The Value of an 'Ocean' View in Oak Bay, British Columbia:

A Comparison of the Hedonic Pricing and Contingent Valuation

Methods for Estimating Intangibles

by

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Abstract

The purpose of this thesis was to examine the implicit pricing theory with respect to the valuation of an 'ocean' view as it influences the price of a house in the Municipality of Oak Bay, a residential area in Victoria, British Columbia. This value was estimated using two different approaches. The hedonic pricing method is a market-based approach which identifies the intangible commodity as an attribute of a commodity which is exchanged in the market. The second approach used was the contingent valuation approach which uses surveys or questionnaires to elicit values for the intangible commodity.

Data on 376 housing sales between October, 1989, and August, 1990, were obtained from the Victoria Real Estate Board. The hedonic pricing technique was used to estimate a linear and nonlinear model. Data for the contingent valuation approach were obtained by a mail survey of the same 376 houses.

The results of the two approaches revealed a range of possible values from a high of 43 percent of the value of the house to a low of 4 percent of the value of the house. Defining the quality of view more strictly, however, resulted in a much more narrow range of possible values. This more narrow range reached a high of 21 percent and a low of close to 6 percent.

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Chapter I

Introduction

The decision on the part of an economic agent to purchase any commodity can be explained in terms of a utility maximization problem where the agent selects that commodity for which the greatest level of utility is derived, given the commodity's relative price and the agent's income/wealth constraint. In the housing market this utility maximization decision is made slightly more complex because of the nature of the housing commodity. Like many other goods, a house can be conceived of as being sold as a package of characteristics (Lancaster, 1959).[1] All of the characteristics of the housing bundle must be considered as part of the housing package, and it is this complete package that the agent must purchase.

Housing characteristics can be described as belonging to one of three main categories. There are the structural, or physical, qualities of the house, such as size, number of rooms, and number of storeys. There are the characteristics of the neighbourhood in which the house is located. These include the environmental quality, socioeconomic make-up of the area, and the quality of the public services such as neighbourhood schools and refuse collection. And finally, there are the characteristics of the lot, or site influences, which include, for example, access to schools, shops and other services, as well as the street type, the location of the house on the street, and the availability of privacy or a view.

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1. Lancaster did not single out the housing commodity. His point was that every commodity is a bundle of characteristics.

In theory, each characteristic of the housing bundle contributes to the determination of the selling price of the house. In other words, implicit in the final price of any house are the prices of the various characteristics that make-up the unique housing bundle. If, for example, there were two houses that were identical in every respect except that one had a particularly attractive view, then the difference in the selling prices of these two houses could be attributed to the view. That is, the value of the view is equal to the price differential between two otherwise identical houses. While it cannot be expected that every characteristic plays a statistically significant role in terms of price determination, we can expect that some characteristics will have a significant impact on the selling price of the house. Furthermore, it is to be expected that some characteristics have a larger impact on the price than others. For example, the number of rooms in the house may have a greater influence on the price than does proximity to a bus route, although the extent of this influence will vary with individual preferences.

The purpose of this thesis is to examine the implicit pricing theory outlined above with respect to the valuation of an 'ocean' view as it influences the price of a house in the Municipality of Oak Bay, a residential area in Victoria, British Columbia.[2] The methods that economists use to obtain these value estimates can be categorized by one of two basic approaches. There are the market related, or revealed preference, approaches such as the travel cost method and the hedonic pricing method which identify the intangible commodity as an attribute of a commodity which is exchanged in the market,

2 For the purpose of this thesis the term 'ocean' refers to salt water, following common usage of the term by realtors and the public.

and attempt to assign a value to the intangible through this linkage. The second approach that economists use to determine the value of an intangible commodity is the contingent valuation, or expressed value, approach. This approach may involve some combination of personal interviews, telephone interviews, and mail surveys. Although each of these techniques have been used to estimate the value of various intangibles, each method is unique and therefore has an application for which it is better suited. The value of an ocean view may be determined by either of the two basic approaches used for intangible estimation. For the purpose of this thesis the hedonic pricing method is the most appropriate of the revealed preference methods and, therefore, both the hedonic pricing and contingent valuation methods are used.

