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**AID HOUSING NEEDS ASSESSMENT MODEL  
USER'S MANUAL**

by

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**IMPORTANT  
READ THIS FIRST**

To avoid accidental erasure or damage to the programs, you should never work directly on the program disk. Before starting work with this manual, you should copy the original program disk to a blank disk. To do this, enter DOS and enter the following (without underline):

DISKCOPY A: B:

If you do not have a "B" drive, substitute the correct drive identifier for "B." The computer will respond:

INSERT SOURCE DISKETTE IN DRIVE A

INSERT TARGET DISKETTE IN DRIVE B

HIT ANY KEY TO CONTINUE

Place your program disk in the "A" drive, and your blank diskette in your "B" drive (or appropriate drive). Hit "RETURN." The program disk will be copied to your blank disk. Save your original program disk in a safe place as a backup disk.

OPERATING SYSTEM

Compatibility between the Housing Needs Assessment program and the operating system used by the computer on which it is to be run is essential. Be sure that the computer that you will be using has available Release V1.22 of the Wang Professional Computer operating system for a Wang Computer. If this operating system is not available on the computer where the analysis will be performed, you

must obtain a copy of the three diskettes for this operating system before using the model. [If an IBM PC will be used, you must have version 2.0 (or higher) of the disk operating system.]

## I. EXECUTIVE SUMMARY: THE NEED FOR A COMPUTER-BASED HOUSING NEEDS ASSESSMENT MODEL

Adequate shelter is among the most basic needs of man. Today, about three-fourths of the world's population lives in a developing nation. The majority of the people in these countries live in overcrowded or substandard housing. By the year 2025, more than four-fifths of the world's population of 8.2 billion will live in developing countries. The vast majority of the world's population growth over the next few decades will occur in the countries least able to feed and shelter them.

Providing even minimal housing for this tremendous population growth will require the efficient allocation of the meager resources available, based on rational long-term planning. Rational planning is making reasonable assumptions about the future and matching policies to the most pressing problems projected.

Several factors often hinder housing planning in the Third World. First, the current situation is usually poorly captured in statistics. Many countries have unreliable statistics on population, housing stock, and income, if the statistics even exist. Second, the traditional behavior patterns of the population relating to housing, investment and saving decisions are often not fully understood. Finally, projections of population, income, prices, and behavior of a nation into the future when the present is not fully understood are difficult, especially if they are not done comprehensively. These obstacles make it difficult to use traditional methods for long-term planning to aid in the allocation of resources for housing.

The Housing Needs Assessment Model was created with these problems in mind. The model enables a planner to work efficiently within the data limitations in several ways.

First, the model provides a structured approach to the problem, aiding the planner in focusing on key variables. The basic framework of the methodology is based largely on the United Nations component method of estimating housing needs. This method classifies housing needs into two broad categories. The first category contains the needs existing at the beginning of the planning period; units requiring upgrading, units requiring replacement, and construction of new dwellings to reduce density levels. The second category identifies those needs expected to arise during the planning period due to population growth and decay of the existing housing stock. These two components comprise housing needs, or demand for housing. The model then calculates the investment required to bring the housing stock to a minimum quality level commensurate with projected requirements. In addition, the model computes the gap between the projected investment levels of the populace and the investment required to bring the housing stock to minimum standards. Different components of this model are handled in specific modules of the computer program. The tasks of these modules and the calculations performed are examined in detail in this paper.

The structure of the model gives the planner a clear framework to conduct analysis. This structure also is reflected in the computer program. The program is written in BASIC, and will run on most microcomputers with a core capacity of 128k or greater, which is now common. It currently is running on the Wang PC, and the IBM PC.

Conversion to additional systems is a moderately difficult task. This manual will deal primarily with the housing model as run on the Wang and IBM PC, although there are few differences in running the model on other computers.

A computerized housing needs model provides several important advantages to the planner. By performing the many calculations necessary for the housing assessment almost instantly, the computer enables the planner to understand the present and future housing environment in ways not possible when doing the calculations manually. The ease and speed of the model enable the user to run the model with many different policy scenarios, judging quickly the likely impact of various policy mixes.

Because many of the variables needed to operate the model are inherently subject to considerable uncertainty, the program can be used to test several different values for key input variables. This process tests the sensitivity of the output to systematic changes in an input variable or variables, while all other factors are held constant. A planner may wish to examine, for example, the impact of a one percent versus two percent real rise in housing cost per annum on housing affordability. Sensitivity analysis plays a key role in the use of the housing needs model.

Finally, the model can be used to test the impact of differing macroeconomic forecasts on housing needs. It will often be useful to run two or three projections, a worst case macroeconomic projection, a best case, and a most realistic case. Some of the key long-term

macroeconomic variables to be considered are Gross Domestic Product (GDP) growth, interest rates, population growth and distribution, income distribution, and inflation rates.

The housing needs assessment framework and its computer model thus can be a powerful tool in the shelter planning process. The computer program was specifically designed to be used by policy minded professionals with no computer training. The computer prompts the user for all required data and aids the user in producing valuable reports quickly and easily.

The next chapter provides a tutorial to demonstrate actual use of the Housing Needs Assessment model. The example is based on an actual housing needs assessment study in Barbados,<sup>1</sup> and further discussion of data inputs and interpretation of the results can be obtained by referring to that study. Chapter III provides reference information for each command in the HNA model. Each description indicates the menu from which the command is issued, the purpose of the command, and the response that the user must make. Chapter IV presents a series of data entry worksheets for all of the data that must be entered into the model. Each worksheet provides a brief description of the data that must be supplied. This description is intended to serve as a supplement to the more complete discussion of data requirements and principles of the methodology in the handbook Preparing a National Housing Needs

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1. Agency for International Development, Office of Housing and Urban Programs, Revised Estimates of Housing Needs and Investment in Barbados: 1980-2000 by Robert Dubinsky and Raymond J. Struyk, The Urban Institute, July 1985.

Assessment.<sup>1</sup> This handbook is available in French and Spanish, as well as English.

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1. Agency for International Development, Office of Housing and Urban Programs, Preparing a National Housing Needs Assessment, Washington, D.C., March 1984.

## II. RUNNING THE AID HOUSING NEEDS ASSESSMENT MODEL PROGRAM ON A WANG PC

To run the Housing Needs Model you must have a diskette with the necessary programs and a properly outfitted Wang PC (or other computer using an MS-DOS operating system). The diskette should be a Wang-compatible diskette (normally a 5-1/4 inch, double-sided, double-density disk) containing the files necessary to run the housing needs program. The Wang PC must have a disk drive, a printer, 128K or more of RAM, and BASIC software. Almost all Wang PCs meet these requirements.<sup>1</sup>

This model will also run without modification on an IBM PC. Only the start-up procedures are different. To run the program on an IBM PC, see Appendix C.

### Running the Model for Barbados: A Tutorial<sup>2</sup>

If the model does not operate as indicated, refer to Appendix D, "Troubleshooting," to identify the cause of your problems and possible solutions.

### Preparing the Wang PC

Your Wang PC will contain a disk drive unit, the central processor unit (CPU), a television-like monitor (the CRT), and a printer. The system will be set up to be started by a floppy disk, or by the hard internal (Winchester) disk. For the purpose of this example, it will be assumed that the system is configured with two floppy disk drives. If

---

1. These instructions assume that the Wang PC is using Release V1.21 or V1.22 of the operating system.

2. To use the HNA model on an IBM PC refer to Appendix C. Then turn to "Running the Model" later in this section.

your system has a Winchester disk, see Appendix I or consult your manual or Wang representative for start-up procedures.

Find your "SYSTEM DISKS." They should be clearly marked as such. Insert SYSTEM DISK 1 into drive "A" unit and close the door. Turn on the two power switches: one on the back of the disk drive unit, and one on the side of the printer.

When the system is powered on, messages should appear on the screen stating that the system files are being loaded. If after three or four minutes, no messages have appeared on the screen, or only error messages have appeared, start over. If you cannot load the system after several tries, consult a Wang representative.

The first screen display will prompt you for the date and time. Enter the date and time and hit the 'EXEC' key.

A menu will appear as in Figure 1. Loading BASIC will vary depending on how the machine was set up. BASIC is normally available under 'APPLICATIONS' OR 'PROGRAM DEVELOPMENT.' To choose one of these options, hit the space bar until the cursor lights up the option desired, then hit the 'EXEC' key. If BASIC does not appear in the next menu, hit the 'CANCEL' key to return to the main menu. If BASIC is not an option under APPLICATIONS, try PROGRAM DEVELOPMENT. When BASIC does appear as an option, use the space bar to move the cursor until the BASIC command is highlighted, then hit EXEC. You are now in BASIC.

If the computer indicates that BASIC is not found (the message looks like "Sorry, Program A: BASIC.EXE Not Found"), then insert SYSTEM DISK 3 into drive A (after removing any disk currently in drive A) and press the EXEC key again. When BASIC is loaded, the top line of the display should say:

Figure 1. Wang Main System Menu

04/24/84

10:15:20

Wang Professional Computer  
Main System Menu  
Release 1.21

Select an item:

- o Applications
- o Communications
- o DOS Command Processor
- o Printer Support
- o Program Development
- o Systems Utilities
- o Other

Space bar = Item Select  
Execute = Proceed

## Wang Interpretive Basic V1.03

The computer is now ready to accept the disk containing the Housing Needs Assessment program. Most Wang machines have two disk drives labeled "A" and "C" or "A" and "B." The program is designed to run on drive "A."

Remove any disk from drive "A" and place the Housing Needs Model Program disk into the drive. The disk labels should face left, and the disk slot should be inserted first into the machine. Be sure to close the door on the disk drive.

You are now ready to run the Housing Needs Assessment Model Program.

### Running the Model

In the following sections, instructions are given on how to enter information into the computer. All underlined characters are the user input and should be entered exactly as shown except that you should not enter the underline. All entries must be followed by hitting the RETURN key.<sup>1</sup>

To run the program, enter the following commands:

---

**1. Important Note:** If you make a mistake in entering any of the information for commands in the Housing Needs Assessment model this can be corrected using the backspace key (sometimes indicated by an arrow pointing to the left). Move the cursor backwards to the point of the mistake, and then retype the remainder of the entry.

If an incorrect command is inadvertently entered (such as Store Data File) it is possible to abort the command before the computer takes any further action. When the computer requests information more than one character in length (such as a data value, filename, or a descriptive title) enter a null response (press the RETURN key only) to abort the command. In situations where a single character response is expected (such as for a command, a row letter designation, or a column number designator), enter X (for exit). When in doubt as to the correct response to abort a command try a null entry first.

LOAD "A:HOUSE1"

(If the computer at this point responds with a message "File not found," check that the correct disk has been inserted into drive A and that the entry was typed exactly as shown above. Repeat the LOAD command, if necessary.)

RUN

The display shown in Figure 2 will appear, asking you to make a choice for the language (English, Spanish, or French) that will be used. Enter the letter corresponding to your choice and press the RETURN key. The title screen shown in Figure 3 will be displayed if you selected English. If you selected Spanish or French, the screen would be in the language selected. All of the messages appearing on the screen and the headings and margins of the output tables are in the language chosen.

Enter "Demonstration using data from Barbados" as the title of this analysis. (Remember to press the RETURN key after entering the title!) It is advisable, though not necessary, to enclose the title within quotation (") marks. This allows special characters, such as a comma, to be included in the title.

Next you will be asked for the starting year of the simulation. This is the base year of the simulation--the year for which data are currently available for items such as population and the housing stock. For this demonstration enter: 1980.

Now you must supply the interval - either 1 year or 5 years - for which the simulation results will be computed. Enter: 5. This

**FIGURE 2**

- A. English**
- B. Espanol**
- C. Francais**

**Choice / Seleccion / Choix -->**

**FIGURE 3**

**U.S. Agency for International Development  
Simulation Model for  
Housing Needs Assessment**

**ENTER -  
Title:**

indicates that the simulation will be run for 20 years and the results will be reported at 5-year increments. (If a 1 is entered the simulation will be run for four years, with the results reported at 1-year increments.)<sup>1</sup> The computer display should now appear as shown in Figure 4. Review the entries that you have made. If they are correct, enter: Y. Otherwise enter: N, and the computer will again prompt you for these inputs.

A new display will now appear on the screen as in Figure 5. The main menu contains all of the major tasks performed by the program. To execute a task, simply enter the letter of the option desired (and then press the RETURN key). For example to end the program, you would enter: X.

The data file for this tutorial is BARBADOS. To load the data file, enter: D. The system will prompt you for the name of the data file. Enter: BARBADOS. The program will respond that the data file is being loaded, and then will return to the main menu.

Once the data file is loaded, a simulation can be run. This is done by selecting: G on the main menu. Running the simulation performs the calculations on data in the data file, creating the four- or twenty-year projections of housing needs, investment, and subsidy requirements. When the calculations are completed (they take about three minutes) the program presents you with a menu to select options for reporting the simulation results, as shown in Figure 6.

From the Report Output Options menu, enter: A to indicate that the results of the simulation should be displayed on the computer screen. A list of the tables that can be selected will appear, as shown in Figure 7.

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1. Running the one-year version is described further in Appendix B.

FIGURE 4

U.S. Agency for International Development  
Simulation Model for  
Housing Needs Assessment

ENTER -  
Title: "Demonstration using data for Barbados"  
Starting Year for Simulation: 1980  
Interval (1 or 5): 5

Are these entries correct? (Y/N):

FIGURE 5

MAIN MENU

- A. Enter/Edit GDP and Income Data
- B. Enter/Edit Housing Data
- C. Display Directory of Data Filenames
- D. Load Data File
- E. Store Data File
- F. Erase Date File
- G. Start Simulation - Print Tables
- H. Sensitivity Analysis
  
- X. STOP

CHOICE ->

FIGURE 6

REPORT OUTPUT OPTIONS

- A. Display Tables
- B. Select Tables for Printing
- C. Cancel Selections
- D. Print Selected Tables
- E. Print All Tables
- F. Save Results for Sensitivity Analysis
- G. Run Sensitivity Analysis
- H. Graphic Display of Housing Investment
  
- X. EXIT to Next Simulation.

CHOICE ->

FIGURE 7

TABLE SELECTION

- A. Population and Household Formation
- B. National and Household Income
- C. Design Standards and Costs
- D. Housing Stock and Replacement
- E. Affordable Capital Costs
- F. Affordable Costs by Income Class and Region
- G. Quintile Design Cost Classification
- H. Target Group Identification
- I. Subsidized Households by Income Class and Region
- J. Investment for Upgrading and New Construction
- K. Target Group Investment and Subsidy Requirements
- L. Housing Investment in Relation to GDP
- M. Components of Target Group Housing Cost
- N. Summary of Housing Needs and Investment
  
- X. EXIT to Report Output Options Menu

CHOICE ->

Entering a letter causes the corresponding table to be displayed on the screen in several panels. Enter: N to display the table which summarizes the housing needs and investment for Barbados in five-year increments over the period 1980 to 2000. The first panel of this table is shown as Figure 8 summary for the country as a whole.

