.0000	0.0582	0.0001
Age	-0.109664	-0.080396	1.000000	0.387840
	0.0097	0.0582	0.0000	0.3613
Benefit	0.427002	0.245769	0.387840	1.000000
	0.0001	0.0001	0.3613	0.0000

discussed for both programs. A regression analysis relating net tenant benefits to tenant's income, family size, and age of the head of the family was performed for both programs. From the analysis it was found that net tenant benefits (if the people with rent allowance in the sample from the publicly built housing program were excluded) are positively related with tenant's income in both programs. Net tenant benefits are positively related with both family size and age of the head of the family in the publicly built housing program, and negatively related with both of them in the interest free loans program. Based on these results this chapter has provided answers to the study questions.

CHAPTER VI

CONCLUSIONS AND POLICY

RECOMMENDATIONS

Public housing programs have been adopted by almost every country
for different reasons. The Libyan Arab Republic is no exception. For
various reasons several housing programs adopted and initiated. This
study has provided data sources and an analysis of specific benefits
for the two main housing programs, namely the publicly built housing
program and the interest free loans program. The purpose has been to
evaluate and compare them in terms of the net tenant benefits they
provide to their tenants, and of the distribution of these tenant
benefits among tenants according to such family characteristics as
income, family size, and age of the head of the family.

This chapter is concerned with presenting specific conclusions of
the analysis and some policy recommendations. The conclusions include:
(1) tenant benefits and subsidies in each program, (2) the distribution
of net tenant benefits, (3) the relationship between net tenant benefits,
tenant's income, family size and age of the head of the family. Finally,
this chapter concludes with policy recommendations which might help
increase the efficiency of these two housing programs in serving their
purposes.

Tenant Benefits and Subsidies

Using the research methodology presented in Chapter IV, the study

has calculated net tenant benefits and tenant subsidies for both

programs. Totals and means of monthly net benefits and subsidies for

the tenants in the samples from both programs are presented in Table XI.

Based on these calculated benefits and subsidies, the study has reached

the conclusion that the publicly built housing program has provided its

tenants with higher mean monthly net tenant benefits than the interest

free loans program. The mean benefits were 36.7662 and 9.5332 Libyan

Dinars, respectively. In terms of net tenant benefits-tenant subsidy

ratio, the publicly built housing program also turned out to be

superior to the interest free loans program. Its ratio amounted to

0.92, while the ratio for the interest free loans program was only

0.72.

Distribution of Net Tenant Benefits

In addition to the calculation of totals and means of net tenant

benefits in each program, the distribution of these net tenant benefits

among tenants of different income classes, family sizes, and ages of the

head of the tenant families was produced for both programs. From that

distribution the following conclusions are drawn:

1. Considering the distribution of net tenant benefits among

tenants of different income classes, it was found that 92.81 percent of

the total monthly net tenant benefits from the publicly built housing

program are received by tenants with monthly income of 75 Libyan Dinars

or less, and only 7.19 percent of the monthly benefits are received by

tenants with monthly income higher than 75 Libyan Dinars.

With respect to the interest free loans program 81.01 percent of the total monthly net tenant benefits are received by tenants with monthly income ranging from 50 to 100 Libyan Dinars, and 18.99 percent are received by tenants with monthly income either less than 50 or greater than 100 Libyan Dinars.

2. With regard to the distribution of net tenant benefits among tenants of different family sizes we find that 67.52 percent of the total monthly net tenant benefits provided by the publicly built housing program goes to tenant families with family sizes of six persons or less, and 32.48 percent of those benefits go to tenant families with family sizes of more than six persons.

With respect to the distribution of net tenant benefits from the interest free loans program among tenant families of different sizes we find that 71.55 percent of the benefits goes to tenant families of sizes of six persons or less, and 28.45 percent of that benefit goes to tenant families with family sizes of more than six persons.

3. From the point of view of the distribution of net tenant benefits among tenant families according to the age of the head of the family, this study found that 11.93 percent of the total monthly net tenant benefits from the publicly built housing program goes to tenant families headed by individuals less than 30 years old, 31.42 percent goes to tenant families headed by individuals aging between 30 and 40 years old, 27.37 percent goes to families headed by individuals aging between 40 and 50 years, 18.03 percent goes to families headed by individuals aging from 50 to 60 years, and 11.25 percent goes to families headed by individuals older than 60 years.