One criticism of these methodologies is that they may be unable to provide accurate market value estimates. This has led to some skepticism regarding the validity, and use, of the estimated results. If, however, two different methodologies are used to obtain similar estimates then this may give some legitimacy to the estimated values. Alternatively, a range of likely values can be determined from the results of the two approaches. Chapter 2 examines this potential complementarity of the different approaches and provides an explanation of the hedonic pricing and contingent valuation methods as these may be used to estimate the value of an ocean view. Chapter 3 outlines the specific hedonic pricing model used in this study. The contingent valuation survey is also discussed in this chapter along with an explanation of the structure of the questionnaire and how this is designed to minimize the biases, as outlined in chapter 2, that can infiltrate the contingent valuation method. Chapter 4 compares the results of the two methodologies and provides a critical analysis of results. Finally, the conclusions of the study are outlined in chapter 5.

Chapter II

Hedonic Pricing and Contingent Valuation Methods For Estimating Intangibles

Estimating the value of an intangible allows the economist to assign a dollar value to commodities which the market is unable to price directly. Assigning such a monetary value is necessary if these intangibles are to be incorporated into a cost-benefit analysis. The value of an 'ocean' view, for example, is important to urban planners if they are to appropriately provide such an urban amenity in their urban design.

There have been several studies that have attempted to measure the value of intangible amenities. Smith and Gilbert (1985), used the hedonic pricing method (HP) to examine the relationship between the wage rate (the price of a job) and the level of environmental risk of specific jobs. Hoch and Drake (1974), in a similar HP study, explained wage rates in terms of climates and the quality of life in certain geographic regions. Much of the applied effort involving intangible estimation has been directed towards measurement of value for environmental amenities. Ridker (1967) was the first to attempt to derive environmental values from environmental property values using the HP technique. Since then there have been several studies which have applied the technique using property values in an effort to determine the implicit price of differing levels of air pollution (Anderson and Crocker, 1971; Harrison and Rubinfeld, 1978). Others have attempted to determine whether geographic location of property with respect to its proximity to such non-desirable amenities as airports and hazardous waste sites is capitalized through its price (Nelson, 1979; Michaels and Smith, 1988). Nelson (1979), in a study of the property values in the vicinity of six major U.S. airports, for example, found aircraft noise to be capitalized in housing prices.

Despite the vast number of studies, relatively few have used more than one approach. While many intangibles lend themselves to both the revealed preference and expressed willingness to pay methods of estimation only a few studies have applied both methodological approaches in estimating the same intangible (Blomquist, 1988; Brookshire et al, 1982; Desvousages et al, 1983).

Since the true value of an intangible commodity cannot be determined, the estimated values are only a second best option. The challenge for the economist is to obtain estimates which are as close as possible to the true values. In other words, the economist must select the most appropriate method of estimation, given the intangible value that is to be estimated. In some cases it may be worthwhile to combine two different methodologies to achieve the best possible estimates. This view was expressed by Blomquist (1988) when he investigated the complementarity of implicit and contingent market approaches. In his study he estimated the value of a water view in the Chicago area using both the hedonic and contingent valuation approaches. He found that the average hedonic value was not significantly different from the expressed willingness to pay (WTP) values. In a similar manner the current thesis compares the estimates found using the hedonic pricing and contingent valuation approaches in the valuation of an ocean view in the Municipality of Oak Bay in Greater Victoria, British Columbia.

2.1 Hedonic Pricing

The hedonic pricing (HP) method is a market approach used by economists to determine the price of items for which the market does not explicitly assign a value. The HP method obtains a price for an intangible item by identifying it as an attribute of a commodity that is exchanged in the market. It is assumed, therefore, that the price of the intangible attribute is implicit in the price of the exchanged commodity. Using the residential housing market as an example, one can say that implicit in the price of any house are the prices of all of the characteristics of that house. These characteristics include the structural characteristics of the house, the lot, and the quality of the neighborhood amenities.