After you have examined this display to your satisfaction, press the RETURN key to display the panel for the Metropolitan Area. Press RETURN again, and the panel for Other Urban Areas (urban areas outside of the metropolitan area) is displayed. (Note that all of the entries in this table are zero because dividing the small country of Barbados into more than two zones was viewed as unnecessary by the analysts.) Another RETURN produces a display of the housing needs and investment in the Rural Areas of Barbados.

Notice that the bottom line on this last panel asks whether the table should be queued for printing. Responding with a 'Y' will cause this table to be marked for printing on request later on during the session. Any other response causes the computer to return to the Table Selection menu. At this point enter: Y. The computer display that follows should look like Figure 9, with an asterisk (\*) next to table N, indicating that it has been designated for later printing.

Enter: X to leave the Table Selection menu and return to the menu for Report Output Options (Figure 6). Once in the Report Output Options menu enter: B to select tables for output on the computer's printer. The display should again look like Figure 9, indicating that the table for the Summary of Housing Needs and Investment has already been queued for printing. Additional tables can be queued for printing (without

FIGURE 8

	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>
Country					
Population	229.80	235.80	240.40	245.10	249.60
Construction New Units/Yr	0.00	1.14	1.25	1.42	1.58
Upgrades per Year	0.00	2.10	2.10	2.10	2.10
Total Construction/Year	0.00	3.24	3.35	3.52	3.68
HHs needing subsidy	0.00	1.76	1.83	2.34	2.43
Subsidy/Year	0.00	17.28	19.59	26.11	29.98
Housing investment	0.00	77.35	90.60	89.77	106.18
Investment as pct of GDP	0.00	4.44	4.40	3.76	3.84
Subsidy as percent of PCE	0.00	71.19	68.26	78.47	77.73

Press "RETURN" for next panel . . .

FIGURE 9

TABLE SELECTION

- A. Population and Household Formation
- B. National and Household Income
- C. Design Standards and Costs
- D. Housing Stock and Replacement
- E. Affordable Capital Costs
- F. Affordable Costs by Income Class and Region
- G. Quintile Design Cost Classification
- H. Target Group Identification
- I. Subsidized Households by Income Class and Region
- J. Investment for Upgrading and New Construction
- K. Target Group Investment and Subsidy Requirements
- L. Housing Investment in Relation to GDP
- M. Components of Target Group Housing Cost
- N. \*Summary of Housing Needs and Investment
  
- X. EXIT to Report Output Options Menu

CHOICE ->

being displayed on the screen) by entering the letter corresponding to the desired table. Enter: K to queue the table for Target Group Investment and Subsidy Requirements for printing, and then enter: L to queue the table for Housing Investment in Relation to GDP for the printer. The display should now look like Figure 10.

These tables (K, L, and N) can now be sent to the printer for printing. (First, make sure that the printer is turned on, and that it is "ready" or "on line.") Enter: D to cause the three tables to be printed. When the printing is completed, these should look like Figures 11 to 13, and the display will return to the menu for Report Output Options (Figure 6).<sup>1</sup>

The tables that have been printed show the various investment and subsidy requirements in Barbados based on the input data in the BARBADOS file stored on your program disk. In a similar manner, other results from the simulation can be printed.

Option H in the Report Output Options menu can be selected to display graphically the Housing Investment and Subsidy Requirements in Barbados.<sup>2</sup> After entering: H, the computer display should look like Figure 14. The display requests that you select one of the regions for the graphic display. Enter: A. The display should now look like Figure 15. When you are ready, return to the Report Output Options menu by pressing the RETURN key.

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1. Notes on the interpretation of output tables are provided in, Preparing a National Housing Needs Assessment, cited earlier.

2. Note: To produce graphic displays on an IBM PC (or an IBM-compatible PC), the system must be configured with a COLOR/GRAPHICS adapter.

FIGURE 10

TABLE SELECTION

- A. Population and Household Formation
  - B. National and Household Income
  - C. Design Standards and Costs
  - D. Housing Stock and Replacement
  - E. Affordable Capital Costs
  - F. Affordable Costs by Income Class and Region
  - G. Quintile Design Cost Classification
  - H. Target Group Identification
  - I. Subsidized Households by Income Class and Region
  - J. Investment for Upgrading and New Construction
  - K. \*Target Group Investment and Subsidy Requirements
  - L. \*Housing Investment in Relation to GDP
  - M. Components of Target Group Housing Cost
  - N. \*Summary of Housing Needs and Investment
- X. EXIT to Report Output Options Menu

CHOICE ->

FIGURE 11

TARGET GROUP INVESTMENT AND SUBSIDY REQUIREMENTS

	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>
<b>Country</b>					
Target Households (1,000s)					
Not Requiring Subsidy	0.00	1.29	1.31	0.70	0.70
Requiring Subsidy	0.00	1.76	1.83	2.34	2.43
Total	0.00	3.05	3.14	3.04	3.13
Target Group Cost (Millions)					
Subsidy Portion	0.00	17.28	19.59	26.11	29.98
Supported by Target Group	0.00	27.31	31.40	26.12	29.70
Total	0.00	44.59	50.98	52.23	59.68
<b>Metropolitan Area</b>					
Target Households (1,000s)					
Not Requiring Subsidy	0.00	0.91	0.93	0.49	0.49
Requiring Subsidy	0.00	1.27	1.34	1.69	1.76
Total	0.00	2.19	2.27	2.17	2.24
Target Group Cost (millions)					
Subsidy Portion	0.00	13.08	15.00	19.81	22.72
Supported by Target Group	0.00	19.52	22.64	18.34	21.00
Total	0.00	32.60	37.64	38.15	43.72
<b>Other Urban Areas</b>					
Target Households (1,000s)					
Not Requiring Subsidy	0.00	0.00	0.00	0.00	0.00
Requiring Subsidy	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00
Target Group Cost (millions)					
Subsidy Portion	0.00	0.00	0.00	0.00	0.00
Supported by Target Group	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00
<b>Rural Areas</b>					
Target Households (1,000s)					
Not Requiring Subsidy	0.00	0.38	0.38	0.21	0.21
Requiring Subsidy	0.00	0.49	0.50	0.65	0.67
Total	0.00	0.87	0.88	0.86	0.88
Target Group Cost (millions)					
Subsidy Portion	0.00	4.20	4.59	6.30	7.26
Supported Portion	0.00	7.79	8.75	7.79	8.70
Total	0.00	11.99	13.34	14.08	15.96

FIGURE 12

HOUSING INVESTMENT IN RELATION TO GDP

	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>
(millions of currency units)					
Country					
Total Housing Expenditure	174.01	181.78	214.20	247.55	285.22
Non-Target Group Investment	0.00	14.09	17.77	33.77	42.27
Target Group Investment	0.00	45.97	53.25	29.89	33.93
Subsidy Required	0.00	17.28	19.59	26.11	29.98
Total Housing Investment	0.00	77.35	90.80	89.77	106.18
Metropolitan Area					
Total Housing Expenditure	124.33	130.95	154.95	179.82	208.91
Non-Target Group Investment	0.00	10.97	14.01	26.20	32.51
Target Group Investment	0.00	32.46	37.82	20.71	23.72
Subsidy Required	0.00	13.08	15.00	19.81	22.72
Total Housing Investment	0.00	56.52	66.84	66.71	78.94
Other Urban Areas					
Total Housing Expenditure	0.00	0.00	0.00	0.00	0.00
Non-Target Group Investment	0.00	0.00	0.00	0.00	0.00
Target Group Investment	0.00	0.00	0.00	0.00	0.00
Subsidy Required	0.00	0.00	0.00	0.00	0.00
Total Housing Investment	0.00	0.00	0.00	0.00	0.00
Rural Areas					
Total Housing Expenditure	49.68	50.82	59.25	67.73	76.31
Non-Target Group Investment	0.00	3.12	3.76	7.58	9.77
Target Group Investment	0.00	13.51	15.42	9.18	10.22
Subsidy Required	0.00	4.20	4.59	6.30	7.26
Total Housing Investment	0.00	20.83	23.77	23.05	27.24
Total Housing Investment in the Base Year	83.70				
Subsidy as a Percent of Public Capital Expenditures	0.00	71.19	68.26	78.47	77.73
Total Housing Investment as a Percent of GDP	5.05	4.44	4.40	3.76	3.84

FIGURE 13

## SUMMARY OF HOUSING NEEDS AND INVESTMENT

	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>
<b>Country</b>					
Population	229.80	235.80	240.40	245.10	249.60
Construction New Units/Yr	0.00	1.14	1.25	1.42	1.58
Upgrades per Year	0.00	2.10	2.10	2.10	2.10
Total Construction/Year	0.00	3.24	3.35	3.52	3.68
HHS needing subsidy	0.00	1.76	1.83	2.34	2.43
Subsidy/Year	0.00	17.28	19.59	26.11	29.98
Housing Investment	0.00	77.35	90.60	89.77	106.18
Investment as pct of GDP	0.00	4.44	4.40	3.76	3.84
Subsidy as percent of PCE	0.00	71.19	68.26	78.47	77.73
<b>Metropolitan Area</b>					
Population	158.90	163.90	168.20	172.60	176.60
Construction New Units/Yr	0.00	0.87	0.97	1.09	1.21
Upgrades per Year	0.00	1.46	1.46	1.46	1.46
Total Construction/Year	0.00	2.33	2.43	2.55	2.67
HHS needing subsidy	0.00	1.27	1.34	1.69	1.76
Subsidy/year	0.00	13.08	15.00	19.81	22.72
Housing Investment	0.00	56.52	66.84	66.71	78.94
Investment as pct of GDP	0.00	3.24	3.24	2.79	2.85
Subsidy as percent of PCE	0.00	53.89	52.28	59.54	58.91
<b>Other Urban Areas</b>					
Population	0.00	0.00	0.00	0.00	0.00
Construction New Units/Yr	0.00	0.00	0.00	0.00	0.00
Upgrades per Year	0.00	0.00	0.00	0.00	0.00
Total Construction/Year	0.00	0.00	0.00	0.00	0.00
HHS needing subsidy	0.00	0.00	0.00	0.00	0.00
Subsidy/year	0.00	0.00	0.00	0.00	0.00
Housing Investment	0.00	0.00	0.00	0.00	0.00
Investment as pct of GDP	0.00	0.00	0.00	0.00	0.00
Subsidy as percent of PCE	0.00	0.00	0.00	0.00	0.00
<b>Rural Areas</b>					
Population	70.90	71.90	72.20	72.50	73.00
Construction New Units/Yr	0.00	0.27	0.28	0.33	0.37
Upgrades per Year	0.00	0.64	0.64	0.64	0.64
Total Construction/Year	0.00	0.91	0.92	0.97	1.01
HHS needing subsidy	0.00	0.49	0.50	0.65	0.67
Subsidy/year	0.00	4.20	4.59	6.30	7.26
Housing Investment	0.00	20.83	23.77	23.05	27.24
Investment as pct of GDP	0.00	1.19	1.15	0.97	0.98
Subsidy as percent of PCE	0.00	17.30	15.98	18.93	18.82

FIGURE 14

Select Region:

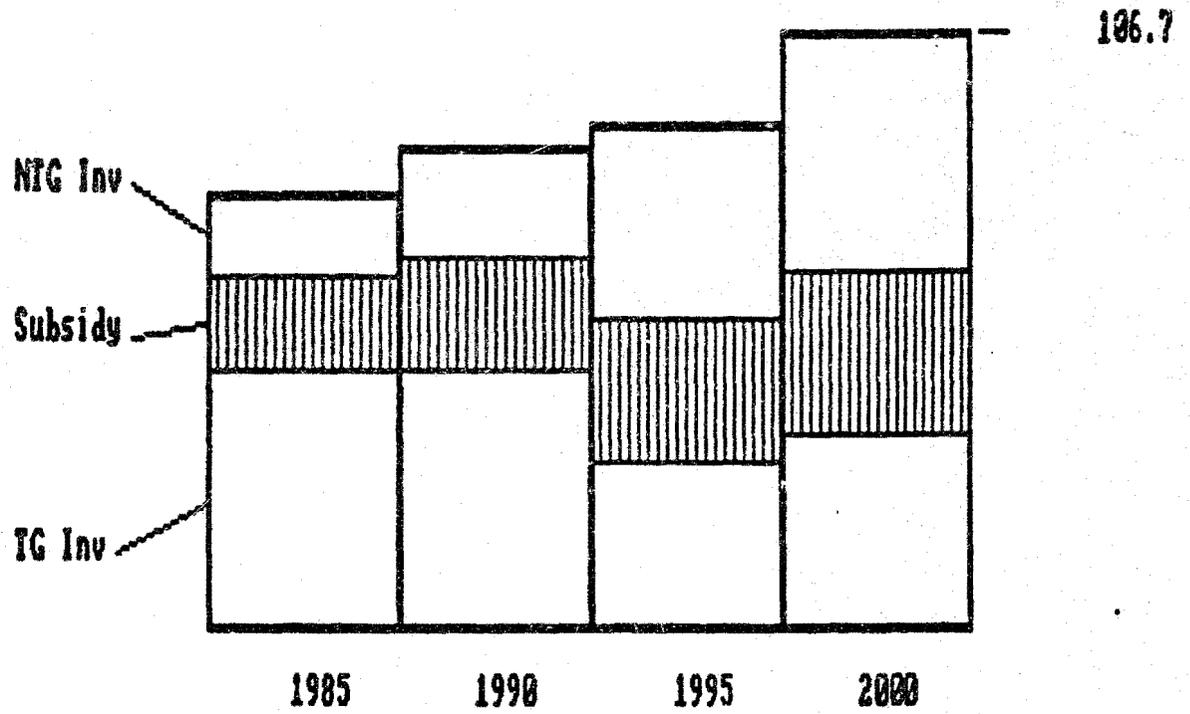
- A. Country
- B. Metropolitan Area
- C. Other Urban Areas
- D. Rural Areas

X. EXIT

CHOICE ->

FIGURE 15

INVESTMENT AND SUBSIDY REQUIREMENTS,  
COUNTRY



So far, this tutorial has been based on the data stored in file BARBADOS, although these data have not yet been displayed. Now we will begin a second simulation that reviews some of the input data and examines the impact of changes in them on the simulation results. At this point, enter: X (the command in the Report Output Options menu to "EXIT to Next Simulation"). After a brief wait the computer screen should look again as it did in Figure 3.

To begin the second simulation enter a new title (to differentiate this run from the first simulation), such as "Barbados: Demonstration 2", and use the same starting year (1980) and interval (5). Once again, using command D from the Main Menu, load the database BARBADOS.<sup>1</sup>

Note that if you do not load a data file, then all of the input data displays will contain only zeros. When constructing a completely new file, you should begin filling in these blank displays with your values. After you have entered values for one or more displays, save the data in a new file as described below. Then, when you next want to add to these input data, you load this new file.

When the BARBADOS data are loaded into the computer memory they are divided into two broad categories. The first group (Main Menu command A) contains data for Gross Domestic Product (GDP), income, and population. The second (command B) contains data on the housing stock and a future program for its improvement.

