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# **WORKING PAPER SERIES**

The Determinants of Consumers' Perceptions of Buying Conditions for Houses

> Pami Dua and David J. Smyth\*

Working Paper No. 41

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#### ABSTRACT

This paper examines the determinants of consumers' buying attitudes for houses. Survey data on buying attitudes are from responses to the Surveys of Consumer Attitudes conducted by the Survey Research Centre, University of Michigan. The determinants considered include current and future housing-related variables and measures of current and future overall economic conditions. The empirical estimates show that the following variables are statistically significant: the level of the mortage rate; the percentage change in house prices; an index of the expected real family income. The standardized coefficients indicate that the level of the mortgage rate has numerically the biggest impact on buying attitudes.

Centre for Development Economics, Delhi School of Economics & University of Connecticut and Louisiana State University. Pami Dua's research was supported by a grant from the University of Connecticut's Centre for Real Estate and Urban Economic Studies. The authors are grateful to the University of Michigan's Survey Research Centre for making available responses to their Surveys of Consumer Attitudes and to Geoffrey Turnbull for comments on an earlier version of this paper.

# 1. Introduction

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This paper examines consumers' perceptions about buying conditions for houses. Consumers' attitudes towards buying houses are a barometer of conditions in the housing sector and have far-reaching effects on the economy. If consumers are optimistic about buying conditions for houses, they spend more on houses. This has repercussions throughout the economy since an increase in spending on houses generally increases the demand for a number of items ranging from building materials like lumber to finished goods like household appliances and furniture. Likewise, if consumers are pessimistic about the buying climate for houses, they postpone buying a house and thus delay spending on these items.<sup>1</sup>

What determines consumers' buying attitudes? Katona (1975) notes that consumer attitudes are affected by more than just the current state of the economy. They can be influenced by political, economic, and other events that are not measurable. Consumer attitudes may thus not be related to current economic variables in a stable way since they can be influenced by events that are not quantifiable.

In this paper we estimate a statistical relationship between consumers' buying attitudes towards houses and factors that are believed to influence them. We examine the proportion of variance in the attitudinal data that can be explained by their determinants and also test whether the statistical relationship is stable over time. If the attitudinal data are largely affected by nonquantifiable factors, the proportion of variance in buying attitudes explained by the causal variables will be small. Again, if consumers' perceptions of buying conditions for houses change in an unpredictable manner over time, the statistical relationship will not

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Two indicators of consumer attitudes, the Consumer Confidence Index of the Conference Board and the Consumer Sentiment Index of the Survey Research Center at the University of Michigan, are often used to measure consumers' perceptions of general economic conditions and their personal financial well-being. The Consumer Sentiment Index also includes consumers' perceptions about buying major household items such as furniture, refrigerators, stoves, and television sets. Both indices are tracked closely by the media and their properties have been examined in several studies including Garner (1991), Leeper (1992), Throop (1992), Fuhrer (1993), Carroll, Fuhrer, and Wilcox (1994) and Matsusaka and Sbordone (1995). Consumers' attitudes towards buying a house come from the same survey as the Consumer Sentiment Index. The house buying attitudinal data differ from the Consumer Confidence Index and the Consumer Sentiment Index since the latter two indices encompass information on general economic conditions and have a much broader focus.

be stable over time. The relationship between buying attitudes and their determinants is estimated using monthly data from January 1981 through August 1995.

The paper is organized as follows. Section 2 describes the survey data on buying attitudes for houses. Section 3 describes the possible determinants of buying attitudes. Section 4 reports the empirical estimates and Section 5 gives the conclusions.

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# 2. Survey Data on House Buying Attitudes

Data on buying attitudes are from the responses of about 500 households per month to the Surveys of Consumer Attitudes conducted by the Survey Research Center, University of Michigan.<sup>2</sup> The specific question on buying attitudes is:

"Generally speaking, do you think now is a good time or a bad time to buy a house?"

The responses are in three categories: the percentage responding "good time", the percentage responding "bad time", and the percentage saying "uncertain". From these responses, we construct an index of a good time to buy a house as follows:

## (1) Buying Index = good + uncertain\*[good/(good+bad)]

where

good = the percentage of consumers responding good time;

and uncertain = the percentage of consumers responding uncertain.

<sup>2</sup>Details of the survey are given in Curtin (1982).

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This index measures the percentage of respondents saying "good time" relative to the percentage of respondents saying "bad time". The uncertain responses are allocated to good and bad in the same proportion as those saying "good time" and "bad time".<sup>3</sup> The buying index can lie between 0 and 100. If all respondents think that it is a good time to buy, the index will be 100. Likewise, if all respondents believe that it is a bad time to buy a house, the index will be 0. An increase in the index indicates a rise in the percentage of consumers who are optimistic about purchasing a house.