With respect to the net tenant benefits from the interest free loans program, the distribution was: 24.65 percent goes to tenant families headed by individuals with age not more than 30 years, 43.86 percent goes to tenant families headed by individuals aging between 30 and 40 years, 20.60 percent goes to tenant families headed by individuals aging between 40 and 50 years, 7.44 percent goes to tenant families headed by individuals aging between 50 and 60 years, and 3.45 percent goes to tenant families headed by individuals aging more than 60 years.

Net Tenant Benefits as a Function of Tenant

Income, Family Size, and Age of the

Head of the Family

To determine these relationships, a linear regression analysis was performed for both samples. From the results of that regression we come up with the following conclusions:

1. It was found that net tenant benefits are positively related with the tenant's actual income in both programs except in the case or regression equation (1) in Table XIX where the tenants with rent allowance were included in the sample from the publicly built housing program. In all cases coefficient of the income term was highly significant at the 0.01 level. This result means that tenant benefits in both programs increase as tenant's actual income increases. In other words, tenant families with relatively high incomes are benefiting more than tenant families with relatively low incomes in both programs.

2. With respect to the relationship between net tenant benefits

and tenant family size it was found that net tenant benefits are
positively related with family size in the sample from the publicly
built housing program, but it is negatively related with family size in
the sample from the interest free loans program. That means larger
size families are relatively benefiting more from the publicly built
housing program than smaller size families, but in the interest free
loans program smaller size families are relatively benefiting more.

3. Referring to the regression results in Table XIX we can
conclude that net tenant benefits are positively related with the age of
the head of the family in the publicly built housing program, and
negatively related with the age of the head of the family in the
interest free loans program.

Policy Recommendations

Considering the results of this study, the following policy recom-
mendations are formulated. It is thought that these policy recommenda-
tions, if followed, will help increase the efficiency of both housing
programs in achieving their purposes. These policy recommendations are:

1. One of the purposes of these housing programs is to help
people with relatively low income. Also, based on equity concerns which
believed to be behind the rationale for subsidy programs persons with
relatively low income should receive larger benefits as they are in
greater need. From the analysis of this study it was found that the net
tenant benefits are positively related to the tenant's actual income,
which means that within the low income population, tenants with
relatively high income are benefiting more from these housing programs,
while it should be the other way around. To make sure that tenant

families with relatively low income will receive more benefits than
tenant families with relatively high income it is recommended that in
both programs we should be sure that the relatively low income families
be subsidized more. We have to make tenant families with relatively
high income pay more for housing than the relatively low income
families. To do that we have to make the program rent in the publicly
built housing program increase as income increases. That means
relatively high income families should pay relatively high program rents
and vice versa. For the interest free loans program it is recommended
that the program should give the relatively low income people (within
its tenants) more advantages such as, making their loans include the
land purchase, extending the mortgage period for them and so on.

2. Based on equity concerns also, larger size families should
receive more housing than smaller ones (and perhaps should receive more
benefits since there are more persons, mostly dependents, in such
families). So if there are two families with the same income, but with
different family size, the larger size family should be helped more.
Larger size family here represents more population, and per capita
income for this family is lower than per capita income for the smaller
size family. Instead of taking the total income of the family as our
criteria we should take the per capita income for the family. A low
income family may not be considered so on per capita basis. In effect
the family size and its effect on per capita income for the family
should be taken into consideration in determining who is eligible for
these housing programs and who is not. Our analysis has showed that net
tenant benefits from the interest free loans program are negatively
related to the family size which means that larger size families are

benefiting less from this program than smaller size families, a result

which does not correspond to the equity criteria mentioned above, and

does not seem to go along with the Libyan population policy which

encourages population increase in many ways. Based on these reasons

it is recommended that larger size families should be helped and sup-

ported more than smaller size families especially if the income

criteria is met.

3. Equity concern also requires that elderly households receive

greater benefits since they hold a distinguished position in the

society. From our analysis it was found that net tenant benefits from

the interest free loans program are negatively related to the age of

the head of the family, which means that tenant families headed with

relatively older people received less benefits than tenant families

headed with relatively younger people. So it is recommended here that

tenant families headed with relatively older people should be given

more advantages and more favorite treatment than what they are receiving

now in order to make them benefit more.

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