Enter: A to display the list of GDP and Income data matrices (Figure 16). Then select: A, "Population," to produce the display shown in Figure 17. This matrix shows the population estimates for the

---

1. It is advisable as a general matter always to load your data file for each simulation, even though an input file once loaded should remain, unaltered, in the computer's memory.

FIGURE 16

ENTER/EDIT GDP AND INCOME DATA

- A. Population
- B. Household Size
- C. Base Year GDP & Average Household Income
- D. GDP Growth and Inflation
- E. Income Shares by Quintile, Metro
- F. Income Shares by Quintile, Urban
- G. Income Shares by Quintile, Rural
- H. Rural Area Share of Total GDP
  
- X. EXIT to Main Menu

CHOICE ->

FIGURE 17

		POPULATION (Thousands)		
		1	2	3
		METRO	URBAN	RURAL
A	1980	158.9	0.0	70.9
B	1985	163.9	0.0	71.9
C	1990	168.2	0.0	72.2
D	1995	172.6	0.0	72.5
E	2000	176.6	0.0	73.0

ROW LETTER->  
(X EXIT)

metropolitan and rural areas of Barbados at five-year intervals from 1980 to 2000. After examining this matrix enter: X to return to the GDP and Income Data menu. Data for the other items on the menu can now be displayed in the same manner.

Now enter: X (from the menu for GDP and Income Data) to return to the Main Menu. Select and enter: B to display the menu for Housing Data. This should produce the display shown in Figure 18.

Now we will set up an alternative scenario to test the impact of changes in the terms of housing finance on the results of the simulation. Select: K, "Terms of Housing Finance, Metro." Figure 19 should now be on the display.

The alternative scenario which we will run will examine the effect of increasing the interest rate for metropolitan area households in the two highest income quintiles (Q4 and Q5) from 10.4 percent per annum to 12 percent.

Notice that the line on which the interest rate is shown is labelled "A." Enter: A in response to the computer's request for "ROW LETTER." See Figure 20. The computer will then request the column number of the item to be changed. Enter: 4 to indicate that a new value will be given for item A4, the interest rate for the fourth income quintile. In response to the request to enter a value, enter: 12 to indicate 12 percent (not 0.12). The display should now look like Figure 21, with an interest rate of 12.0 for the fourth income quintile in the metropolitan area. Repeat these steps, but now change the interest rate for quintile 5, the highest income group. Again, the interest rate that is displayed should change from 10.4 percent to 12.0 percent.

FIGURE 18

ENTER/EDIT HOUSING DATA

- A. Share of Household Income Devoted to Housing
- B. Share of Housing Expenditures Devoted to Recurring Expenses
- C. Base Year Housing Stock
- D. Housing Total Investment, Public Expenditures, and Decay Rates
- E. Construction to Reduce Overcrowding
- F. Number Upgraded & Value of Unit Before Upgrading
- G. Construction for Replacement
- H. Units Construction Costs
- I. New House Construction Cost Shares
- J. Upgrade Construction Cost Shares
- K. Terms of Finance. Metro
- L. Terms of Finance. Other Urban
- M. Terms of Finance. Rural
  
- X. EXIT to Main Menu

CHOICE ->

FIGURE 19

TERMS OF HOUSING FINANCE. METRO  
(Thousands)

		1	2	3	4	5
		Q1	Q2	Q3	Q4	Q5
A	Interest Rate (%)	10.4	10.4	10.4	10.4	10.4
B	Loan Term (years)	20.0	20.0	20.0	20.0	20.0
C	Downpayment Share (%)	20.0	20.0	20.0	20.0	20.0
D	Graduation Rate (%)	0.0	0.0	0.0	0.0	0.0
E	Graduation Period (years)	0.0	0.0	0.0	0.0	0.0

ROW LETTER ->  
(X EXIT)

All of the desired changes to the data for the alternative scenario are now complete. Enter: X to return to the Housing Data menu, then enter X to return to the Main Menu.

To retain the changes that have been made, the data must be saved on the diskette. To do this, enter: E from the main menu to store the data on the disk. In response to the prompt from the computer for a filename for this data file you might enter BARBADO2. (The filename that you enter must not exceed eight characters in length!) See Figure 22. The display will then return to the Main Menu.

You can enter: C to see a directory of the filenames of all data files that are stored on the disk. As shown in Figure 23, the list should contain BARBADOS and BARBADO2.

We are now ready to assess the impact of raising interest rates for upper income households in metropolitan areas. Enter: G to begin this simulation. When the Report Output Options menu appears (see Figure 6) you can display tables K, L, and N on the screen (or print them on the printer), and compare these results with those from the previous simulation. Of course, you can also display or print any of the other tables that are on the table selection list.

A convenient way to compare the results of using the different interest rates is to run a sensitivity analysis. But first, the results from this alternative scenario simulation must be saved for use in the sensitivity analysis.<sup>1</sup> To do this, enter: F (see Figure 6) for the command to Save Results for Sensitivity Analysis using the filename

---

1. It is assumed that the results for the previous simulation using the BARBADOS file have already been saved.

FIGURE 20

TERMS OF HOUSING FINANCE. METRO  
(Thousands)

		1	2	3	4	5
		Q1	Q2	Q3	Q4	Q5
A	Interest Rate (%)	10.4	10.4	10.4	10.4	10.4
B	Loan Term (years)	20.0	20.0	20.0	20.0	20.0
C	Downpayment Share (%)	20.0	20.0	20.0	20.0	20.0
D	Graduation Rate (%)	0.0	0.0	0.0	0.0	0.0
E	Graduation Period (years)	0.0	0.0	0.0	0.0	0.0

ROW LETTER -> a  
 COLUMN NUMBER -> 4  
 A 4 is 10.4 -- ENTER VALUE -> 12

FIGURE 21

TERMS OF HOUSING FINANCE. METRO  
(Thousands)

		1	2	3	4	5
		Q1	Q2	Q3	Q4	Q5
A	Interest Rate (%)	10.4	10.4	10.4	10.4	10.4
B	Loan Term (years)	20.0	20.0	20.0	20.0	20.0
C	Downpayment Share (%)	20.0	20.0	20.0	20.0	20.0
D	Graduation Rate (%)	0.0	0.0	0.0	0.0	0.0
E	Graduation Period (years)	0.0	0.0	0.0	0.0	0.0

ROW LETTER ->  
 (X EXIT)

FIGURE 22

(STORE DATA) ENTER FILENAME: BARBADO2

FIGURE 23

DIRECTORY OF DATA FILES

A:\  
BARBADO2.DAT      BARBADOS.DAT  
124928 Bytes fre

Press 'RETURN' to continue

FIGURE 24

(SAVE SENSITIVITY) ENTER FILENAME: barbado2

FIGURE 25

SENSITIVITY ANALYSIS

- A. Select Sensitivity File for the Base Case
- B. Select File for the First Alternative
- C. Select File for the Second Alternative
- D. Display Directory of Sensitivity files
- E. Erase Sensitivity File
- F. Display Sensitivity Analysis
- G. Print Sensitivity Analysis
  
- X. EXIT to Main Menu

CHOICE ->

BARBADO2. (See Figure 24.) It is possible to use the same file name for a data input file and a results file because the computer program adds a different "Extension" to the two kinds of file to distinguish them.<sup>1</sup> Once the file has been stored, enter: H to run the sensitivity analysis. After the sensitivity program has been loaded from the program disk, the display should look like Figure 25. Note that you should run the sensitivity analysis last among the "Output Menu options," since when the sensitivity analysis is complete you must exit back to the Main Menu.

The first step in running the sensitivity analysis is to select the files that contain the data from the simulations that are to be compared. Before doing this, however, it might be useful to review the names of these files. This is done by entering the Sensitivity Analysis command: D, Display the Directory of Sensitivity Files, which should produce the display shown in Figure 26. Notice that the sensitivity file from the second simulation, BARBADO2, appears on the list. Also on the list is the sensitivity file BARBADOS. (This file should already have been on the disk when you received it.)

The next step is to indicate the file in the simulation run that will serve as the base case. Enter: A. The computer will prompt you for a title to be used on the sensitivity analysis table, and for the name of the base case sensitivity analysis file. Enter these as shown in Figure 27.

---

1. The full file names are BARBADO2.DAT for an input file and BARBADOS.SEN for a results file to be used in sensitivity analyses.

FIGURE 26

DIRECTORY OF SENSITIVITY FILES

A:\  
BARBADOS.SEN      BARBADO2.SEN  
122880 Bytes fre

Press RETURN to continue

FIGURE 27

ENTER A TITLE FOR THIS SENSITIVITY ANALYSIS  
"Raise interest rates for high income metropolitan households"

ENTER THE SENSITIVITY FILENAME FOR THE BASE CASE: barbados

After loading the base case sensitivity file from the disk, the computer will indicate the choice of years that can be used in a sensitivity comparison. (These are determined by the base year and interval period that was used in the base case simulation run.) The analysis allows two different years to be compared. In this case let's enter: 1985 as the first year and 1990 as the second, as shown in Figure 28. Next enter a brief title to describe the differentiating features of the base case.

The sensitivity analysis can compare the results of one or two alternative scenarios with a base case. In our tutorial only one alternative will be used. Enter: B to Select a File for the First Alternative (see Figure 25). The computer will prompt you for the name of the sensitivity file for the first alternative. Enter: BARBADO2, the name of the sensitivity file that was saved from the simulation based on higher (12 percent) interest rates for upper income metropolitan area households. Next enter a descriptive title for this alternative scenario. See Figure 29.

(At this point a second alternative scenario could also be compared with the base, but so far we have developed only one alternative. A second alternative might, for example, also increase interest rates for households in the third income quintile, in addition to those in the fourth and fifth quintiles.)

The results of sensitivity analysis can now be displayed on the printer or on the computer screen. Enter: G to print the results. The table that is produced should look like Figure 30.

FIGURE 28

VALID YEARS FOR SENSITIVITY COMPARISONS ARE: 1985 . 1990 . 1995 and 2000

ENTER THE FIRST YEAR FOR COMPARISON: 1985

ENTER THE SECOND YEAR FOR COMPARISON: 1990

ENTER A BRIEF TITLE TO DESCRIBE THE BASE CASE: All quintiles 10.4%  
interest rate

FIGURE 29

ENTER THE SENSITIVITY FILENAME FOR THE FIRST ALTERNATIVE: barbado2

ENTER A TITLE TO DESCRIBE THIS ALTERNATIVE: High interest for high income  
metro

FIGURE 30

SENSITIVITY ANALYSIS  
RAISE INTEREST RATES FOR HIGH INCOME METRO AREA HOUSEHOLDS

	1985			1990		
	<u>BASE</u>	<u>ALT 1</u>	<u>ALT 2</u>	<u>BASE</u>	<u>ALT 1</u>	<u>ALT 2</u>
<b>--Total Housing Needs--</b>						
Metropolitan Area	2.3	2.3	0.0	2.4	2.4	0.0
Other Urban Areas	0.0	0.0	0.0	0.0	0.0	0.0
Rural Areas	0.9	0.9	0.0	0.9	0.9	0.0
Country	3.2	3.2	0.0	3.4	3.4	0.0
(%) Diff. from Base	0.0	0.0	0.0	0.0	0.0	0.0
<b>--Size of Target Group--</b>						
Metropolitan Area	2.2	2.2	0.0	2.3	2.3	0.0
Other Urban Areas	0.0	0.0	0.0	0.0	0.0	0.0
Rural Areas	0.9	0.9	0.0	0.9	0.9	0.0
Country	3.1	3.1	0.0	3.1	3.1	0.0
(%) Diff. from Base	0.0	0.0	0.0	0.0	0.0	0.0
<b>--Households Needing Subsidy--</b>						
Metropolitan Area	1.3	1.3	0.0	1.3	1.3	0.0
Other Urban Areas	0.0	0.0	0.0	0.0	0.0	0.0
Rural Areas	0.5	0.5	0.0	0.5	0.5	0.0
Country	1.8	1.8	0.0	1.8	1.8	0.0
(%) Diff. from Base	0.0	0.0	0.0	0.0	0.0	0.0
<b>--Total Housing Investment--</b>						
Metropolitan Area	56.5	53.4	0.0	66.8	63.1	0.0
Other Urban Areas	0.0	0.0	0.0	0.0	0.0	0.0
Rural Areas	20.8	20.8	0.0	23.8	23.8	0.0
Country	77.3	74.2	0.0	90.6	86.9	0.0
(%) Diff. from Base	0.0	-4.0	0.0	0.0	-4.1	0.0
<b>--Subsidy Requirement--</b>						
Metropolitan Area	53.9	53.9	0.0	52.3	52.3	0.0
Other Urban Areas	0.0	0.0	0.0	0.0	0.0	0.0
Rural Areas	4.2	4.2	0.0	4.6	4.6	0.0
Country	17.3	17.3	0.0	19.6	19.6	0.0
(%) Diff. from Base	0.0	0.0	0.0	0.0	0.0	0.0
<b>--Subsidy as a pct PCE--</b>						
Metropolitan Area	53.9	53.9	0.0	52.3	52.3	0.0
Other Urban Areas	0.0	0.0	0.0	0.0	0.0	0.0
Rural Areas	17.3	17.3	0.0	16.0	16.0	0.0
Country	71.2	71.2	0.0	68.3	68.3	0.0
(%) Diff. from Base	0.0	0.0	0.0	0.0	0.0	0.0

BASE = ALL QUINTILES 10.4% INTEREST RATE  
ALT1 = HIGH INTEREST FOR HIGH INCOME METRO

The sensitivity analysis results shown in Figure 30 compare the major indicators of housing need and housing investment in 1985 and 1990 under the base case and the alternative scenario of higher interest rates for high income households. (The results for Alternative 2 are zero because a second alternative was not used in the analysis.)

Notice that total Housing Needs in the table remain unchanged in each period. This is because higher interest rates do not affect housing needs, although they do reduce the affordability levels of households in Q4 and Q5 because they must pay the higher rates of interest for housing finance.

In the first year to be compared, 1985, in the high interest rate scenario, Total Housing Investment declines by -4.0 percent for the country because of the decline in metropolitan area housing investment from Bds \$56.7 million to Bds \$53.6 million. This lower level of investment occurs because metropolitan area households in the fourth and fifth income quintiles cannot purchase as much housing in this alternative scenario as in the base case due to their higher cost of financing. In the second period, similar changes occur, although there is a slightly larger decline in total housing investment.

This completes the tutorial. You can now enter: X to return to the main menu and continue experiment with the Housing Needs Assessment model, or you can simply remove the diskette from the drive and turn off the computer.

The next section of this guide is organized as a reference manual in which the commands in each of the menus is explained in turn.

**CHAPTER III**

**COMMAND SUMMARY AND REFERENCE**

Figure 31

U.S. Agency for International Development  
Simulation Model for  
Housing Needs Assessment

ENTER -

Title:

Starting Year for Simulation:

Interval (1 or 5):

Are these entries correct? (Y/N):

## Title Display

### Title Display:

#### Purpose:

- (1) Provide a title for the simulation.
- (2) Indicate the starting year (base year) of the simulation.
- (3) Indicate the interval between years reported in the simulation results.