Prior to the formulation of a well defined theoretical explanation of the HP technique, Griliches (1961) applied the method to the estimation of the value of quality changes in automobiles. Others have attempted to infer values of environmental quality levels from the market prices of residential property (Ridker and Henning, 1967; Anderson and Crocker, 1971). However, it was the formal theoretical explanation of the HP method that provided the technique with a consistent framework for interpreting the statistical results (Rosen, 1974; Freeman, 1974).

Using the housing market example to illustrate the HP method, we assume that the price of a house is a function of a number of characteristics. In other words, the price of any residential house may be expressed as follows:

$$P_h = f(X_i, X_j, X_k) \qquad (1)$$

where P_h is the selling price of the house, and the X_i's, X_j's, and X_k's represent the different characteristics of the house structure, lot, and neighbourhood respectively.

This function is referred to as the hedonic, or implicit, price function for the housing commodity. The implicit price for any characteristic is obtained by differentiating the function with respect to the characteristic of interest. If the variable X_1, in the X_i matrix, represents the type of view from the house, then the first derivative of the hedonic function with respect to X_1 gives the implicit price, or value, of this view. Therefore the implicit price of the view (β_1) can be expressed as:

$$\delta P_h / \delta X_1 = \beta_1 \qquad (2)$$

The interpretation of the coefficient estimates will be dependent on the functional form of the equation.[3] If the hedonic equation is linear then the partial derivative, or marginal implicit price, is a constant. If, on the other hand, the hedonic pricing function is nonlinear, the partial derivative is not constant but may also be a function of its quantity or the quantities of other characteristics within the hedonic function.The first derivative of a linear equation gives the implicit price.

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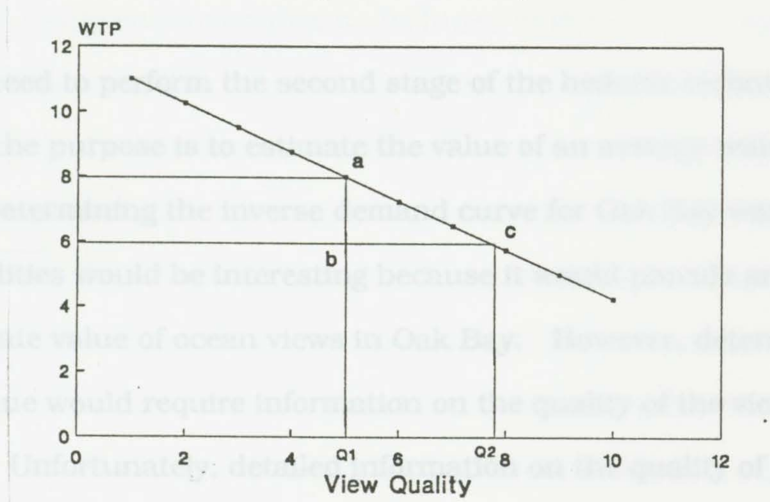
3. The specific functional form used in this study is discussed in the modelling section in chapter 3.

$$\beta_i = f(Q_{view}, SE_i) \tag{3}$$

where Q_{view} and SE represent the quality of view and the relevant social and economic information.

Figure 2 illustrates the inverse demand function for X_{k1} from the above example.

Figure 2: The Willingness to Pay Curve



The estimation of the inverse demand curve, for a particular characteristic, allows the economist to determine the consumer surplus associated with a specific quantity, or changes in quantities, of the characteristic. For example, area 8ac6 in figure 2 represents the increase in consumer surplus associated with moving from quantity of view Q_1 to quantity of view Q_2. This is useful for situations where a social welfare estimation is required. The decision on the part of municipalities to prevent the construction of buildings on the shores of local water sites in order to preserve some water access for the residents of the municipality is a situation where the social value estimates are required. These estimates facilitate a tangible comparison of value between conflicting land uses, and assist municipal leaders in their decision. The measure of consumer surplus is the area under the WTP curve for changes in the amount of the characteristic. Brown and Pollakowski (1977) used this type of hedonic procedure to determine the value of shoreline on lakes in the Seattle area. The estimation of the area under the demand curve was then used to determine the optimal level of water access.