Figure 1 plots the index from January 1981 through August 1995. The index varies from 16.5 percent in September 1981 to 89.6 percent in March 1994. After fluctuating between 16.5 percent and 27.4 percent during the period January 1981 to July 1982, the index increases to 69.5 percent in June 1983. These movements are consistent with the U.S. business cycle recession that lasted from July 1981 through November 1982. The index hits a new low of 51.1 percent in September 1984 before climbing to 88.7 percent in April 1986. The next local low is in October 1990 (53.2 percent) which corresponds to the business cycle recession that is dated from July 1990 through March 1991. After the dip in late 1990, the buying index reaches a maximum of 89.6 percent in March 1994.

While there is some tendency for buying attitudes to follow recessions, what other factors explain fluctuations in buying attitudes? Following the question on a good time or a bad time to buy a house, the respondents are asked a supplementary question as follows:

"Why do you say so?"

<sup>&</sup>lt;sup>3</sup>Variations of the index can be constructed as in Dua and Smyth (1995).

Selected reasons for saying "good time to buy" are: prices low, good buys available; prices won't come down: interest rate low; borrow in advance, rising rates; good investment; and times good, prosperity. Selected reasons for saying "bad time to buy" are: prices high; interest rates high, credit tight; can't afford to buy; and uncertain future.

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From these responses, we can infer that buying attitudes depend on obvious housing sector variables such as house prices and the mortgage rate and variables pertaining to general economic conditions that measure "times good, prosperity". In the reasons stated, there is also reference to the "future" implying that future factors may affect house buying attitudes in addition to current variables. In the next section, we analyze these factors and describe ways to measure them.

# 3. Determinants of Consumers' Buying Attitudes for Houses

We divide the potential determinants of consumers' buying attitudes for homes into three categories as follows:

A. housing sector factors such as house prices and the mortgage rate;
B. factors that measure general economic conditions such as the unemployment rate and real disposable income; and

C. factors that measure future expected housing-related and general economic conditions.

We discuss the measurement of each of these below.<sup>4</sup>

<sup>4</sup>For a discussion of variables to include in models of the housing market, see, for example. Arnott (1987). Schwartz (1988). Smith et al. (1988), and Megbolugbe et al. (1991).

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Housing sector variables include house prices and the mortgage rate. Based on the answers to the supplementary survey question discussed in the preceding section, both the level and the change in these variables are examined.

House prices are measured by the median sales price of existing single-family homes and come from the National Association of Realtors. The change in house prices is measured by the monthly percentage change in house prices. Since monthly data are used, both variables are lagged one month to measure the most recent information available to the respondents of the Surveys of Buying Attitudes.

The mortgage rate is measured by the contract interest rate on single-family existing home purchases and is provided by the Federal Housing Finance Board. The change in the mortgage rate is measured by the monthly percentage point change in the rate. Both the level and the change in the rate are measured with a lag of one month to reflect the most recent information available at the time the surveys are conducted.

B. Current economic conditions

Current economic conditions are measured by the level of the unemployment rate, the month-on-month percentage point change in the unemployment rate, the level of real disposable income, and the monthly percentage change in real income. These are lagged one month to represent the most recent information known to the respondents. The unemployment

rate is measured by the rate for all civilian workers, 16 years and over, seasonally adjusted. Real income is measured by disposable personal income in 1987 dollars, at seasonally adjusted annual rates. Both series are from the Federal Reserve Bank of St. Louis' database.

# C. Expected future housing and general economic conditions

The responses to the supplementary question "Why do you say so?" suggest that the people surveyed take into account expectations of housing-related and general economic conditions to evaluate if the present time is a good time to buy a house. We derive expectations of these variables from the same survey. This ensures that the respondents to the question on buying conditions for houses are the same as the respondents to questions on expectations of economic conditions.

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There are three questions asked in the Surveys of Consumer Attitudes that provide information on expected housing-related conditions and general economic conditions. These relate specifically to interest rates, the unemployment rate, and real family income. However, quantified estimates of expectations of these variables are not available from this survey. We therefore construct indices to measure these variables.<sup>5</sup> These are discussed below.

#### Index of interest rate expectations

An index of expectations of interest rates is constructed from the responses to the following question asked in the Surveys of Consumer Attitudes:

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It is possible to quantify the responses by using a procedure such as that developed in Carlson and Parkin (1975). However, such a procedure requires an assumption on the distribution of expectations among respondents and the imposition of unbiasedness. We prefer to use an index constructed from the raw data instead.

No one can say for sure, but what do you think will happen to interest rates for borrowing money during the next 12 months -- will they go up, stay the same, or go down?