#### Response:

- (1) Enter a title that describes the simulation to be performed. It should distinguish the simulation from other analyses that will be run. Any title containing commas (,) in the text must be enclosed in quotation marks ("").
- (2) Enter the starting year of the simulation. This is the base year. All data must be available for this base year.
- (3) a. Enter 1 to indicate that annual results should be simulated for the four years following the starting year.  

or

b. Enter 5 to indicate that results should be reported for every fifth year over a period of twenty years.

#### Remarks:

- (1) Prompts appear sequentially after each entry. After the interval has been entered examine the entries for accuracy. Indicate that they are correct by entering a Y; any other response will cause the prompting sequence to repeat.
- (2) Be sure to see Appendix B, "Using One-year Increments in a Simulation," for additional information on the relationships between the data input requirements for simulations based on one-year and five-year increments.

**MAIN MENU**

Figure 32

MAIN MENU

- A. Enter/Edit GDP and Income Data
- B. Enter/Edit Housing Data
- C. Display Directory of Data Filenames
- D. Load Data File
- E. Store Data File
- F. Erase Data File
- G. Start Simulation - Print Tables
- H. Sensitivity Analysis
  
- X. STOP

CHOICE ->

## Main Menu

### Purpose:

Indicate the next action to be taken by the Housing Needs Assessment Model.

### Response:

Enter a command (A-H, X) to indicate desired action.

### Remarks:

- (1) Before a simulation can be run data must either be loaded from an existing data file or be entered using the Enter/Edit Data commands (A and B).
- (2) Refer to the following descriptions of the individual commands for a detailed descriptions.

ENTER/EDIT GDP AND INCOME DATA

- A. Population
- B. Household Size
- C. Base Year GDP & Average Household Income
- D. GDP Growth and Inflation
- E. Income Shares by Quintile, Metro
- F. Income Shares by Quintile, Urban
- G. Income Shares by Quintile, Rural
- H. Rural Area Share of Total GDP
  
- X. EXIT to Main Menu

CHOICE ->

## Enter/Edit GDP and Income Data

Menu: Main

Command: A

Purpose:

Enter values into the matrices for demographic, macroeconomic, and income data. Edit existing values in these matrices.

Response:

Enter the letter corresponding to the matrix for which data are to be entered or edited.

Remarks:

- (1) See Chapter IV for the worksheets related to each of the data matrices.
- (2) After a data matrix has been selected and displayed on the computer screen respond sequentially to the prompts for ROW LETTER, COLUMN NUMBER, and ENTER VALUE for each element of the matrix to be entered or edited.
- (3) A response of X to the prompt for ROW LETTER or COLUMN NUMBER will return the display to the Enter/Edit GDP and Income Data menu. A null response (RETURN only) to the ENTER VALUE prompt will leave the data element unchanged.
- (4) Existing data must first be loaded from a file on diskette before they can be edited.
- (5) Before a simulation can be run correctly, data must be supplied for each of the matrices (A through H).
- (6) Notes on data entry:
  - a. If you enter more numbers after the decimal point than are shown on the matrix, the program rounds the number for display. However, the full number as entered is used in calculations.
  - b. All percent data are entered as percent (e.g., 6 percent is entered as 6.0). Interest rates are in annual percent.
  - c. Do not use commas in entering large numbers (e.g., ten thousand is entered as 10000).

Figure 34

ENTER/EDIT HOUSING DATA

- A. Share of Household Income Devoted to Housing
- B. Share of Housing Expenditures Devoted to Recurring Expenses
- C. Base Year Housing Stock
- D. Housing Total Investment, Public Expenditures, and Decay Rates
- E. Construction to Reduce Overcrowding
- F. Number Upgraded & Value of Unit Before Upgrading
- G. Construction for Replacement
- H. Unit Construction Costs
- I. New House Construction Cost Shares
- J. Upgrade Construction Cost Shares
- K. Terms of Finance, Metro
- L. Terms of Finance, Other Urban
- M. Terms of Finance, Rural
  
- X. EXIT to Main Menu

CHOICE ->

## Enter/Edit Housing Data

Menu: Main

Command: B

Purpose:

Enter values into the data matrices for the current housing conditions and the future program to improve the existing housing stock and to meet incremental housing needs. Edit existing values in these matrices.

Response:

Enter the letter corresponding to the matrix for which data are to be entered or edited.

Remarks:

- (1) See Chapter IV for the worksheets related to each of the data matrices.
- (2) After a data matrix has been selected and displayed on the computer screen respond sequentially to the prompts for ROW LETTER, COLUMN NUMBER, and ENTER VALUE for each element of the matrix to be entered or edited.
- (3) A response of X to the prompt for ROW LETTER or COLUMN NUMBER will return the display to the Enter/Edit GDP and Income Data menu. A null response (RETURN only) to the ENTER VALUE prompt will leave the data element unchanged.
- (4) Existing data must first be loaded from a file on diskette before they can be edited.
- (5) Before a simulation can be run data must be supplied for each of the matrices (A through M).
- (6) Notes on data entry:
  - a. If you enter more numbers after the decimal point than are shown on the matrix, the program rounds the number for display. However, the full number as entered is used in calculations.
  - b. All percent data are entered as percent (e.g., 6 percent is entered as 6.0). Interest rates are in annual percent.
  - c. Do not use commas in entering large numbers (e.g., ten thousand is entered as 10000).

Display Directory of Data Filenames

Menu: Main

Command: C

Purpose:

Display the filenames of all data files that have been stored on the Housing Needs Assessment program diskette.

Response:

None.

Remarks:

- (1) Data filenames have the qualifier ".DAT" appended to their names to indicate that these files contain input data for the Housing Needs Assessment model.
- (2) The display also indicates the amount of free storage remaining on the program diskette.

Figure 35

(LOAD DATA) ENTER FILENAME:

## Load Data File

Menu: Main

Command: D

Purpose:

Load values into all data matrices from a file previously stored on the program diskette.

Response:

Enter the filename of the file to be loaded.

Remarks:

- (1) Enter a null response (RETURN only) to abort this command. No data will be loaded.
- (2) Omit the filename qualifier ".DAT".
- (3) A filename for which there is no corresponding data file will produce the error message "FILE NOT FOUND". Use the Main Menu command C, "Display Directory of Data Filenames," to determine the correct name of the desired data file.

(STORE DATA) ENTER FILENAME:

## Store Data File

Menu: Main

Command: E

Purpose:

Store values from all data matrices as a diskette file.

Response:

Enter a filename to identify the data file to be stored.

Remarks:

- (1) An existing data file having the same filename will be overwritten.
- (2) Enter a null response (RETURN only) to abort this command. No data will be stored.
- (3) Filenames must not exceed eight characters in length; do not specify a file extension.

## Erase Data File

Menu: Main

Command: F

### Purpose:

Remove an existing data file from a diskette.

### Response:

Enter the filename of the data file that is to be erased from the program diskette.

### Remarks:

- (1) Additional storage space on the diskette can be obtained by erasing data files that are no longer needed.
- (2) Enter a null response (RETURN only) to abort this command. No data files will be erased.
- (3) Filenames for which there is no corresponding data file will produce the error message "FILE NOT FOUND". Use the Main Menu command C, "Display Directory of Data Filenames," to determine the correct name of the data file to be erased.
- (4) Omit the qualifier ".DAT".
- (5) To make more room on the program diskette while saving the data files, first use the standard COPY command in the Disk Operating System (DOS) to copy the files to another diskette. Then, follow the procedure outlined above to delete the files from the program diskette.

Start Simulation - Print Tables

Menu: Main

Command: G

Purpose:

Run the Housing Needs Assessment simulation model using values currently loaded into the data matrices and prepare tables for output on the computer display screen and/or the printer.

Response:

None.

Remarks:

- (1) Run time for the simulation is about three minutes, although this may vary according to the type of computer that is used.
- (2) As the simulation progresses, the computer display screen will indicate the type of calculations that are being performed.
- (3) If newly entered or edited data are to be retained for later retrieval, they must be saved using the Main Menu command E, "Store Data File", before entering command G to start the simulation.

## Sensitivity Analysis

Menu: Main

Command: H

Purpose:

Initiate the Sensitivity Analysis program of the Housing Needs Assessment Model. A sensitivity analysis compares the primary results of one or two alternative scenario simulations with the corresponding results of a base case simulation.

Response:

None.

Remarks:

- (1) At a minimum, two sensitivity files must have been saved from simulation runs prior to using this command. Refer to the Report Output Options menu command F, "Save Results for Sensitivity Analysis," for additional information.
- (2) The Sensitivity Analysis program can also be initiated after a simulation has been run. Refer to the Report Output Options menu command G, "Run Sensitivity Analysis," for additional information.

STOP

Menu: Main

Command: X

Purpose:

Terminate the Housing Needs Assessment program and return to DOS.

Response:

Confirm your intention to terminate the Housing Needs Assessment program by entering "YES" to the prompt issued by this command.

Remarks:

- (1) Data that have not been saved on the program diskette will be lost.
- (2) It is not necessary to issue this command if you will not continue to use your computer. Simply turn off the machine.
- (3) The computer will return to the DOS command level.

**REPORT OUTPUT OPTIONS**

**MENU**

REPORT OUTPUT OPTIONS

- A. Display Tables
- B. Select Tables for Printing
- C. Cancel Selections
- D. Print Selected Tables
- E. Print All Tables
- F. Save Results for Sensitivity Analysis
- G. Run Sensitivity Analysis
- H. Graphic Display of Housing Investment
  
- X. EXIT to Next Simulation

CHOICE ->

## Report Output Options Menu

### Purpose:

Indicate the action to be taken after the computations for a simulation have been completed.

### Response:

Enter a command (A-H, X) to indicate the desired action.

### Remarks:

- (1) Refer to the following descriptions of the individual Report Output Options commands for detailed descriptions of their use.

TABLE SELECTION

- A. Population and Household Formation
- B. National and Household Income
- C. Design Standards and Costs
- D. Housing Stock and Replacement
- E. Affordable Capital costs
- F. Affordable Costs by Income Class and Region
- G. Quintile Design Cost Classification
- H. Target Group Identification
- I. Subsidized Households by Income Class and Region
- J. Investment for Upgrading and New Construction
- K. Target Group Investment and Subsidy Requirements
- L. Housing Investment in Relation to GDP
- M. Components of Target Group Housing Cost
- N. Summary of Housing Needs and Investment
  
- X. EXIT to Report Output Options Menu

CHOICE ->

## Display Tables

Menu: Report Output Options

Command: A

Purpose:

Write tables containing the results of the simulation on the computer's output screen.

Response:

Enter the letter that corresponds to the table to be displayed.

Remarks:

- (1) Each table will be displayed as a series of panels. Each subsequent panel is displayed by pressing the RETURN key.
- (2) At the foot of the last panel will appear a prompt to queue the table just displayed for the printer. Respond with a "Y" if you want the table to be printed. (Any other response indicates that it should not be printed.) Tables queued for the printer will be marked with an asterisk (\*) and will be printed when Report Output Options command D, "Print Selected Tables," is issued.

TABLE SELECTION

- A. Population and Household Formation
- B. National and Household Income
- C. Design Standards and Costs
- D. Housing Stock and Replacement
- E. Affordable Capital Costs
- F. Affordable Costs by Income Class and Region
- G. Quintile Design Cost Classification
- H. Target Group Identification
- I. Subsidized Households by Income Class and Region
- J. Investment for Upgrading and New Construction
- K. Target Group Investment and Subsidy Requirements
- L. Housing Investment in Relation to GDP
- M. Components of Target Group Housing Cost
- N. Summary of Housing Needs and Investment
  
- X. EXIT to Report Output Options Menu

CHOICE ->

## Select Tables for Printing

Menu: Report Output Options

Command: B

Purpose:

Select tables containing the results of the simulation that should be output on the printer.

Response:

Enter the letter corresponding to the table that is to be printed.

Remarks:

- (1) Tables selected for printing will be marked with an asterisk (\*). After selecting the tables, type "X" to return to the Output Menu. The selected tables will be printed when Report Output Options command D, "Print Selected Tables," is issued.
- (2) Responding with the letter of a table already queued for printing causes the table to be removed from the queue.

Cancel Selections

Menu: Report Output Options

Command: C

Purpose:

Cancel the printing of all tables queued for the printer.

Response:

None.

Remarks:

- (1) The list of tables queued for the printer will be cleared regardless of whether tables were selected by Report Output Options command A, "Display Tables," or Report Options command B, "Select Tables for Printing."
- (2) After issuing this command all tables may be again selected for printing.

## Print Selected Tables

Menu: Report Output Options

Command: D

Purpose:

Initiate printing of all tables that have been queued for printing.

Response:

None.

Remarks:

- (1) The list of tables queued for the printer will be cleared when the printing has finished.
- (2) Be sure that the printer has been turned on and is ready for printing. This is usually indicated by a light labelled "READY" or "ON LINE".

Print All Tables

Menu: Report Output Options

Command: E

Purpose:

Print all tables on the Table Selection List (A-N) regardless of whether or not they have been selected for printing.

Response:

None.

Remarks:

- (1) This command provides an alternative to individually selecting each of the tables on the Table Selection List for printing. Printing all tables may take 20-30 minutes.
- (2) Be sure that the printer has been turned on and is ready for printing. This is usually indicated by a light labelled "READY" or "ON LINE".

(SAVE SENSITIVITY) ENTER FILENAME:

## Save Results for Sensitivity Analysis

Menu: Report Output Options

Command: F

Purpose:

Save the results from the Housing Needs Assessment Simulation for later use in a sensitivity analysis.

Response:

Enter a filename to identify the data to be saved.

Remarks:

- (1) An existing sensitivity file having the same filename will be overwritten.
- (2) Enter a null response (RETURN only) to abort this command. No simulation results will be saved.
- (3) Filenames must not exceed eight characters in length.
- (4) If the data for this simulation have also been stored as a file on diskette, it is good practice to use the same name for the sensitivity file.

## Run Sensitivity Analysis

Menu: Report Output Options

Command: G

Purpose:

Initiate the Sensitivity Analysis program of the Housing Needs Assessment Model. A sensitivity analysis compares the primary results of one or two alternative scenario simulations with the corresponding results of a base case simulation.

Response:

None.

Remarks:

- (1) At a minimum, two sensitivity files must have been saved from prior simulation runs before using this command. Refer to the Report Output Options menu command F, "Save Results for Sensitivity Analysis", for additional information.
- (2) The Sensitivity Analysis program can also be initiated before a simulation has been run. Refer to the Main menu command H, "Sensitivity Analysis," for additional information.
- (3) It is not possible to return to the Output Menu after this option has been selected. So be sure to create the sensitivity file and to print the tables wanted before selecting this option.

Select region:

- A. Country
- B. Metropolitan Area
- C. Other Urban Areas
- D. Rural Areas
  
- X. EXIT

CHOICE ->

## Graphic Display of Housing Investment

Menu: Report Output Options

Command: H

Purpose:

Draw a bar graph of housing investment in each period of the simulation showing the components of Target Group Investment, Non-Target Group Investment, and Subsidy Requirements.

