AN ANALYSIS OF THE HOUSING AND MORTGAGE MARKET IN BARBADOS

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Introduction

This paper sets out to analyse the demand for housing in Barbados. Improved housing has long been regarded as a national priority and a great deal of attention has been given to the supply of owner-occupied housing with modern conveniences and amenities. However, discussion has focussed narrowly on the social desirability of good housing to the neglect of economic factors. The amount of housing demanded will depend on such factors as the availability and cost of finance and the clients' ability to service a mortgage loan. This paper is an initial attempt to shed some light on the impact of the economic factors as well as to assist policy-makers in decision making.

The next section provides information on housing deficiencies and changes over the period of analysis, on institutions in the housing market and on the development of the mortgage market. This is followed by presentation and analysis of a model which is used to test for the relative importance of the factors affecting house purchases; here we also present empirical results. Our conclusions appear on the final section.

Indicators of the Quality of Housing

The principal underlying factor in the growth of housing demand in Barbados is the desire to improve the quality of

housing. The volume of housing in Barbados seems adequate if we are to judge by the low numbers of occupants per dwelling on average. However, the Barbadian prefers a house made of stone or concrete and a major portion of the demand is for the replacement of wooden houses with more substantial wall structures. Moreover, most homeowners wish to upgrade the amenities their dwelling offers. In addition, the averages conceal the fact that there are pockets of overcrowding, where there is need for more dwellings.

The ratio of population per housing unit fell from 4.01 at the 1970 population census to 3.64 at the 1980 census as housing stock rose from 58,598 to 67,138, an increase of 8,540. This 14.6% increase in the stock compares favourably with the 4.6% increase in the population over the same time period.

Table 1

Age Distribution of Housing Stock at 1980

Year of Construction	Number	% of Total
1980	385	0.6
1979	1,398	2.1
1978	1,577	2.3
1970-77	13,942	20.8
1961-69	12,642	18.8
1960 and before	31,408	46.8
Not Stated	5,786	8.6
Total	67,138	100.0

Source: 1980 Census Report

However, in 1980, about one-half of the housing stock was over twenty years old. This age profile suggests that emphasis may have been placed on upgrading and maintenance at the expense of new construction. This supports our earlier argument that much of the housing demand is for improved quality.

For the country as a whole, overcrowding is not a serious problem. The proportion of overcrowded units with three or more persons per room was 4.3% in 1970 (See Jones [1982], pg. 28), falling to 3.1% by 1980. Other measures used to judge the level of housing are the proportion of houses with toilets (and the share of those with waterborne toilets); the material of which the house is made; and the proportion of homes with electricity and piped water.[1] By all of these indicators of the quality of housing, Barbados showed substantial improvement between 1970 and 1980.

The census of 1970 records that 60.8% of the occupied dwellings had easy access to water - 38.9% with water piped into the dwelling and 20.6% with water taps in the yard.[2] The corresponding percentages for 1980 were 80.1%, 58.9% and 21.2%.

Table 2

Housing Stock by Type of Construction Material

	1970		1980		%
	Amount	%	Amount	%	Change
Wood	44,096	75.0	38,447	57.3	-13
Wood and Concrete	2,587	4.4	7,808	11.6	202
Concrete/Stone	11,312	19.3	16,954	25.2	50
Total	57,995	98.7	63,238	94.1	9

Table 2 indicates the shift from wood to stone/concrete structures. The largest increase was for wood and concrete/brick structures - wooden homes with bathrooms built of concrete. The surge in this category reflects the increase in the proportion of homes with water and waterborne toilets.

Dwellings with toilet facilities accounted for 98% of the total housing stock in 1970 and 99% in 1980. There were 29,254 (46.3%) homes with waterborne toilets in 1980, compared with 15,536 (26.5%) in 1970. No information was available from the 1970 census of the number of dwellings with electricity. In 1980, 55,738 units (83% of the total) were provided with electricity.