There is no need to perform the second stage of the hedonic technique in this thesis since the purpose is to estimate the value of an average water view in Oak Bay.[4] Determining the inverse demand curve for Oak Bay water views of differing qualities would be interesting because it would provide an estimate of the aggregate value of ocean views in Oak Bay. However, determining this aggregate value would require information on the quality of the view for each observation. Unfortunately, detailed information on the quality of the views for each observation was not available. Nonetheless, the data were sufficient to enable the estimation of the average value of an ocean view as a percentage of the selling price of the house.

The HP method has received wide acceptance as a valid method of intangible estimation because of its use of market data in the estimation procedure. The

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[4] If the hedonic pricing function is linear it is not possible to identify the demand curve for an ocean view because the implicit price calculated in step one is a constant.

method, however, is not perfect. The most critical weakness of the HP method is the problem of model specification. Model specification refers to the decision to include certain variables, which are considered to be significant, while excluding others, that are believed to be insignificant. This problem is not unique to HP models as model specification is an admitted problem with most economic research where exact models are unknown.

The specification in the modelling of hedonic functions, however, does contain potential for serious multi-collinearity because many of the characteristics of the house are correlated. While it has been suggested that all utility-providing and costly characteristics be included in the model, a number of characteristics meeting this criterion are related (Butler, 1982). One possible example of this is the relationship between the number of rooms and the square footage of the house. It may be expected that the number of rooms will increase with the size of the house, although this relationship may diminish as the size of the house increases and individual rooms become larger. On the other hand many of the characteristics of a house are qualitative in nature and are mutually exclusive (Carbone and Longini, 1977).[5] An example of a qualitative characteristic is the type of exterior finish or siding.

The potential for collinearity is even more problematic with the quantitative characteristics because the size of a house often dictates the quantity of other quantitative characteristics such as the number of rooms, number of bathrooms, size of kitchen, and so on. However, it is possible to overcome

5. The difference between quantitative and qualitative characteristics is discussed in chapter 3.

this weakness without losing any reliability in the estimates by restricting the model. Restricting the specification by removing, or combining, some of the related independent variables will reduce the collinearity without necessarily weakening the fit of the model (Butler, 1982).

Omitted variables is another potential problem of model specification. Omitted variables bias can result if one, or more, significant explanatory variables, or housing characteristics, are not included in the model. However, it is unlikely that the models used in this study will suffer from omitted variables bias because the data contained a large number of characteristics for each observation.

As well as the problems of multicollinearity and omitted variables, there are also problems of heteroskedasticity and autocorrelation. Heteroskedasticity is present when the variance of the disturbance terms for each observation are not equal. Heteroskedasticity is a symptom of some form of model misspecification such as omitted variables or an incorrect functional form.

Autocorrelation may be a problem if disturbances associated with one observation are correlated with another observation. Autocorrelation is commonly associated with time-series data because events which occur at one point in time often continue to create disturbances in periods which follow. For example, a temporary drop in mortgage rates may create an immediate increase in demand for real estate. The increased demand, however, may continue long after mortgage rates had returned to their previous level because banks often guarantee rates for fixed periods of time.

Spatial autocorrelation is a problem which is associated with cross-sectional data. It can exist if an event in one area has an impact on the economic activity in an adjacent area. An economic downturn in Victoria, for example, may cause a decline in demand for real estate in the surrounding municipalities. The economic downturn in Victoria could affect the results of this study if the decline was more severe in specific areas within Oak Bay. However, it is likely that the different areas in Oak Bay would experience similar impacts.

The functional form of the equation is another important modelling consideration. Functional form refers to the mathematical form of the equation in which the dependent variable, the house price, is expressed as a function of the independent variables, or housing characteristics. Although there are an unlimited number of possible functional forms, there are two general categories of forms, namely; linear and nonlinear. There are no set rules for selecting the appropriate form and it is up to the economist to select the form that is best suited to the equation that is being estimated.

It is apparent that there are many possible problems that can infiltrate the analysis. Therefore it is very important that the hedonic pricing model is specified carefully, using the appropriate functional form, in order to avoid, or at least minimize, the econometric problems which can plague the estimated results.