Response:

A menu indicating the regions for which the graph can be drawn will be displayed. Choose the letter corresponding to the desired region.

Remarks:

- (1) The graphic display may be printed on a computer having a dot matrix printer by pressing the "print screen" key. Unless you have entered the Housing Needs Assessment model directly without issuing the command to load BASIC (i.e., the model "auto-booted"), you must first issue the DOS command GRAPHICS before loading BASIC. See your system's DOS manual for more detail. Users of IBM PCs will normally enter the model directly from start up through the "auto-boot" procedure on the program diskette.
- (2) Your computer must be equipped with a Color/Graphics adapter to use this command. Computers with only a Monochrome Display cannot show graphs of housing investment.

# Investment and Subsidy Requirements, Country

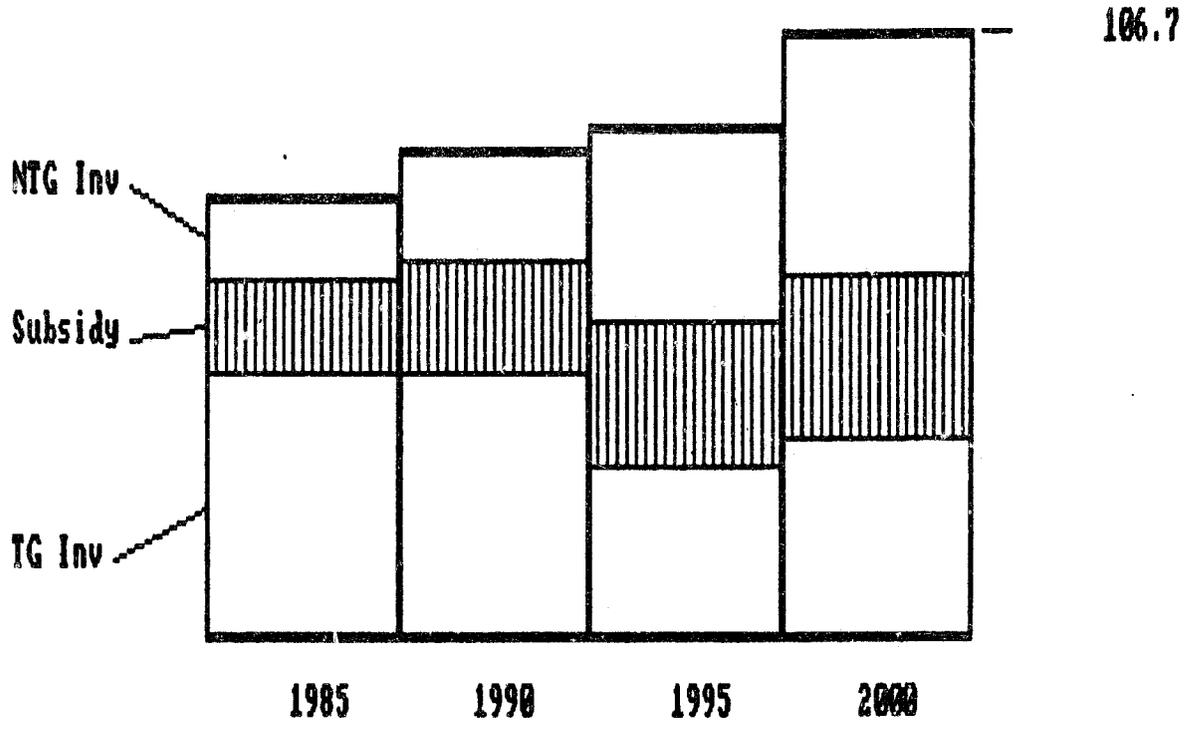


FIGURE 41a

EXIT to Next Simulation

Menu: Report Output Options

Command: X

Purpose:

Leave the Report Output Options menu and return to the Main menu.

Response:

A new title, starting date, and interval must be entered when the title display appears.

Remarks:

- (1) Tables that have not been printed will be lost.
- (2) If the results are to be used in a sensitivity analysis, they must be saved before issuing this command.
- (3) Data used in the previous simulation will remain in memory. These can be edited for the next simulation or new data can be loaded from diskette.

**SENSITIVITY ANALYSIS**

**MENU**

SENSITIVITY ANALYSIS

- A. Select Sensitivity File for the Base Case
- B. Select File for the First Alternative
- C. Select File for the Second Alternative
- D. Display Directory of Sensitivity Files
- E. Erase Sensitivity File
- F. Display Sensitivity Analysis
- G. Print Sensitivity Analysis
  
- X. EXIT to Main Menu

CHOICE ->

## Sensitivity Analysis

Menu: Sensitivity Analysis

Purpose:

Indicate actions to be taken by the Sensitivity Analysis program.

Response:

Enter a command (A-G,X) corresponding to the desired action.

Remarks:

- (1) Sensitivity results cannot be output unless at least the Base Case (command A) and the First Alternative (command B) have been selected.
- (2) The Base Case must be selected (command A) before either alternative is selected (command B or C). A second alternative can only be selected after the first alternative has been chosen.

ENTER A TITLE FOR THIS SENSITIVITY ANALYSIS

ENTER THE SENSITIVITY FILENAME FOR THE BASE CASE:

VALID YEARS FOR SENSITIVITY COMPARISONS ARE:

ENTER THE FIRST YEAR FOR COMPARISON:

ENTER THE SECOND YEAR FOR COMPARISON:

ENTER A BRIEF TITLE TO DESCRIBE THE BASE CASE:

Select Sensitivity File for the Base Case

Menu: Sensitivity Analysis

Command: A

Purpose:

Identify the sensitivity file from the simulation that will serve as the base case.

Response:

Enter a title to be used on the output table and enter the filename of the base case sensitivity file. Additional entries must be made for the first year for which comparisons are to be made, and for the second year for which comparisons are to be made. A brief title that describes the base case must also be entered.

Remarks:

- (1) Enter a null response (RETURN only) to abort this command.
- (2) Omit the filename qualifier ".SEN".
- (3) Filenames for which there is no corresponding sensitivity file will produce the error message "FILE NOT FOUND". Use Sensitivity Analysis Menu command F, "Display Directory of Sensitivity Files," to determine the correct name of the desired sensitivity file.
- (4) Valid years for the sensitivity comparisons will be automatically displayed.

Figure 44

ENTER THE SENSITIVITY FILENAME FOR THE FIRST ALTERNATIVE:

ENTER A TITLE TO DESCRIBE THIS ALTERNATIVE:

## Select File for the First Alternative

Menu: Sensitivity Analysis

Command: B

Purpose:

Identify the sensitivity file from the simulation that will serve as the first alternative.

Response:

Enter the sensitivity filename of the first alternative and a title that describes the distinguishing characteristics of the alternative.

Remarks:

- (1) Enter a null response (RETURN only) to abort this command.
- (2) Omit the filename qualifier ".SEN".
- (3) Filenames for which there is no corresponding sensitivity file will produce the error message "FILE NOT FOUND". Use Sensitivity Analysis menu command F, "Display Directory of Sensitivity Files," to determine the correct name of the desired sensitivity file.
- (4) A Base Case sensitivity file (command A) must be selected before issuing this command.

Figure 45

ENTER SENSITIVITY FILENAME FOR THE SECOND ALTERNATIVE:

ENTER A TITLE TO DESCRIBE THIS ALTERNATIVE:

Select File for the Second Alternative

Menu: Sensitivity Analysis

Command: C

Purpose:

Identify the sensitivity file from the simulation that will serve as the second alternative.

Response:

Enter the sensitivity filename of the second alternative and a title that describes the distinguishing characteristics of the alternative.

Remarks:

- (1) Enter a null response (RETURN only) to abort this command.
- (2) Omit the filename qualifier ".SEN".
- (3) Filenames for which there is no corresponding sensitivity file will produce the error message "FILE NOT FOUND". Use Sensitivity Analysis menu command F, "Display Directory of Sensitivity Files," to determine the correct name of the desired sensitivity file.
- (4) A sensitivity file for the first alternative must be selected before this command is issued.

Display Directory of Sensitivity Files

Menu: Sensitivity Analysis

Command: D

Purpose:

Display the filenames of all sensitivity files that have been saved on diskette.

Response:

None.

Remarks:

- (1) Sensitivity filenames have the qualifier ".SEN" appended to their names to indicate that these files contain results from a simulation that can be used in a sensitivity analysis.
- (2) The display also indicates the amount of free storage space remaining on the program diskette.

(ERASE SENSITIVITY) ENTER FILENAME:

## Erase Sensitivity File

Menu: Sensitivity Analysis

Command: E

Purpose:

Remove an existing sensitivity file from a diskette.

Response:

Enter the filename of the sensitivity file that is to be erased from the diskette.

Remarks:

- (1) Additional storage space on the diskette can be obtained by erasing sensitivity files that are no longer needed.
- (2) Enter a null response (RETURN only) to abort this command. No sensitivity files will be erased.
- (3) Filenames for which there is no corresponding sensitivity files will produce the error message "FILE NOT FOUND". Use the Sensitivity Analysis menu command D, "Display Directory of Sensitivity Files," to determine the correct name of the sensitivity file to be erased.

## Display Sensitivity Analysis

Menu: Sensitivity Analysis

Command: F

Purpose:

Write the table of sensitivity analysis results on the computer's output screen.

Response:

None.

Remarks:

- (1) The sensitivity analysis table will be displayed in a series of panels. Each subsequent panel is displayed by pressing the RETURN key.
- (2) Selecting this command does not preclude printing the results of the analysis.

Print Sensitivity Analysis

Menu: Sensitivity Analysis

Command: G

Purpose:

Print the table of sensitivity analysis results on the computer's printer.

Response:

None.

Remarks:

- (1) Be sure that the printer has been turned on and is ready for printing. This is usually indicated by a light for "READY" or "ON LINE".

**CHAPTER IV**  
**DATA ENTRY WORKSHEETS**

**Note:** It is advisable to make a photocopy of the pages in this chapter for use as the actual working copies of the worksheets.

**GDP AND INCOME DATA**

Figure 47

POPULATION  
(Thousands)

	1 Metro	2 Urban	3 Rural
year 1	_____	_____	_____
year 2	_____	_____	_____
year 3	_____	_____	_____
year 4	_____	_____	_____
year 5	_____	_____	_____

ROW LETTER-**>**  
(X EXIT)

Data Entry Worksheet

Matrix:

A. Population

Type:

GDP and Income Data

Description:

Base year (year 1) population and population estimates for future years, by region. Figures are entered in thousands.

Potential sources of data:

Census reports, demographic projections.

Figure 48

HOUSEHOLD SIZE

	1	2	3
	METRO	URBAN	RURAL
year 1	_____	_____	_____
year 2	_____	_____	_____
year 3	_____	_____	_____
year 4	_____	_____	_____
year 5	_____	_____	_____

ROW LETTER ->  
( X EXIT)

Data Entry Worksheet

Matrix:

B. Household Size

Type:

GDP and Income Data

Description:

Base year (year 1) average household size and estimates of household size in future years. Average household size is measured as the total population (for each region) divided by the number of households (in each region). As a result of overcrowding, some dwellings may be occupied by more than one household. In such cases average household size will not be equal to the population divided by the number of dwellings.

Potential sources of data:

Census reports; demographic projections.

BASE YEAR GDP & AVERAGE ANNUAL HOUSEHOLD INCOME

	1
	year 1
A. Gross Domestic Product (M)	_____
B. Avg. Metro HH Income (K)	_____
C. Avg. Urban HH Income (K)	_____
D. Avg. Rural HH Income (K)	_____

ROW LETTER ->  
(X EXIT)

Data Entry Worksheet

Matrix:

C. Base Year GDP and Average Annual Household Income

Type:

GDP and Income Data

Description:

Base year gross domestic product (GDP) is entered as millions of local currency units. Average household income (in the base year) for metropolitan area, other urban area, and rural area households is entered in thousands of currency units. Note that these data are for average (rather than median) household income. For each region, average household income will be equal to the total regional household income divided by the number of households in the region.

Potential sources of data:

National income and product accounts; income and expenditure surveys; income tax data.

Figure 50

GDP GROWTH AND INFLATION  
(Percent)

	<sup>1</sup> yr1/yr2	<sup>2</sup> yr2/yr3	<sup>3</sup> yr3/yr4	<sup>4</sup> yr4/yr5
A. Country GDP Real Growth	_____	_____	_____	_____
B. General Price Inflation	_____	_____	_____	_____
C. Construction Inflation	_____	_____	_____	_____

ROW LETTER ->  
(X EXIT)

Data Entry Worksheet

Matrix:

D. GDP Growth and Inflation

Type:

GDP and Income Data

Description:

Data indicate annual rates of change in each period. Periods will be either one year or five years, depending upon the interval specified at the start of the simulation. GDP growth is indicated in real terms, while the general price and construction cost inflation estimates are nominal rates of change. Rates of change are entered as percentage amounts, e.g., 12.5 percent.

Potential sources of data:

Economic projections from central bank and international donor organizations.

Figure 51

INCOME SHARE BY QUINTILE. METRO  
(Percent)

	1 Q1	2 Q2	3 Q3	4 Q4	5 Q5
year 1	_____	_____	_____	_____	_____
year 2	_____	_____	_____	_____	_____
year 3	_____	_____	_____	_____	_____
year 4	_____	_____	_____	_____	_____
year 5	_____	_____	_____	_____	_____

ROW LETTER ->  
(X EXIT)

Data Entry Worksheet

Matrix:

E. Income Shares by Quintile, Metro

Type:

GDP and Income Data

Description:

The data in this matrix describe the distribution of metropolitan area income accruing to each income quintile in a given year. (For example, an entry of 6.5 percent for the first quintile means that households in the lowest 20 percent of the income distribution account for 6.5 percent of all metropolitan area income.) Shifts in the income distribution towards more or less concentration over time are shown by changes in the income shares of the various quintiles. Otherwise, the income distribution is the same for each period.

Note that the shares for all five income quintiles must sum to 100 percent in each year.

Potential sources of data:

Census reports; income and expenditure surveys.

Figure 52

INCOME SHARES BY QUINTILE. OTHER URBAN  
(Percent)

	1 Q1	2 Q2	3 Q3	4 Q4	5 Q5
year 1	_____	_____	_____	_____	_____
year 2	_____	_____	_____	_____	_____
year 3	_____	_____	_____	_____	_____
year 4	_____	_____	_____	_____	_____
year 5	_____	_____	_____	_____	_____

ROW LETTER ->  
(X EXIT)

Data Entry Worksheet

Matrix:

F. Income Shares by Quintile, Other Urban

Type:

GDP and Income Data

Description:

The data in this matrix describe the distribution of urban (non-metropolitan) area household income. Entries in the matrix indicate the share of total urban (non-metropolitan) area income accruing to each income quintile in a given year. (For example, an entry of 6.5 percent for the first quintile means that households in the lowest 20 percent of the income distribution account for 6.5 percent of all urban (non-metropolitan) area income.) Shifts in the income distribution towards more or less concentration over time are shown by changes in the income shares of the various quintiles. Otherwise, the income distribution is the same for each period.