We calculate:

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#### (2) Index of interest rate expectations = up + same\*[up/(up+down)]

where

up = the percentage of consumers responding go up;

down = the percentage of consumers responding go down; and

and same = the percentage of consumers responding stay the same.

This index measures the percentage of respondents expecting interest rates to increase during the next 12 months relative to the percentage expecting interest rates to decrease. The "stay the same" responses are allocated to up and down in the same proportion as those saying "go up" and "go down".

# Index of unemployment rate expectations

An index of the expectations of the unemployment rate is calculated from the responses to the question:

How about people out of work during the coming 12 months -- do you think that there will be more unemployment than now, about the same, or less?

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We calculate:

(3) Index of unemployment rate expectations = more + same\*[more/(more+less)]

## where

more = the percentage of consumers responding more;

less = the percentage of consumers responding less;

and same = the percentage of consumers responding about the same.

This index measures the percentage of respondents expecting unemployment to increase in the next 12 months relative to the percentage expecting unemployment to decrease. The "about the same" responses are allocated to more and less in the same proportion to those saying "more" and "less".

# Index of real family income expectations

An index of expectations of real family income is constructed from the following question:

How about the next year or two -- do you expect that your (family) income will go up more than prices will go up, about the same, or less than prices will go up?

These responses can be interpreted as : real income will go up, stay the same, or go down. From this, we calculate an index as follows:

(4) Index of real income expectations = up + same\*[up/(up+down)]

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up = the percentage of consumers responding income will go up more than prices will go up;

down = the percentage of consumers responding income will go up less than prices will go up;

and same = the percentage of consumers responding about the same.

This index measures the percentage of respondents expecting real income to go up in the next year or two relative to the percentage expecting real income to go down.

# 4. Empirical Estimates

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The relationship between consumers' house buying attitudes and their potential determinants discussed in Section 3 is estimated using monthly data from January 1981 through August 1995. At the outset, all of the variables described in the previous section are included. Statistically insignificant variables are then dropped from the "general" model to yield a parsimonious relationship between house buying attitudes and the explanatory variables.

Table 1 reports the estimation results. Model 1 is the "general model". In addition to the independent variables discussed above, the model also includes two lagged values of the dependent variable.<sup>6</sup> The level of the unemployment rate, the month-on-month percentage

Lags of the dependent variable are included to pick up the effects of habit formation of consumers and their resistance to change. Because of this inertia, the adjustment to a change is spread over a period of time. Various lags of the dependent variable were tried. Two lags gave the "best" fit evaluated by the significance of the lagged dependent variables and the absence of serial correlation in the equation. A t-test was conducted to test if the sum of the coefficients of the two lagged dependent variables equals one. The null hypothesis that the sum equals

point change in the unemployment rate, and the month-on-month growth rate in real income have t-statistics less than one. The signs on the remaining variables are plausible. The index of unemployment rate expectations has a negative sign implying that the bigger the percentage of people who think that the unemployment rate is going to increase, the larger the percentage of people who consider that now is not a good time to buy a house. The signs on the index of real income expectations and the level of real income are both positive, i.e., an increase in these variables raises the buying attitudes index. The index of interest rate expectations, the level of the mortgage rate, and the month-on-month percentage point change in the mortgage rate all have negative signs.<sup>7</sup> The level of house prices also enters with a negative sign meaning that an increase in house price decreases the buying index. The month-on-month change in house prices, however, has a positive sign.<sup>8</sup> This implies that when house prices are rising, the percentage of people who consider it to be a good time to buy a house also increases, perhaps because they expect further rises in prices.

Model 2 excludes the variables in Model 1 that have a t-statistic less than one. Compared to Model 1, the adjusted  $\mathbb{R}^2$  stays the same, and the Lagrange multiplier tests for first and sixth order serial correlation show no evidence of serial correlation. There are, however, still three variables that have t-statistics greater than one but are not statistically significant at the 5 percent level. These are the level of real disposable income, the month-on-

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one is strongly rejected in favor of the alternative that the sum is less than one.

The real interest rate was also tried by taking the difference between the nominal interest rate and the expected inflation rate, the latter being from the Surveys of Consumer Attitudes. The fit of the equation was better with the nominal interest rate.

House prices deflated by the consumer price index and the month-on-month percentage change in the ratio were also tried in place of nominal house prices and the percentage change in nominal house prices. The substantive results, however, remained unchanged.

month percentage point change in the mortgage rate, and the level of house prices. Dropping these three brings us to Model 3.

The diagnostic statistics of Model 3 are satisfactory. The adjusted  $R^2$  remains unchanged and there is no evidence of serial correlation. The t-statistic of the coefficient on the index of unemployment rate expectations now falls slightly below the two-tailed 5 percent critical value. However, excluding the index of unemployment expectations from the model produces serial correlation in the residuals suggesting that this variable should be retained in the model.