It appears from this survey that the major source of demand for housing in the 1970s was the desire to upgrade the quality of dwellings and amenities they contained. The housing stock grew by 14.6% overall, but the increase in concrete houses was 50%. Further, a large number of wooden units were fitted with concrete bathrooms, and many more boasted basic utilities.

The Structure of the Housing Market

In 1970 owner-occupied houses accounted for approximately 78% of dwellings in Barbados while private and public rental units accounted for 15% and six percent, respectively. The comparative figures for 1980 were owner-occupied, 79.4%, private rentals, 14% and public rentals, 6.6%. The 1970 census indicated that only 0.4% of the annual additions to the housing stock were

for private rentals and we believe that this trend continued between 1970 and 1980. Jones ([1982], pg. 38) concludes that the increase in private rental units result largely from a redistribution of the existing stock and only marginally from new additions. The major source of new housing demand is the owner-occupant, and the empirical tests in this paper focus on this section of the market.

Financial institutions provide little finance for wooden houses which accounted for 57.3% of the housing stock in 1980. Only two financial institutions give mortgages for wooden houses and they both insist on short repayment periods. Some distribution companies (mainly those dealing in lumber) construct houses for sale, and sometimes they arrange bank financing for their customers. Other companies advance materials on credit and hold a lien on the property until the individual repays the amount owed.

During the period 1970 to 1981 it is estimated that the public sector provided approximately four thousand new dwellings or about 40% of houses added to the stock. Most of the units provided by the National Housing Corporation were for rental purposes at subsidised rates. This supply fell short of demand; during the period 1976 to 1980 when 5,895 applications reached the corporation only 1,133 units were allocated - enough for 19% of applicants.

Mortgages

Availability of mortgages has often curtailed the growth of housing - for example, in 1982. This implies that the mortgage market is an essential element in the housing sector. In the remainder of this section, we give a brief analysis of the mortgage market.

Table 3

Mortgage Loans Outstanding at Major Lending Institutions

Year	Total	Commercial Banks		Insurance Companies		B.M.F.C.		Trust Companies	
		$M	%	$M	%	$M	%	$M	%
1970	18.8	8.0	47.3	6.5	34.6	1.5	8.0	1.9	10.1
1973	38.0	12.0	31.6	12.2	32.1	10.3	27.1	3.5	9.2
1978	98.3	16.5	16.9	32.5	33.1	22.0	22.4	27.3	27.8
1981	194.6	28.8	15.6	54.5[P]	24.1	39.1	21.2	72.2	39.1

Source: Central Bank of Barbados, ASD 1982

P = provisional

Total mortgages grew rather rapidly during the seventies. In the earlier years the B.M.F.C. and insurance companies led the way while trust companies maintained the momentum in the latter half of the decade.

The trust companies are the largest mortgage lenders, moving from $1.9 million in 1970 to $72.2 million in 1981, and increasing their market share from 10.1% to 39.1%. However,

during the latter half of 1981 and through 1982 the rapid rate of growth of mortgages for private dwellings slackened. The mortgage interest rate rose more slowly than deposit interest rates, making new mortgage loans unattractive to trust companies.

Mortgage lending by insurance companies grew from $6.5 million in 1970 to $54.5 million in 1981. Insurance companies' market share fell slightly between 1970 to 1973 and rather sharply between 1978 and 1981. (See Table 4).

Commercial banks fell back, diverting funds to short-term housing requirements. Their involvement in long-term lending contracted throughout the period (See Table 3). The contraction in long term lending may be attributed to the opening of trust divisions by commercial banks to look after this aspect of their portfolio. However, banks made loans for home improvement and real estate, rising from $9.6 million at the end of 1973 to $40.3 million in 1981.

Two public institutions engaged in mortgage lending prior to January 1979 - the National Housing Corporation (NHC) and the Barbados Mortgage Finance Company (BMFC).[3] After January 1979, BMFC became the sole lender while NHC specialised in the construction of houses for sale/rent. Total mortgages outstanding at BMFC have grown constantly but the company's market share declined between 1973 and 1981 because of periodic shortages of funds and inappropriate loan ceilings.