Note that the shares for all five income quintiles must sum to 100 percent in each year.

Potential sources of data:

Census reports; income and expenditure surveys.

Figure 53

INCOME SHARE BY QUINTILE. RURAL  
(Percent)

	1 Q1	2 Q2	3 Q3	4 Q4	5 Q5
year 1	_____	_____	_____	_____	_____
year 2	_____	_____	_____	_____	_____
year 3	_____	_____	_____	_____	_____
year 4	_____	_____	_____	_____	_____
year 5	_____	_____	_____	_____	_____

ROW LETTER ->  
(X EXIT)

Data Entry Worksheet

Matrix:

G. Income Shares by Quintile, Rural

Type:

GDP and Income Data

Description:

The data in this matrix describe the distribution of rural area household income. Entries in the matrix indicate the share of total rural area income accruing to each income quintile in a given year. (For example, an entry of 6.5 percent for the first quintile means that households in the lowest 20 percent of the income distribution account for 6.5 percent of all rural area income.) Shifts in the income distribution towards more or less concentration over time are shown by changes in the income shares of the various quintiles. Otherwise, the income distribution is the same for each year.

Note that the shares for all five income quintiles must sum to 100 percent in each year.

Potential sources of data:

Census reports; income and expenditure surveys.

RURAL SHARE OF TOTAL GDP  
(Percent)

1  
(%)

year 1	_____
year 2	_____
year 3	_____
year 4	_____
year 5	_____

ROW LETTER ->  
(X EXIT)

## Data Entry Worksheet

Matrix:

H. Rural Share of Total GDP

Type:

GDP and Income Data

Description:

For each year in the simulation this data matrix indicates the percentage share of total gross domestic product that can be attributed to production in rural areas. The rural area share of GDP will be affected by changes in productivity and economic structure, and by shifts in the balance of population between rural and urban areas. In practice this figure is often approximated by the percentage of aggregate household income accruing to rural households, which can be computed from data on average household incomes by sector and the number of households in each sector. The analyst will often have to adjust this figure in future years so that household income growth by sector is consistent with expected developments in this area.

Potential sources of data:

National income and product accounts.

**HOUSING DATA**

SHARE OF HOUSEHOLD INCOME DEVOTED TO HOUSING  
(Percent)

		1	2	3
		METRO	URBAN	RURAL
A.	Q1	_____	_____	_____
B.	Q2	_____	_____	_____
C.	Q3	_____	_____	_____
D.	Q4	_____	_____	_____
E.	Q5	_____	_____	_____

ROW LETTER ->  
(X EXIT)

Data Entry Worksheet

Matrix:

A. Share of Household Income Devoted to Housing

Type:

Housing Data

Description:

For each income quintile in each geographic area the data in this matrix indicates the income equivalent of the proportion (as a percent) of total income that households spend for their housing expenses. These expenses include all costs related to housing such as debt service, taxes, and maintenance. They also include the value of contributed labor and scavenged materials. However, they exclude utility payments.

Potential sources of data:

Income and expenditure surveys.

Figure 5 6

SHARE OF HOUSING EXPENDITURES DEVOTED TO RECURRING EXPENSES  
(Percent)

		1 METRO	2 URBAN	3 RURAL
A.	Q1	_____	_____	_____
B.	Q2	_____	_____	_____
C.	Q3	_____	_____	_____
D.	Q4	_____	_____	_____
E.	Q5	_____	_____	_____

ROW LETTER ->  
(X EXIT)

Data Entry Worksheet

Matrix:

B. Share of Housing Expenditures Devoted to Recurring Expenses

Type:

Housing Data

Description:

For each income quintile in each geographic area the data in this matrix indicate the proportion (as a percent) of all housing expenditures that is directed towards recurring expenses. Recurring expenses are those expenditures for housing that do not contribute to housing investment. They include items such as taxes and routine maintenance. (Utilities are excluded.)

Potential sources of data:

Income and expenditure surveys.

Figure 57

HOUSING STOCK IN BASE YEAR  
(Thousands)

		1	2	3
		METRO	URBAN	RURAL
A.	Non-Upgradable	_____	_____	_____
B.	Upgradable	_____	_____	_____
C.	Upgradable	_____	_____	_____

ROW LETTER ->  
(X EXIT)

Data Entry Worksheet

Matrix:

C. Housing Stock in the Base Year

Type:

Housing Data

Description:

Housing stock by condition for each of the three regions in the base year. Non-upgradable units are considered to be too deficient to be economically upgraded to meet the minimum standard and therefore must be replaced. Upgradable units are salvagable and can be improved to meet the minimum standard. Acceptable housing units meet or exceed the minimum standard. All standards are defined by the analyst. Entries are in thousands.

Potential sources of data:

Census reports.

HOUSING TOTAL INVESTMENT. PUBLIC EXPENDITURES. AND DECAY RATE

		1
		year 1
A.	Total Housing Invstmt (M)	_____
B.	Public Capital Expend (M)	_____
C.	Accnt Decay Rt. M / U (%)	_____
D.	Upgrd Decay Rt. M / U (%)	_____
E.	Accnt Decay Rt. Rural (%)	_____
F.	Upgrd Decay Rt. Rural (%)	_____

ROW LETTER-)  
(X EXIT)

## Data Entry Worksheet

### Matrix:

D. Housing Total Investment, Public Expenditures, and Decay Rates

### Type:

Housing Data

### Description:

Base year housing investment and public capital expenditure provide reference points against which to compare simulated estimates of future housing investment and subsidy requirements. Entries are in millions of local currency units.

Decay rates indicate the percentage of units in the housing stock that are lost annually as a result of causes such as deterioration, redevelopment, and losses due to fire and natural disasters. Separate estimates of decay rates are required for the acceptable and upgradable portions of the housing stock in metropolitan and other urban areas, and in rural areas.

### Potential sources of data:

Housing investment and public capital expenditure: national income and product accounts; decay rates can be computed from vintage data in housing census reports.

Figure 59

NUMBER TO BE UPGRADED ANNUALLY & UNIT VALUE BEFORE UPGRADING  
(Thousands)

		1	2	3
		METRO	URBAN	RURAL
A.	period 1	_____	_____	_____
B.	period 2	_____	_____	_____
C.	period 3	_____	_____	_____
D.	period 4	_____	_____	_____
E.	Value Before Upgrade (K)	_____	_____	_____

ROW LETTER ->  
(X EXIT)

## Data Entry Worksheet

### Matrix:

F. Number of Units to be Upgraded Annually and the Unit Value before Upgrading.

### Type:

Housing Data

### Description:

Number of units in an upgradable condition that will be improved annually in each of the periods, for all three geographic areas. Rates of construction may, or may not, be uniform over time, but the total number of units that will be upgraded in the planning period must not exceed the number of upgradable units defined in the "base year housing stock." Entries are in thousands of units per year.

The last row of entries in the matrix indicates the average value of upgradable units prior to improvement. Affordability for upgrading is determined by comparing the difference between affordable cost and the value before upgrading to the estimated cost of raising a unit to an acceptable standard. Entries are in thousands of local currency units.

### Potential sources of data:

Number of units to be upgraded: proposed plans to improve the housing situation; value before upgrading: informed sources.

Figure 60

ANNUAL CONSTRUCTION TO REDUCE OVERCROWDING  
(Thousands)

	1 METRO	2 URBAN	3 RURAL
A.	_____	_____	_____
B.	_____	_____	_____
C.	_____	_____	_____
D.	_____	_____	_____

ROW LETTER->  
(X EXIT)

Data Entry Worksheet

Matrix:

E. Annual Construction to Reduce Overcrowding

Type:

Housing data

Description:

Number of new units meeting the minimum housing standard that will be constructed annually in each period for the purpose of reducing overcrowding in each of the three geographic areas. Rates of construction may, or may not, be uniform over time, but the total number of units constructed to relieve overcrowding must not exceed the number of overcrowded units present in the base year. Entries are in thousands of units per year.

Potential sources of data:

Proposed plans to improve the housing situation.

Figure 61

ANNUAL CONSTRUCTION TO REPLACE NON-UPGRADABLE UNITS  
(Thousands)

		1	2	3
		METRO	URBAN	RURAL
A.	period 1	_____	_____	_____
B.	period 2	_____	_____	_____
C.	period 3	_____	_____	_____
D.	period 4	_____	_____	_____

ROW LETTER ->  
(X EXIT)

Data Entry Worksheet

Matrix:

G. Annual Construction to Replace Non-upgradable Units

Type:

Housing Data

Description:

Number of new units that will be constructed annually in each period to replace units that are too deficient to be raised to an acceptable standard through upgrading. Rates of construction may, or may not, be uniform over time, but the total number of units that will be constructed to replace these deficient units over the planning period must not exceed the number of non-upgradable units defined in the "base year housing stock." Entries are in thousands of units per year.

Potential sources of data:

Proposed plans to improve the housing situation.

CONSTRUCTION COST IN BASE YEAR

	1	2	3
	METRO	URBAN	RURAL
A. Upgrade (K)	_____	_____	_____
B. Core House (K)	_____	_____	_____
C. Standare House (K)	_____	_____	_____

ROW LETTER ->  
(X EXIT)

Data Entry Worksheet

Matrix:

H. Construction Cost in the Base Year

Type:

Housing Data

Description:

Estimates of the full cost of improving an upgradable unit to meet the minimum standard, constructing a new core house that meets the minimum standard, and the cost of a new standard house that can be purchased on the open market. Estimates include the cost of land (except for upgrading where it may be included), infrastructure, and superstructure. Entries are in thousands of local currency units.

Potential sources of data:

Developers and government estimates of construction costs; experience of international donors with costs of low-income housing projects.

Figure 63

COST SHARES FOR NEW HOUSE CONSTRUCTION  
(Percent)

	1 METRO	2 URBAN	3 RURAL
A. Land	_____	_____	_____
B. Infrastructure	_____	_____	_____
C. Superstructure	_____	_____	_____

ROW LETTER ->  
(X EXIT)

Data Entry Worksheet

Matrix:

I. Cost Shares for New House Construction

Type:

Housing Data

Description:

The proportion of the total construction cost of a new unit that is accounted for by land, infrastructure and superstructure. Entries are as percents. The sum of these three elements must be equal to 100 percent for each of the three regions.

Potential sources of data:

Developers and government estimates of construction costs; experience of international donors with costs of low-income housing projects.

COST SHARES FOR UPGRADES  
(Percent)

	1	2	3
	METRO	URBAN	RURAL
A. Infrastructure	_____	_____	_____
B. Superstructure	_____	_____	_____

ROW LETTER-  
(X EXIT)

Data Entry Worksheet

Matrix:

J. Cost Shares for Upgrades

Type:

Housing Data

Description:

The proportion of the total cost of upgrading accounted for by the cost of improvements to the infrastructure and the superstructure. Entries are as percents. The sum of these two elements must be equal to 100 percent for each of the three regions.

Potential sources of data:

Developers and government estimates of construction costs; experience of international donors with costs of low-income housing projects.

Figure 65

TERMS OF HOUSING FINANCE. METRO  
(Percent)

	1	2	3	4	5
	Q1	Q2	Q3	Q4	Q5
A. Interest Rate (%)	_____	_____	_____	_____	_____
B. Loan Term (years)	_____	_____	_____	_____	_____
C. Downpayment Share (%)	_____	_____	_____	_____	_____
D. Graduation Rate (%)	_____	_____	_____	_____	_____
E. Graduation period (years)	_____	_____	_____	_____	_____

ROW LETTER ->  
(X EXIT)

## Data Entry Worksheet

### Matrix:

#### K. Terms of Housing Finance, Metropolitan Areas

### Type:

Housing Data

### Description:

The terms of housing finance may vary according to income quintile, reflecting different access to formal and informal financing. A conventional fixed rate mortgage instrument or a graduated payment mortgage financing may be specified.

Interest rates are entered in terms of nominal annual (percentage) rates. The loan term is the number of years required to amortize the loan. The downpayment share is the typical percent share of housing purchase cost that is made as a cash downpayment. (This may be equal to the minimum downpayment share required by the lender.)

Conventional mortgage loans are indicated by a graduation rate of 0 percent and a graduation period of 0 years.

Graduated payment mortgage loans are indicated by non-zero entries for the graduation rate and graduation period. The graduation rate is the annual percent increase in installment payments during the graduation period. As an example, a common GPM is one in which payments rise 5 percent per year for 7 years. (Thereafter payments are fixed.) To employ such an option, enter "5" for the graduation rate and "7" for the graduation period. Note that the graduation period must not exceed the loan term.

### Potential sources of data:

Public and private lenders.

Figure 66

TERMS OF HOUSING FINANCE. OTHER URBAN  
(Percent)

	1	2	3	4	5
	Q1	Q2	Q3	Q4	Q5
A. Interest Rate (%)	_____	_____	_____	_____	_____
B. Loan Term (years)	_____	_____	_____	_____	_____
C. Downpayment Share (%)	_____	_____	_____	_____	_____
D. Graduation Rate (%)	_____	_____	_____	_____	_____
E. Graduation Period (years)	_____	_____	_____	_____	_____

ROW LETTER->  
(X EXIT)

## Data Entry Worksheet

### Matrix:

#### L. Terms of Housing Finance, Other Urban (non-metro) Areas

### Type:

Housing Data

### Description:

The terms of housing finance may vary according to income quintile, reflecting different access to formal and informal financing. A conventional fixed rate mortgage instrument or a graduated payment mortgage financing may be specified.

Interest rates are entered in terms of nominal annual (percentage) rates. The loan term is the number of years required to amortize the loan. The downpayment share is the typical percent share of housing purchase cost that is made as a cash downpayment. (This may be equal to the minimum downpayment share required by the lender.)

Conventional mortgage loans are indicated by a graduation rate of 0 percent and a graduation period of 0 years.

Graduated payment mortgage loans are indicated by non-zero amounts for the graduation rate and graduation period. The graduation rate is the annual percent increase in installment payments during the graduation period. As an example, a common GPM is one in which payments rise 5 percent per year for 7 years. (Thereafter payments are fixed.) To employ such an option, enter "5" for the graduation rate and "7" for the graduation period. Note that the graduation period must not exceed the loan term.

### Potential sources of data:

Public and private lenders.

Figure 67

TERMS OF HOUSING FINANCE. RURAL  
(Percent)

	1	2	3	4	5
	Q1	Q2	Q3	Q4	Q5
A. Interest Rate (%)	_____	_____	_____	_____	_____
B. Loan Term (years)	_____	_____	_____	_____	_____
C. Downpayment Share (%)	_____	_____	_____	_____	_____
D. Graduation Rate (%)	_____	_____	_____	_____	_____
E. Graduation Period (years)	_____	_____	_____	_____	_____

ROW LETTER ->  
(X EXIT)

## Data Entry Worksheet

Matrix:

M. Terms of Housing Finance, Rural Areas

Type:

Housing Data

Description:

The terms of housing finance may vary according to income quintile, reflecting different access to formal and informal financing. A conventional fixed rate mortgage instrument or a graduated payment mortgage financing may be specified.