2.2 The Contingent Valuation Method

The contingent valuation (CV) method attempts to place a value on a nonmarket good through the use of surveys. The surveys may be presented to the respondents in an interview format, either personal or telephone, or through the mail. Regardless of the presentation, however, the function of the survey is to elicit the value, or values, people place on the nonmarket good, or goods, in question. Unlike the market based approaches, CV methods do not rely on an existing market to determine the value of the nonmarket good. Instead the CV approach must create a hypothetical market for the good and determine its value from actions within this hypothetical market. In many situations CV is the only method that can be used to obtain the desired value. Examples include the estimation of existence value such as the value of saving a species from extinction.

Robert K. Davis (1963) was one of the earliest to perform a CV study. In his study Davis interviewed a number of big game hunters in a specific area in Maine. Using an iterative bidding game process he attempted to estimate the maximum willingness to pay (WTP) of the hunters to continue to hunt if their expenses rose by a specified amount. The aggregate value expressed by the hunters could then be compared to the value of the timber in the area. Such a comparison enables the policy makers to allocate the woodlands in a socially desirable manner. If the expressed WTP exceeded the value of the timber, for example, it may be socially optimal not to harvest. In this situation the total benefits to hunters would exceed the benefits of harvesting.

Since the Davis study there have been several CV studies covering a wide range of intangible commodities. One of the more significant of these studies was a study by Randall, Ives, and Eastman (1974). Their study represents one of the first empirical applications of the CV method and has contributed to the development of a sound CV theory. In their study of the damages from coal development the authors enhanced the survey with the use of photographs which accurately, and consistently, illustrated the commodity being valued. The hypothetical nature of the CV survey can make it difficult to achieve a consistent value. The use of photographs helps to direct the respondents' thoughts which may help to lead to a consistent expressed value. One person's description of a coal development may differ substantially from another person's. The photographs can help narrow this difference. However, it is important that the photographs do not mislead the respondents. The photographs of coal development, for example, must depict the impact of the development on the recreationists, and not simply show the localized upheaval of land in the coal pit.

Randall, Ives and Eastman also used a refined bidding game process. A number of different quality scenarios were presented with different starting values depending on the quality improvements at the site relative to its present state. Respondents were then asked to bid on the different quality scenarios. Bidding adds another dimension to the survey because it attempts to elicit behavioral responses instead of simply expressed preferences.

The application of the CV method to the problem of determining the value of an ocean view uses the same utility maximization theory as the hedonic pricing method. Recall the assumption that a residential house consists of a number of characteristics each of which contribute, in varying degrees, to the selling price of a house. The characteristics are not individually priced in the market but nonetheless do have an implicit value (Lancaster, 1959). The HP method uses existing market information, such as selling price, to determine the value of individual characteristics. The CV method establishes a hypothetical market for the characteristic and simply asks the home owner to state a value for that characteristic. More specifically, the respondent is given a detailed description of the characteristic being evaluated along with the hypothetical situation under which this characteristic is being made available or is to be taken away. Within this hypothetical framework the respondents are asked to state the maximum they would be willing to pay (WTP) for the provision of the characteristic, or the minimum they would be willing to accept (WTA) as compensation for the loss of the characteristic. Regardless of which measure of value is used the respondents are assumed to maximize their utility in the same manner they would if the situation was real.

The choice of which measure of value to use, that is the choice between using WTP or WTA, has received much attention. Traditionally economic assessment was made under the assumption that WTP and WTA measures were equivalent (Knetsch and Sinden, 1984). Under this assumption the choice of using either WTP or WTA depends on the property rights. For example, residents with ocean views may be asked to state the minimum that they would be WTA as compensation in the hypothetical situation that the existing view was to be blocked. This is reasonable because they are in a position to sell the view rather than buy it. These people would maximize their utility, or maintain the same level of utility, if they were given an amount of money equivalent to the loss of the view. The opposite is true for those residents without an ocean view. These people are asked to state their WTP for the provision of a view from their present home. Recent research, however, indicates that this assumption of equivalence may not be true. As Knetsch (1989) states;

