Implicit Value and Risk Perception: Sales of Floodplain Property

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Introduction

The use of mass appraisal techniques, and, more specifically multiple regression analysis (MRA), can facilitate the determination of the degree of disutility which buyers associate with, as measured by the differential value they place upon – specific house characteristics, *e.g.*, a location in a floodplain. Park and Miller (1982) consider flood risk perception, and Shilling, *et al* (1986), present an argument in relation to the capitalized value of flood insurance premiums. The literature has established MRA as a procedure useful for the designation of the component values relating to the attributes of a composite good, that is, an item which is a "bundle" of diverse characteristics. Early empirical studies relating to the valuation of a complex good measure the quality change in automobiles (Court, 1939, and Griliches, 1961); then Rosen (1974) established the theoretical basis for the models. The MRA parameter estimates obtained from such studies provide the means for measuring the implicit value of the individual characteristics of the good; this is referred to as the "hedonic price index" technique. The housing market receives much attention, because of the ready availability, and the good quality, of house-sales data, and the data sources include: US Bureau of the census surveys, Federal Housing Administration summary reports, tax assessor's records, and MultiList Service files, among others. The most detailed and reliable information on the characteristics of properties sold are the files that are maintained by tax assessor's offices and by MultiList Service (MLS) co-operatives, and those latter data are used to illustrate the hedonic technique for identifying the decrement to a residence's selling price as a consequence of its location in a floodplain. These data are currently considered by appraisers as ancillary information, but the application of MRA has awaited the requisite hardware and software to accomplish the analysis effectively. Donnelly and Andrews (1988) demonstrate how the current generation of microcomputers and electronic spreadsheet software can be used to implement regression based appraisals, and how the regression routine can easily generate confidence intervals for forecast values. In the context of determining the disutility of a floodplain location to the purchaser, the primary interest of the analysis is in the identification of the model's parameters, and not on the forecast value of the property *per se*. Thus, in this context, the presence of some degree of collinearity and its magnitude in the independent variable set are important concerns;

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TABLE 1

Regression Model Output

(SHAZAM 6.01)[4]

R-SQUARE = 0.8304 R-SQUARE ADJUSTED = 0.8253
VARIANCE OF THE ESTIMATE = 0.83787E + 08 STANDARD ERROR OF THE ESTIMATE = 9153.5
MEAN OF DEPENDENT VARIABLE = 49970. LOG OF THE LIKELIHOOD FUNCTION = -3620.46

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO 333 DF	PARTIAL CORR.	STANDARDIZED COEFFICIENT	ELASTICITY AT MEANS
RESIDTAX	31.645	3.0069	10.524	0.4996	0.32741	0.56744E-16
AGE	-275.66	79.804	-3.4542	-0.1860	-0.21748	-0.23976
LIVSPACE	20.386	1.8897	10.788	0.5089	0.46418	0.54259
GARSIZE	7.4682	2.4264	3.0778	0.1663	0.76945E-01	0.49223E-01
LOTSIZE	0.86266	0.21161	4.0766	0.2180	0.14708	0.12075
AC	6711.9	1059.8	6.3333	0.3279	0.15184	0.57398E-01
FIREPLACE	9394.6	1143.3	8.2170	0.4106	0.19730	0.56839E-01
STHSIDE	1990.6	881.26	2.2588	0.1228	0.43856E-01	0.25245E-01
YEARDUM	-2190.2	913.41	-2.3978	-0.1303	-0.49257E-01	-0.17965E-01
FLOOD	-5.2006	1.9973	-2.6039	-0.1413	-0.81892E-01	-10381E-01
CONSTANT	20790.	6836.0	3.0413	0.1644	0.00000E+00	0.41606

these issues are taken up in the explication which follows.

Implicit Value Model

This model is parsimonious in explanatory variables, containing ten explanatory variables, and differs from the specification of Shilling, *et al.* (1985), in that it is based upon theoretical considerations; namely, there is a tautological relationship between the dependent variable, selling price, and the explanatory variable for the floodplain, the flood insurance premium in the Shilling, *et al.* specification.[1] Instead, in this paper, the previous assessed value of the property is used to weight the floodplain zero/one dummy variable. This variable is determined prior to the sale, and must therefore be independent of the selling price.

The MultiList data used here make reference to 344 houses which sold in La Crosse, Wisconsin between January 1984 and December 1985. La Crosse is a regional service center having a population of about 50,000 with roughly 13,000 residential properties. The city is situated on terraces of the Upper Mississippi River, and the area exhibits a low crime rate, clean air and water, relatively uniform quality of public and private schools, and good access to employment, and to community private and public services. MLS records represent around 50 percent of the residential sales. The database includes information on selling price (PRICE), date of sale, days on market, financing utilized, property TAX, AGE of house, finished floorspace (LIVSPACE), size of garage (GARSIZE), LOTSIZE, existence of a dining room, porch, air conditioning (AC), fireplace (FIREPLCE), *etc.*; and neighborhood, location in floodplain, and other attributes. From this set of variables the preferred model is:[2]

PRICE = f(TAX, AGE, LIVSPACE, GARSIZE, LOTSIZE, AC, FIREPLCE, STHSIDE, YEARDUM, FLOOD)

The recorded property liability on these houses in the year prior to the sale amounted to $371,726. The average AGE of the houses which sold during this period is 43.5 years old with that house containing 1,300 sq. ft. of LIVSPACE. Eighty-six-point nine percent of the houses in the data set have garages, the average size being 329 sq. ft. or roughly 16.5 ft. by 20 ft. The LOTSIZE average is 6,995 sq. ft.; that is to say, the approximate dimensions of the average lot are 58 ft. by 120 ft. Forty-two-point-seven percent of the houses sold have AC and 30.2 percent have a FIREPLCE. The variables, STHSIDE, YEARDUM,

Continued on Page 16