Interest rates are entered in terms of nominal annual (percentage) rates. The loan term is the number of years required to amortize the loan. The downpayment share is the typical percent share of housing purchase cost that is made as a cash downpayment. (This may be equal to the minimum downpayment share required by the lender.)

Conventional mortgage loans are indicated by a graduation rate of 0 percent and a graduation period of 0 years.

Graduated payment mortgage loans are indicated by non-zero amounts for the graduation rate and graduation period. The graduation rate is the annual percent increase in installment payments during the graduation period. As an example, a common GPM is one in which payments rise 5 percent per year for 7 years. (Thereafter payments are fixed.) To employ such an option, enter "5" for the graduation rate and "7" for the graduation period. Note that the graduation period must not exceed the loan term.

Potential sources of data:

Public and private lenders.

**APPENDICES**

APPENDIX A

HOUSING NEEDS ASSESSMENT MODEL  
INPUT DATA REQUIREMENTS

Variables	Level of Disaggregation			Units
	Year <sup>a</sup>	Regions <sup>b</sup>	Quintiles <sup>c</sup>	
Population	All	MOUR		Thousands
Household Size	All	MOUR		Units
GDP	Base	Country		Millions
GDP Real Growth Rate	Future	Country		Percent
Rural Share of GDP	All	Country		Percent
Average Household Income	Base	MOUR		Thousands
Household Income Distribution Shares	All	MOUR	Yes	Percent
Upgrading Cost	Base	MOUR		Thousands
Value of Upgradable Units	Base	MOUR		Thousands
New Housing Unit Cost	Base	MOUR		Thousands
Current Formal Sector Housing Cost	Base	MOUR		Thousands
General Inflation Rate	All	Country		Percent
Construction Cost Escalation Rate	All	Country		Percent
Upgradable Units	Base	MOUR		Thousands
Non-Upgradable Units	Base	MOUR		Thousands
Acceptable Units	Base	MOUR		Thousands
Annual Upgradings	Future	MOUR		Thousands
Annual Replacement of Non-Upgradable Units	Future	MOUR		Thousands
Annual New Units to Relieve Overcrowding	Future	MOUR		Thousands
Acceptable Housing Decay Rate	Constant	MOUR		Percent
Upgradable Housing Decay Rate	Constant	MOUR		Percent
Mortgage Interest Rate (Nominal)	Constant	MOUR	Yes	Percent
Mortgage Loan Term	Constant	MOUR	Yes	Years
Downpayment Percentage	Constant	MOUR	Yes	Percent
Graduation Rate (optional)	Constant	MOUR	Yes	Percent
Graduation Period (optional)	Constant	MOUR	Yes	Years
Housing Expenditures Share of Household Income	Constant	MOUR	Yes	Percent
Recurring Expenditures Share of Housing Expenditures	Constant	MOUR	Yes	Percent
Public Sector Capital Expenditures	Base	Country		Millions
Total Housing Investment (Formal and Informal Sectors)	Base	Country		Millions
Share of Land, Infrastructure, and Construction in Housing Costs	Base	MOUR		Percent

a. Base year only, future years only, all years, or assumed constant.

b. Metropolitan, other urban, and rural (MOUR), or total country only.

c. "Yes" if data must be provided for all five quintiles of the income distribution.

## APPENDIX B

### USING 1-YEAR INCREMENTS IN A SIMULATION

Simulating housing needs over a four-year period at increments of one year provides annual detail on housing needs, investment, and subsidy requirements. This may be particularly useful in constructing five-year plans and other situations where policymakers would like to know the near term impact of a particular program.

One should not proceed by simply changing the simulation increment from five-years to one-year and re-running the simulation; important changes to the input data must first be made. These concern input data items that reflect expected conditions in the future and the program to improve the housing stock. In changing the simulation increment from five years to one year, these input data items must be adjusted to assure internal consistency in the simulation.

The type of adjustment to the data that is required can be illustrated with population data. In a simulation based on five-year increments the input data will indicate the population (by region) in the base year, and at future points in time five, ten, fifteen, and twenty years later. If the simulation increment is changed to a single year, the input data for population in future years must be adjusted accordingly. The base year population will, of course, remain unchanged. The data inputs for population in the future, however, will apply to the first, second, third and fourth years following the base year. Naturally the trend shown by population change over this four-year period should be consistent with population estimates for the fifth

year -- the first simulated period in an analysis with a five-year increment.<sup>1</sup>

Similar adjustments must be made to all data inputs related to future years. For some, future levels must be adjusted, such as for population. For others, rates of change must be adjusted to be consistent with the simulation based on a five-year increment. Although changes may not be required to all items, the list of variables for which adjustments may be required includes:

- o population
- o household size
- o GDP growth rate
- o rate of inflation
- o rate of construction cost escalation
- o rural share of GDP
- o household income distributions
- o rates of upgrading, and new construction to replace non-upgradable units and reduce overcrowding.

---

1. A quick consistency check for data entries like population and household size is that the value of these data entries in the final (fourth) year of the 1-year data set should align nicely with the first projection year (year 5) in the 5-year data set.

**APPENDIX C**  
**USING AN IBM PC**

Running the Housing Needs Assessment Model program on an IBM PC is identical to running it on a Wang PC except for start-up procedures. This appendix explains the power-on and loading procedures for an IBM PC. If your IBM PC has a hard internal disk and you wish to run the program from this disk, please skip down to the section, "USING A HARD DISK ON AN IBM PC." Otherwise please continue.

First, put your DOS diskette (version 2.0 or higher) in the left disk drive (the "A" drive) and close the disk drive door. Turn on the system by flipping the red power switch on the right rear of the PC to the up position. Turn on the printer (the location of the switch varies from printer to printer, but it will be clearly marked) and turn on the monitor.

When it is ready, the computer will prompt you to enter the date and time. You must hit the RETURN key after each entry. You will then be greeted by the "A>" prompt.

You are now ready to load BASIC. If necessary, replace the DOS diskette in the left disk drive with the diskette containing the BASIC language program for your computer. This BASIC program file may or may not be on the same diskette that your DOS programs are on, depending on which version of DOS you are using. Consult your manuals if you are unsure. After inserting the diskette with BASIC on it into the computer, type "BASIC" next to the "A>" prompt and then hit RETURN. The

display should indicate that you are in BASIC, and an "OK" prompt should be visible.

You are now ready to load the Housing Needs Assessment program. Replace the diskette in the "A" drive (i.e., the diskette containing BASIC) with the diskette containing the Housing Needs Assessment program files. To load the program, type the following command and then hit RETURN:

LOAD "HOUSE1"

After loading the program from the diskette, the computer should respond with an "OK" prompt. If it does not, try repeating the LOAD command exactly as shown above. At this point the program is loaded and ready to run. You should now return to the section entitled "Running the Model"; but be sure to ignore the part that describes how to LOAD the program, since you have already done this.

IBM-compatible PC users:

The instructions for using an IBM PC generally apply to IBM-compatible PCs. The locations of the power switch and disk drives, however, may vary. For example, on some IBM-compatible PCs, disk drives are stacked vertically such that the "A" drive is located above the "B" drive instead of to the left of the "B" drive. If you are unsure of how your computer is configured, consult your computer's operations guide. You can run the Housing Needs Assessment Model on a PC that has only one disk drive.

There are important differences between the disk operating system (DOS) of an IBM PC and the disk operating system of IBM-compatible PCs

(such PCs are often referred to as IBM "clones"). Most clones operate under some version of an operating system called MS-DOS while IBM PCs operate under a special version of MS-DOS known as PC-DCS. The two kinds of operating systems are not entirely compatible with each other. When running the Housing Needs Assessment Model, you should always use the operating system that was supplied with your computer. You must use version 2.0 (or higher) of MS-DOS.

The IBM PC also uses a version of BASIC (called IBM Personal Computer BASIC) that differs from the versions of BASIC that are available for clones. Many clones, for example, use a version called GW-BASIC. The version of BASIC that you use must be compatible with your computer and its operating system. It must also, of course, be compatible with IBM Personal Computer BASIC since the Housing Needs Assessment Model is written in this language. You cannot run IBM Personal Computer BASIC on a clone. If your clone did not come with BASIC software (many clone makers do include it), ask the dealer you purchased your computer from or the manufacturer of your computer for the name(s) of the BASIC software that will run on your machine.

The Housing Needs Assessment Model has been run successfully on a number of IBM-compatible PCs; however, there is no guarantee that it will run correctly on every clone. If you are planning to purchase an IBM-compatible PC, and want to run the Housing Needs Assessment Model on it, make sure you test the program on it before making your decision.

## USING A HARD DISK ON AN IBM PC

If you wish to run the Housing Needs Assessment Model program from your hard disk, you will have to copy certain files from the program diskette to your hard disk.

First, you must turn on the PC, the printer, and the monitor. Make certain that the floppy disk drive is empty. Wait for the system files to be loaded from the hard disk, then enter the time and date when you are prompted to do so. Next, insert the program diskette into the floppy disk drive ("A" drive). Using the COPY command, copy the following files to the hard disk:<sup>1</sup>

HOUSE1.BAS	PRMPT1E.TXT
HOUSE2A.BAS	PRMPT2AE.TXT
HOUSE2B.BAS	PRMPT2BE.TXT
HOUSE3.BAS	PRMPT3E.TXT
BARBADOS.DAT	BARBADOS.SEN

Once all ten files have been copied, make sure that the computer is reading from drive C (the prompt will be C>). If it is not, type "C:" and then hit RETURN.

You are now ready to load BASIC, so enter "BASIC". The display should indicate that you are in BASIC. You are now ready to load the program.

To load the program enter the following command:

```
LOAD "HOUSE1"
```

---

1. Note the letter 'E' after each prompt file (the four filenames on the right above). This indicates that the prompts and text will be in English. If you wish to run the program with French or Spanish prompts and text, you must replace the 'E' in each of the four filenames with an 'F' or an 'S' respectively. For more details on the prompt files see Annex G.

The computer should respond with "OK." If it does not, try repeating the LOAD command exactly as shown above. At this point the program is loaded and ready to run. You should now return to the section entitled "Running the Model"; but be sure to ignore the request to LOAD the program, since you have already done this.

APPENDIX D

TROUBLE-SHOOTING

<u>Problem</u>	<u>Probable Cause</u>	<u>Solution</u>
DATA FILES - Data files will not load	<ol style="list-style-type: none"> <li>1) Wrong disk is in the drive.</li> <li>2) You are accessing the wrong drive.</li> <li>3) Incorrect data file name.</li> </ol>	<ol style="list-style-type: none"> <li>1) Check the disk in the drive.</li> <li>2) If the disk is not in the default drive, use the correct file specifier.</li> <li>3) Do a directory on your disk and check file names.</li> </ol>
DATA FILES - Data files will not store	<ol style="list-style-type: none"> <li>1) Illegal file name.</li> <li>2) Disk is full.</li> </ol>	<ol style="list-style-type: none"> <li>1) Check system manuals for legal file names; see user's manual III-9.</li> <li>2) Check disk by doing directory. If full, use new disk.</li> </ol>
LOADING - Program will not load from disk	<ol style="list-style-type: none"> <li>1) Wrong disk being used.</li> <li>2) File name misspelled.</li> <li>3) Disk is in wrong drive.</li> <li>4) Cannot read disk.</li> </ol>	<ol style="list-style-type: none"> <li>1) Check disk.</li> <li>2) Retype command.</li> <li>3) Try other drive.</li> <li>4) Make sure that you are using DOS version 2.0. If version is correct, disk is bad or drive is not working.</li> </ol>
PRINTING - Tables will not print	<ol style="list-style-type: none"> <li>1) Printer power not on.</li> <li>2) No tables selected for printing.</li> </ol>	<ol style="list-style-type: none"> <li>1) Turn on printer.</li> <li>2) Go back to table select menu and select tables.</li> </ol>
SIMULATION - The main menu works but the simulation program will not run	<ol style="list-style-type: none"> <li>1) Program disk is not in "A" drive.</li> </ol>	<ol style="list-style-type: none"> <li>1) Make sure that the program disk is in the "A" drive. If the "A" drive is a hard disk, you may need to copy the program files to the hard disk.</li> </ol>
TABLES - Results do not appear correct	<ol style="list-style-type: none"> <li>1) Data input errors.</li> </ol>	<ol style="list-style-type: none"> <li>1) Check data tables for correct input. Check for zeros.</li> </ol>

## APPENDIX E

### OUTLINE OF COMPUTER PROGRAM STRUCTURE

This appendix provides an overview of the structure of the computer program. It should be sufficient to permit the interested user to determine which part of the program he would want to examine if he had a specific question about the model's calculations. In general, there are numerous "remark statements" in the code which further help to guide the analyst to the particular section of the code which is of interest. Note that this appendix does not discuss the logic of the calculations; this subject is covered in the companion document, Preparing a National Housing Needs Assessment.<sup>1</sup>

The total program consists of eight files--four linked files containing the actual code for the calculations and four "text" files which contain the labels for the messages and data tables appearing on the monitor and for the output tables. There is a text file for each of the program files.<sup>2</sup>

The functions of the four linked program files are as follows:

HOUSE1 -- This is the file that is loaded to start the operation of the model. It handles the data input functions and does a number of preliminary calculations. It also handles various file management chores, such as storing, retrieving, and deleting data files.

HOUSE2A -- This file contains the vast majority of the actual calculations of housing needs and corresponding investment requirements, given the data provided from HOUSE1.

---

1. This document was prepared and published by the Office of Housing and Urban Programs, USAID, Washington, D.C.

2. There are actually twelve text files on the diskette--four in each of three languages. For more on these files, see Appendix G.

HOUSE2B — This file runs the Output Report Options, and handles the formatting and labeling of output. It also directs the results of the computations from HOUSE2A to the monitor or printer, depending on the instructions from the user.

HOUSE3 — All aspects of the sensitivity analysis are handled by this file. This includes soliciting key inputs from the user, doing the computations and sending the output table to the monitor or printer.