The terms on which mortgages are offered have a strong influence on the type and amount of housing demanded. They include stipulations about the percentage of the property value to be covered by the mortgage, the lending institution's ceiling on the size of mortgage loan and the amortization period. Around 1973 mortgage ceilings on residential mortgages were raised, longer amortisation periods were offered and lenders agreed to finance larger portions of the mortgaged property.[4] These changes opened the market to a wider clientele. In addition, Williams [1975][5] notes that lower finance costs resulting from these changes reduced the risks of mortgage delinquency and led to a phenomenal increase in mortgage applications in 1973.

A Model of Housing Demand

Our model relates to individuals purchasing or constructing homes for personal use and not for renting.[6] We assume there are two goods, owner-occupied housing and a composite of all other goods with prices PH and OP, respectively. The individual must have the wherewithal to service a mortgage, after satisfying basic family needs. Therefore, the demand for housing (HD) is a function of nominal income (Y), the price of other goods and services (OP)[7] and the price of housing. In our model we opted to use current income because it is the measure used by bankers to determine the ability to service the mortgage; several models in the literature which use permanent income estimate this concept on the basis of current income. We expect the income

variable to have a positive impact but the 'other price' (OP) to have a negative impact on the level of housing demanded. Moreover, if the price of housing (PH)[8] rises, ceteris paribus, some people at the margin drop out of the housing market.

The terms on which financing is available - interest rates (MR) down-payment and amortization period - determine whether some people can afford a house. Smaller down-payments coupled with longer amortization periods (given a relatively fixed martgage rate) will lead to an increase in the amount of housing demanded. We use a dummy variable with value zero before 1973 and unit value after to capture the liberalisation of terms and conditions in that year.

Rising population requires more sheltered living space. If the increase in population (PP) reflects more families (rather than larger families) this leads to a greater demand for housing. This is especially true if crowding is to be avoided.

Our model makes the desired demand for housing a function of income, price of housing, price of other goods and services, mortgage interest rate, mortgage terms and conditions and some demographic variable. That is,

$$HD^* = f(Y, OP, PH, MR, D, PP)$$

These variables are found in tests by other analysts (See Arcelus and Meltzer [1973], Carliner [1973]).

We postulate that HD^* is not directly observable so we assume that some attempt is made to bring the actual demand (HD) to the desired level (HD^*). We further assume that any such attempt is only partially successful during any time period due to institutional rigidities; for example, lack of mortgage credit. That is, the model is supply constrained.

Thus we get that the actual change is only a fraction of the desired change.[9] That is,

$$HD_t - HD_{t-1} = \beta(HD_t^* - HD_{t-1})$$

where $0 < \beta \leq 1$

Therefore the estimated model makes

$$HD = f(Y, OP, PH, MR, d, PP, HD_{-1}) + E_t$$

where E_t follows an AR1.

Results[10]

We first ran the specified model using the Cochrane-Orcutt procedure. However, the coefficient of the lagged dependent variable was insignificant and carried the wrong sign. That is, the coefficient was negative suggesting that there was an over-adjustment. We therefore opted to run the model without the lagged dependent variable, thus assuming that the partial adjustment coefficient was unity. These results are reported in text, while those including the lagged variable are

reported in Appendix 2. Except for the price of housing, all variables carry the same signs in equations with and without the lagged variable. The coefficient of PH was in any case not significant.

Our model was estimated in double-log form and the population variable was used to convert housing demand and income to their per capita form. The results were:

$$1.\quad L\ \frac{HD}{PP} = \underset{(-0.48)}{-0.268} \underset{(-0.06)}{- 0.035\ LPH} \underset{(3.44)}{+ 1.31\ L\ \frac{Y}{PP}} \underset{(-3.45)}{- 1.70\ LOP}$$

$$\underset{(-1.51)}{-0.337\ LMR} \underset{(1.93)}{+ 0.27\ d}$$

$$R^2 = 0.85 \qquad D\text{-}W = 2.06 \qquad F(5,14) = 16.04$$

(T-Statistics are in parentheses)

The estimated regression equation for housing demand indicates the model fits the data very well and that several variables contribute significantly to the explanation of the behaviour of housing demand. The signs of the significant explanatory variables are consistent with a priori specification.