The Chow test for structural stability is also conducted to test the robustness of Model 3 over time. The model is tested for stability at two points - before and after January 1984<sup>9</sup> and January 1988. The Chow F-statistics are not significant at the 5 and 1 percent levels of significance indicating that the model is structurally stable over time.<sup>10</sup>

Model 3 is thus a satisfactory statistical relationship between buying attitudes for houses and their determinants. The determinants include the index of unemployment rate expectations, the index of real income expectations, the index of interest rate expectations, the level of the mortgage rate, and the percentage change in house prices. Thus expected future economic conditions and expectations of interest rates play a major role in determining consumers' attitudes towards buying houses. Together, all of the variables explain 97 percent

<sup>&</sup>lt;sup>9</sup>This period was chosen to test if the model remained stable after the buying index increased dramatically from mid 1982 through mid 1983.

<sup>&</sup>lt;sup>10</sup>The Chow tests for Model 2 are significant at the 5 percent level but not at the 1 percent level.

of the variation in buying attitudes leaving very little unexplained. Moreover, the model is structurally stable suggesting a predictable relationship between buying attitudes and their determinants. ince

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Which of these determinants has the greatest impact on buying attitudes for houses? It is not possible to answer this by comparing the size of the coefficients in numerical terms since the variables are measured in different units. Instead, we examine the standardized or beta coefficients that are directly comparable to each other in numerical value. These come from a standardized regression in which each variable (dependent and independent) is transformed to a standardized form by subtracting the mean and dividing by the standard deviation. The transformed variables are thus unit-free. The standardized coefficients for Model 3 are reported in the last column of Table 1. Ignoring the lagged dependent variables, numerically, the level of the mortgage rate has the biggest impact on buying attitudes with the index of interest rate expectations in second place. This result suggests that the cost of borrowing is an important determinant of a consumer's decision to buy a house. Other variables, in order of importance are the index of real income expectations, the index of unemployment rate expectations, and the percentage change in house prices.

# 5. Conclusions

This paper examined several factors that can influence consumers' attitudes towards buying houses. The variables selected on the basis of statistical significance are the level of the mortgage rate, the percentage change in house prices, the index of interest rate expectations, the index of unemployment rate expectations, and the index of real family income expectations. The standardized coefficients indicate that the level of the mortgage rate has the largest impact on buying attitudes. The variables in the model explain almost all of the variation in buying attitudes. More importantly, the relationship is structurally stable over time yielding a predictable relationship between buying attitudes and their determinants.

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Table 1 Determinants of Buying Attitudes for Houses

•	Variables	Model 1	Model 2	Model 3	Model 3 Std. Coeff.
<u>ban</u> and	Buying Index.1	0.616 (8.64)	0.624 (8.88)	0,645 (9,38)	0.654
	Buying Index.	0.243 (3.32)	0.231 (3.23)	0.220 (3.14)	0.224
cast	Index of Expected Unemployment	-0.075 (2.25)	-0.049 (2.04)	-0.042 (1.80)	0.030
i.	Unemployment	-0.393 (0.91)			
, cys	ΔUnemployment.	0.622 (0.37)			
and 14,	Index of Expected Real Income	0.188 (2.51)	0.195 (2.65)	0.244 (3.55)	0.065
: <b>y</b> ?"	Real Income.,	0.006 (1.28)	0.007 (1.64)		
-44.	AReal Income.	-0.301 (0.96)			
n to mic	Index of Expected Interest Rates	-0,156 (5.37)	-0.139 (5.71)	-0.144 (6.63)	0.131
Co.,	Mortgage Rate.1	-1.379 (2.59)	-1.434 (2.73)	-1.503 (4.59)	0.189
unta	AMortgage Rate.1	-2.618 (1.39)	-2.330 (1.30)		
una	House Prices.1	-0.119 (1.13)	-0.135 (1.48)		
mic	ΔHouse Prices.1	0.338~ (1.93)	0.357 (2.11)	0.336 (2.03)	0.027
ing	Constant	24.999 (1.61)	19.221 (1.44)	28.516 (4.48)	
and	Adjusted R <sup>2</sup>	0.970	0.970	0.970	
ysis	LM (1)	3.018	2.820	2.682	
na relation da	LM (6)	11.457	9.419	8.316	
leis	Chow (1984:1)	-	2.025*	1.686	
; of	Chow (1988:1)		2.329*	1.563	

Notes: T-statistics of coefficients are in parentheses. LM (1) and LM (6) are the Lagrange multiplier test statistics for first and sixth order serial correlation respectively. Chow is an F-test for parameter stability with the sample split at the date in parentheses. For the LM and Chow tests, \* denotes significant at 5% and \*\* denotes significant at 1%.

# Index of House Buying Attitudes



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