APPENDIX F

GLOSSARY OF VARIABLE NAMES<sup>1</sup>

Variables followed by parentheses are array variables. The first subscript can be thought of as the row identifier, the second as the column identifier. The following letters will be used to identify subscripts:

Y = Year

R = Region (metro, other urban, rural, and country)

Q = Quintile

<u>Variable</u>	<u>Meaning</u>
ACMQ (Q,Y)	Affordable housing cost for metro quintiles
ACRQ (Q,Y)	Affordable housing cost for rural quintiles
ACUQ (Q,Y)	Affordable housing cost for other urban quintiles
AGGDP (Y)	Agricultural GDP
AGGDPGROW (Y)	Agricultural GDP annual growth rate
AGSHAREGDP (Y)	Agricultural share of GDP
AL0DU (R,Y)	Affordable level 0 dwelling units
AL1DU (R,Y)	Affordable level 1 dwelling units
AL2DU (R,Y)	Affordable level 2 dwelling units
CAPEXP (R,Y)	Total housing expenditures

---

1. These are the variable names used in the BASIC program.

DESIGNCOSTPH (R,Y)	Minimum design cost for formal sector housing unit
DESIGNCOSTPP (R,Y)	Design cost for new housing unit
DESIGNCOSTUP (R,Y)	Design cost for upgrade
DISPINCOME (R,Y)	Total disposable income by region
DLØSH (R,Y)	Share of design level zero quintiles by region
DL1SH (R,Y)	Share of design level one quintiles by region
DL2SH (R,Y)	Share of design level two quintiles by region
DL3SH (Q,Y)	Share of design level three quintiles by region
DLMQ (Q,Y)	Design level for metro quintiles
DLNMQ (Q,Y)	Design level for non-metro quintiles
DOWNPAY (R,Q)	Downpayment required on mortgage (percent of purchase price)
DLRQ (Q,Y)	Design level for rural quintiles
DYHOUSE (R,Y)	Disposable income per household
DYHOUSEGROW (R,Y)	Rate of growth for disposable income per household
GDP (Y)	Gross domestic product
GDPGROW (Y)	GDP growth rate per annum
GRADUATION (R,Q)	Mortgage graduation rate
GTERMS (R,Q)	Mortgage graduation period
HOUSEEXPENSE (R,Y)	Share of household income devoted to housing expense
HOUSEHOLDS (R,Y)	Number of households
HOUSESIZE (R,Y)	Average household size
HSUB (R,Y)	Number households requiring subsidy

INTEREST (R,Q)	Mortgage interest rate
INVPP (R,Q,Y)	Investment for new construction
INVUP (R,Q,Y)	Investment for upgrading
MAVGDISPINCOMEQ (Q,Y)	Metro mean disposable income by quintile
MAVGDISPY	Metro average disposable base year income
MMORTGAGE (Q,Y)	Mortgage affordable by metro quintiles
MQDISPINCOME (Q,Y)	Metro disposable income shares by quintile
NAGDP (Y)	Non-agricultural GDP
NAGDPGROW (Y)	Non-agricultural GDP annual growth rate
NASHAREGDP (Y)	Non-agricultural share of GDP
NEWCONSTR (R,Y)	Construction of new units pre year
NEWHOUSEHOLDS (R,Y)	Number of new households
NEWINVEST (R,Y)	Target group cost
NHTARQ (R,Y)	Number of households in target quintiles
NMAVGDISPINCOMEQ (Q,Y)	Other urban mean disposable income by quintile
NMØDLQ (Y)	Number of metro design level zero quintiles
NM1DLQ (Y)	Number of metro design level one quintiles
NM2DLQ (Y)	Number of metro design level two quintiles
NMØH (Q,Y)	Number of metro design level zero households
NM1H (Q,Y)	Number of metro design level one households

NM2H (Q,Y)	Number of metro design level two households
NRØDLQ (Y)	Number of rural design level zero quintiles
NR1DLQ (Y)	Number of rural design level one quintiles
NR2DLQ (Y)	Number of rural design level two quintiles
NRØH (Q,Y)	Number of rural design level zero households
NR1H (Q,Y)	Number of rural design level one households
NR2H (Q,Y)	Number of rural design level two households
NTARQ (R,Y)	Number of target quintiles
NTDU (R,Y)	Non-target group dwelling units
NUØDLQ (Y)	Number of other urban design level zero quintiles
NU1DLQ (Y)	Number of other urban design level one quintiles
NU2DLQ (Y)	Number of other urban design level two quintiles
NUØH (Q,Y)	Number of other urban design level zero households
NU1H (Q,Y)	Number of other urban design level one households
NU2H (Q,Y)	Number of other urban design level two households
NUHSCONSTINV (R,Y)	Cost of construction for new housing unit
NUHSLANDINV (R,Y)	Cost of land for new housing unit
NUHSINV (R,Y)	Cost of new housing unit
NUPDU (R,Y)	Non-upgradable

NUPR (R,Y)	Construction to replace non-upgradable units
OCDU (R,Y)	Over-crowded dwelling units
OCR (R,Y)	Construction to relieve overcrowding
PDU (R,Y)	Permanent dwelling units
PGROW (R,Y)	Rate of growth of population
PINV (R,Y)	Non-target group investment
POP (R,Y)	Population
POPSHARE (R,Y)	Percent share of population in each region
PUBEXP (Y)	Total country public expenditures
RAVGDISPINCOMEQ (Q,Y)	Rural mean disposable income by quintile
RAVGDISPY	Rural disposable base year income
REXPENSE (R,Q)	Share of housing expenditures devoted to housing expense
RINV (R,Y)	Recoverable investment
RMORTGAGE (Q,Y)	Mortgage affordable by rural quintiles
RQDISPINCOME (Q,Y)	Rural disposable income shares by quintiles
SPR	Decay rate, acceptable rural units
SPU	Decay rate, acceptable metro/other urban units
SUB (R,Y)	Subsidy portion of target group cost
SUBHHQ (R,Q,Y)	Number of households requiring a subsidy
SUMM (Y)	Temporary variable used in various calculations as intermediate step
SUMR (Y)	Temporary variable used in various calculations as intermediate step

SUMU (Y)	Temporary variable used in various calculations as intermediate step
SUR	Decay rate, upgradable rural units
SUU	Decay rate, upgradable metro/other urban units
TARDU (R,Y)	Target group dwelling units
TARINV (R,Y)	Target group investment
TDU (R,Y)	Total construction of dwelling units required
TEMP (Y)	Temporary variable used in various calculations as intermediate step
TERMS (R,Q)	Mortgage life in years
TGQ (R,Y)	Number of income quintiles that fall into the target group.
TR (R,Y)	Total remedial construction to alleviate deficiencies in base year housing stock
TOTALCONSTR (R,Y)	Total housing construction/yr.
TOTDU (R,Y)	Total dwelling units
UAVGDISPY	Other urban disposable base year income
UNMORTGAGE (Q,Y)	Mortgage affordable by other urban quintiles
UP (R,Y)	Planned annual upgrades
UPCONST (R)	Construction share of upgrade cost
UPCONSTINV (R,Y)	Cost of construction for upgrades
UPDU (R,Y)	Upgradable permanent dwelling units
UPINFRA (R)	Infrastructure share of upgrade cost
UPINFRAINU (R,Y)	Cost of infrastructure for upgrades
UPINV (R,Y)	Cost of upgrades

UPSH (R,Y)

Share of upgrades by region

UPUAL (R)

Value of the core unit needing an upgrade

UQDISPINCOME (Q,Y)

Other urban disposable income shares by quintile.

## APPENDIX G

### CUSTOMIZING MONITOR AND OUTPUT TABLE LABELS

The standard statements which appear on the monitor screen to direct the user to input data and the labels for the entries in the output tables have been designed to cover a wide range of country situations. Hence, the language is fairly broad. It may be that the user will wish to customize a few of these labels to fit his analysis more exactly. As an example, in applying the Housing Needs Assessment Model to Jordan, the following changes were made:

- o The label "metropolitan areas" was changed to "Greater Amman".
- o Since it was more appropriate to use gross national product than gross domestic product in the calculations, "GDP" was changed to "GNP".
- o The label "millions of currency units" was changed to "millions of dinars".

This appendix outlines how to change the labels. It begins by describing the structure of the text files and then addresses making the changes.

There are a total of twelve files on the program diskette containing the text which appears on the monitor and the output tables. There are four text files for each of three languages--English, French, and Spanish. As described in Appendix E, each of the four files has the text corresponding to the functions of one of the four program files that together do all of the operations of the Housing Needs Assessment. When the user selects the language in which to operate, the model automatically reads in the correct four text files.

The names of these text files are as follows:

English	French	Spanish
PRMPT1E.TXT	PRMPT1F.TXT	PRMPT1S.TXT
PRMPT2AE.TXT	PRMPT2AF.TXT	PRMPT2AS.TXT
PRMPT2BE.TXT	PRMPT2BF.TXT	PRMPT2BS.TXT
PRMPT3E.TXT	PRMPT3F.TXT	PRMPT3S.TXT

The last letter before the extension "TXT" indicates the language, and the number or number and letter combinations preceding it refer to the program file with which the text file is associated.

Each text file contains a list of words and phrases. They are ordered one beneath the other, and each word or phrase that constitutes a separate "label" is on its own line.

To modify any of the files, load the file into any standard text editor, make the changes wanted, and then write the revised file on the program diskette. For those using IBM or IBM compatible machines, the EDLIN program, which is available as part of the Disk Operating System (DOS), is a convenient editor for this purpose. Be sure to make a back-up copy of the diskette prior to attempting to edit a text file, just in case you run into problems. (See the first pages of this manual for how to make a back-up diskette.)

There are several critical rules to follow when making the changes to a text file:

1. You must preserve the order in which the text statements appear. The model selects the text it wants by going to a numbered location in the text file. If you insert extra lines, the model will select the wrong text and your output or messages on the monitor will be incorrect.
2. All statements (words, phrases) must end with a period.

3. Whenever you use punctuation within the text you are entering, the text must be enclosed within quotation marks.
4. You should be sensitive to the length of the original statement, as these statements often appear in the margins of tables where space is very limited. It is a good rule to try to keep the new statement to the same length as the original. When in doubt about the maximum space available, look at the table or screen display where the text is used to get an accurate reading.

## APPENDIX H

### RUNNING THE MODEL FOR LESS THAN THREE REGIONS

Normally the user will take full advantage of the model's capacity to divide a country into three geographic areas or sectors for the calculations. A typical division is to group the principal metropolitan areas into a metropolitan category, with the balance of the country being divided between other urban areas and rural areas. Sometimes other divisions make sense. In Sri Lanka, where tea, rubber, and coconut plantations are important, the country was divided into urban, rural, and estate sectors.

There may, however, be cases in which fewer than three divisions may be warranted. In Barbados, for example, the country was simply too small--both geographically and in terms of population--to merit disaggregation beyond urban vs. rural. In other cases, the data available may not support much disaggregation.

This appendix provides a few notes on how the user may want to adjust the data inputs when this case is encountered. In general, the model ignores the sector for which no input data is provided and the portion of the output tables reserved for the omitted sector is filled with zeros. There are, however, a couple of exceptions to this rule; the data inputs for population and household size are the key variables for preventing the model from performing "division by zero" and displaying very large values in the output tables.

The following points summarize the options available:

1. If all of the data entries for the omitted sector are set equal to zero (which is the value the model assumes for them unless the analyst specifies otherwise), then all output values will equal zero with a single exception. The exception is that the population growth rate appears as  $-100$ .
2. If the user wants to avoid even the  $-100$  entry, then he should set the population in the omitted region to a small value in every year (e.g.,  $.001$ ) and set the household size in the region to a reasonable value (e.g., 5). You must put in values for both population and household size to avoid problems.

In general the user is cautioned not to have some entries filled in the input data file for the omitted sector, aside from those just mentioned. Such entries can affect the results of the computations. For example, entries for the base year housing stock and the rate at which units depreciate will cause a number of required replacement units to be computed for the sector and added to the country's housing needs.

## APPENDIX I

### USING A WANG PC WITH A WINCHESTER DISK

If you are using a Wang PC with a hard internal (Winchester) disk, the start-up procedure is a bit different than if you were starting-up with a floppy disk. In order to run the Housing Needs Assessment Model program it will be necessary to copy the program files and the prompt files to the hard disk. This appendix explains how to copy and load these files so that the program may be run using a hard disk.

First, turn on the power switches on the disk drive, and on the printer. The computer should default to the hard disk (drive 'C') where it will find and load the system files. If after several minutes nothing appears on the screen, or only error messages have appeared, turn the power off and start over.

The first screen display will prompt you for the date and time. Enter the date and time and hit the 'EXEC' key.

A menu will appear as in Figure 1 in the text. Hit the space bar until 'SYSTEMS UTILITIES' is highlighted, and then hit the 'EXEC' key. The SYSTEMS UTILITIES menu should appear on the screen. Hit the space bar until 'File Copy' is highlighted.

You are now going to copy the necessary files from the program diskette to the hard disk.

First, place the program diskette into the "A" disk drive. At this point the screen should be prompting you for the input drive. You should respond by hitting the 'A' key, and then the 'RETURN' key. Hit the 'RETURN' key again and then type 'HOUSE1.BAS'. If 'HOUSE1.BAS' does

not appear next to the prompt for the file identification, you should hit the 'RETURN' key until the cursor returns to this prompt, and then reenter 'HOUSE1.BAS'. Once the filename appears on the screen, hit EXEC. You must now enter the output drive, so hit the 'C' key. It should now say "C" next to the prompt 'Output Drive'. If this is the case, hit EXEC. The computer should now indicate that it is copying the file. If this is not the case hit CANCEL and restart the copying procedure.

Once the computer has copied the file, it will be ready to copy another file. You should follow the same procedure to copy the following additional files.<sup>1</sup>

HOUSE2A.BAS	PRMPT1E.TXT
HOUSE2B.BAS	PRMPT2AE.TXT
HOUSE3.BAS	PRMPT2BE.TXT
BARBADOS.DAT	PRMPT3E.TXT

If you have difficulty copying the files, consult your manual or Wang representative. If you think you have successfully copied all nine files, hit CANCEL to return to the SYSTEM UTILITIES menu. To check if all the necessary files have been copied to the hard disk, hit the space bar until 'DIRECTORY DISPLAY' is highlighted, then hit EXEC. Make sure that the monitor indicates that it is reading the disk in the "C" drive, then hit EXEC. You should now be viewing a listing of all the files on the hard disk. Check to see that all nine files from the model are on the list. If one or more is missing, return to the FILE COPY option and

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1. Note the letter 'E' after each prompt file (the four filenames on the right above). This indicates that the prompts and text will be in English. If you wish to run the program with French or Spanish prompts and text, you must replace the 'E' in each of the four filenames with an 'F' or an 'S' respectively. See Annex G for more details on the prompt files.

copy the missing file(s). If all the files are there, hit CANCEL, and then hit CANCEL again to return to the main menu.

You will now load BASIC. Loading BASIC will depend on how the machine was set up. BASIC is normally available under 'APPLICATIONS' or 'PROGRAM DEVELOPMENT'. To choose one of these options, hit the space bar until the cursor lights up the option desired, then hit EXEC. If BASIC does not appear on the next menu, hit CANCEL to return to the main menu. If BASIC is not an option under APPLICATIONS, try PROGRAM DEVELOPMENT. When BASIC does appear as an option, hit the space bar until the BASIC command is highlighted, then hit EXEC. You are now in BASIC.

When BASIC is loaded, the top line of the display should say:

Wang Interpretive Basic V1.03

The computer is now ready to run the program.

To run the program, enter the following command:

LOAD "HOUSE1"

The computer should respond with 'OK'. If it does not, try repeating the LOAD command exactly as shown above. At this point the program is loaded and ready to run. You should now return to the section of this manual entitled 'RUNNING THE MODEL'; but be sure to ignore the request to LOAD the program, since you have already done this.