Income, the 'other price' variable and the dummy variable are significant but the price of housing as well as interest rates are insignificant. Income growth is vital to the demand for housing. We obtain an elasticity of housing with respect to income of 1.31 which is significantly higher than the estimate of Reid [1962] and DeLeeuw [1971]. DeLeeuw contends

that the income elasticity for owners is about 1.0; any rise in income produces additional demand for housing of a similar proportion. A 10% increase in the pri e of goods and services other than housing will lead to a 17% decrease in the amount of housing demanded because of the individual's diminished capacity to service his mortgage. The results suggest that easing mortgage terms and conditions significantly influenced the level of housing demanded.

The coefficient of the mortgage interest rate has the correct negative sign but is insignificant. This may reflect the sma l and infrequent movements in this variable. The housing price variable carries the correct sign but is insignificant. This suggests that the housing price may not be an important variable to the prospective home-owner, so long as he is able to service his mortgage. It may also be the case that (PH) is insignificant because additions to the housing stock are influenced by supply and demand which a priori have opposite signs on the price variable, the net effect being insignificant. Furtner, it may be that the price effect is outweighed by the effect of the non-price terms.

To compare the implications of the alternative assumption that housing price was not of major importance to the home-owner, we performed a test omitting that variable.

$$2.\quad L\left(\frac{HD}{PP}\right) = -0.259 - 0.40\ LMR + 1.30\left(\frac{Y}{PP}\right) - 1.72\ LOP$$

$$(-0.50)\quad (-1.51)\quad (4.57)\quad (-3.85)$$

$$+0.27\ d$$

$$(2.04)$$

$$R^2 = 0.85 \qquad D\text{-}W = 2.06 \qquad F(4,15) = 21.47$$

The general result of this experiment did not significantly affect the sign nor size of the other coefficients. This led us to accept that the model is rather robust to the alternative specification and that housing price may not be of major importance to the prospective home-owner.

Conclusion

There is a strong demand for housing in Barbados even though the existing stock seems adequate (using rough aggregates such as the ratio of population per dwelling) to satisfy basic needs for satisfactory shelter.

Income growth brings increase housing demand of the same relative magnitude while a given increase in the price of goods and services other than housing, leads to a greater reduction in the amount of housing demanded. The findings further suggest that neither increased house prices nor interest rates have been deterrents.

Footnotes

1. Measures of dilapidation would be useful but are unavailable for Barbados.

2. The number does not include dwellings with private piped water or those in the 'not stated' category.

3. BMFC is not a deposit-taking institution and most of its funds are long-term and comes from the National Insurance Fund. These funds are usually rolled over.

4. For a detailed report on these changes refer to Williams [1975] pages 24-26.

5. McFarland (1966) supports the view that liberalisation of mortgages leads to an increase in demand.

6. We view housing as a service rather than an asset since we believe that owner-occupancy is the dominant motive. However, we accept that in the rental market the demand is for an asset.

7. We opted to use other price rather than rental price because (a) no rental price index is available and (b) we believe that people purchase homes only after satisfying basic family needs.

8. It has been suggested that the appropriate measure of homeownership cost is significantly different from that used in the consumer price index. This is due to deductions of interest costs which passes on subsidies to homeowners (See Dougherty and Van Order [1982]).

9. This is the usual partial-adjustment model postulated by Nerlove.

10. All data except housing starts and stock are taken from the Central Bank of Barbados - Annual Statistical Digest. Housing starts and completions are taken from the Town Country and Planning Statistical Bulletin and various copies of the Economic Report while housing stock is calculated by adding the completions in a year to the stock outstanding - the initial years being census years. No corrections have been made for houses removed from the stock since data on this is not available.

Appendix 1

List of Variables

AP = consumer price index

HD = housing demand i.e. additions to stock

d = this is a dummy variable to present the effect of mortgage terms. It takes the value:

0 - 1960 - 1972
1 1973 - 1982

MR = mortgage rate

OP = price of other goods and service

PH = price of housing

PP = population

Y = nominal Gross Domestic Product

Appendix 2

Results of the Model Including Partial Adjustment Mechanism

$$1(a)\quad L\left(\frac{HD}{PP}\right) = -0.559 + 0.47\ LPH + 1.47\ L\left(\frac{Y}{PP}\right) - 1.94\ LOP$$

$$(-0.89)\quad (0.09)\quad (3.68)\quad (-3.70)$$

$$-0.357\ LMR + 0.268d - 0.30\ L\left(\frac{HD}{PP}\right)_{-1}$$

$$(-1.32)\quad (1.94)\quad (-1.23)$$

$R^2 = 0.87$ D-W = 1.97 F(6,13) = 13.99

$$2(a)\quad L\left(\frac{HD}{PP}\right) = -0.569 - 0.359\ LMR + 1.49\ L\left(\frac{Y}{PP}\right) - 1.93\ LOP$$

$$(-0.96)\quad (-1.37)\quad (4.63)\quad (-4.10)$$

$$+0.27d - 0.30\ L\left(\frac{HD}{PP}\right)_{-1}$$

$$(2.12)\quad (-1.28)$$

$R^2 = 0.87$ D-W = 1.99 F(5,14) = 18.07

Appendix 3

We also tested the influence of the determinants on per capita housing expenditure as opposed to per capita housing stock. The resulting equation was:

$$L\left(\frac{HD.PH}{PP}\right) = -0.26 + 0.96\ LPH - 1.71\ LOP + 1.31\ L\left(\frac{Y}{PP}\right)$$

$$(-0.46)\quad (1.71)\quad (-3.45)\quad (3.44)$$

$$-0.41\ LMR + 0.27\ d$$

$$(-1.51)\quad (1.94)$$

$R^2 = 0.99$ D-W = 2.1 F(5, 14) = 264.3

The results of the expenditure model are rather similar in sign and magnitude to those of the housing stock model; except the housing price variable which now becomes positive (the correct sign) and is marginally insignificant. As would be expected the R^2 for the expenditure function exceeds that for the housing units function.

Bibliography

1. Arcelus, F. and A.H. Meltzer, "The Market for Housing and Housing Services, Journal of Money, Credit and Banking, February 1973.

2. Carliner, G., "Income Elasticity of Housing Demand," Review of Economic and Statistics, November 1973.

3. DeLeeuw, F., "The Demand for Housing: A Review of Cross Section Evidence", Review of Economic and Statistics, February 1971.

4. Dougherty A. and Van Order R., "Inflation, Housing Costs and the Consumer Price Index," American Economic Review, March 1982.

5. Gramlich, E.M. and D. Jaffee, Savings Deposits, Mortgages and Housing, Heath Lexington 1972.

6. Huang, D. and McCarthy, M.D. "Simulation of the Home Mortgage Market in the Late '60's," Review of Economic and Statistics, November 1967.

7. Jones, A., Housing in Barbados: Facing the Challenge of the 1980's (mimeo) - Ministry of Housing & Land November 1982.

8. Lee, T.H., "Housing and Permanent Income," Review of Economic and Statistics, November 1968.

9. McFarland, C.M. "Major Developments in the Financing of Residential Construction since World War II," Journal of Finance, May 1966.

10. Muth, R., "Interest Rates, Contract Terms and the Allocation of Mortgage Funds", Journal of Finance, March 1962.

11. Reid, Margaret, Housing and Income, University of Chicago Press, 1962.

12. Williams, Marion, "Institutional Mortgage Market in Barbados, 1970-1975," Central Bank of Barbados (mimeo) 1975.

13. Barbados Economic Report, various issues, Government Printing Press, 1979.

14. 1980 Population Census.