> "The accumulating evidence is, however, not at all consistent with these traditional assumptions of equivalence. The results of virtually all controlled tests of the conventional assertion, as well as the commonplace reactions of people to real choices, point instead to large differences between the alternative value measures." (Knetsch, 1990, p.227)

It is, therefore, important to make the correct choice of measures. In practice, CV researchers rely on WTP measures as their main source of expressed valuation. This is because traditional WTP questions are directed towards those people who do not hold the property rights for the good in question. For people who hold the property rights, the WTA question is replaced by a WTP question where the respondents are asked to state their WTP for the good in order to maintain their property rights. This is consistent with maintaining the same level of utility by exchanging money to preserve the view. This is believed to be a valid question since in many circumstances the owner is already paying to hold onto the good through higher taxes, and so on.

With the recent increase in awareness of the environmental impacts of public policy decisions the estimation of intangible costs and benefits is playing a more significant role in all public policy decisions. Although improvements have been made to the CV method since the pioneering study by Davis, and the debate over the use of WTP or WTA seems to have been resolved, CV is sometimes looked upon with skepticism. This skepticism focuses on a number of potential biases which may plague the validity of the methodology's results. These potential biases are discussed in turn below.

2.2.1 Hypothetical Bias

Hypothetical bias refers to any difference between the estimated values and the true values which result from the hypothetical nature of the survey situation. This bias may result from difficulties in people's ability to properly perceive whether payment is expected or not, and if so, when this payment is to be made. Unlike an actual market transaction the survey respondent does not have to make the purchase. Rather he/she must only express a willingness to make a payment. It is possible that people will express exaggerated values for the commodities if they do not believe that they will ever have to make a payment. This type of hypothetical bias is very similar to strategic bias; however, in this case the respondent is not necessarily acting strategically. Rather he/she may not be giving enough thought to the response because it is not believed that the situation warrants it. Therefore, it is also essential that the respondents believe that the proposed change is possible and that their answers will affect the out come.

Aside from perceptions of payment, people may have difficulty perceiving the actual proposal (Freeman 1978) because many of the situations that arise in surveys may have never entered the minds of the people being surveyed. Those people who are presently without an ocean view, for example, may have great difficulty perceiving their home with such a view. This sort of confusion is likely to be reflected by a low response rate but may also be the cause of some bias by those who do respond. The more obscure the nonmarket good the less likely it is that the respondent has even considered the value. Many surveys attempt to elicit values for environmental change. An example of this is the valuation of air quality improvements. Since many people, outside of Los Angeles perhaps, may take clean air for granted it is not likely that many people could evaluate a change in air quality. Perhaps this is why many air quality studies are performed in the Los Angeles area. The market for ocean views in Oak Bay is much less ambiguous than air quality changes. Ocean views are a housing characteristic that can be purchased as a characteristic of a house and it seems reasonable to assume that a person who is buying a home in Oak Bay will consider the value of such a view in the purchasing decision.

Understandably, the hypothetical nature of the CV method has raised some questions regarding its validity as an acceptable method of intangible estimation. As Scott (1965) bluntly states, 'Ask a hypothetical question and you get a hypothetical answer' (p. 26). In other words, without the proper market incentives Scott believes that it is not possible to extract realistic value estimates from individuals. Since it lacks the market based property of the

HP method, the CV method does not include the built-in incentives of the market and is therefore subject to a hypothetical bias.

This criticism of the CV method, however, has not been empirically justified. In a comparison of the results obtained using the CV method to results obtained using the market based approaches Anderson and Bishop (1986) found that the results were 'roughly comparable in magnitude' (p.95). They concluded, if the survey is carefully designed, and the surveyor anticipates and corrects for such problems, the CV results should not suffer significantly from a hypothetical bias.

2.2.2 Strategic Bias

Strategic bias occurs when respondents deliberately misrepresent their true valuations in an attempt to influence the results of the survey in their favour (Samuelson, 1954). It is similar in origin to the free rider problem associated with the provision of a public good. If local residents in Victoria were asked how much they would be WTP to have a sewage treatment plant installed for their city, and if they expected the cost of the plant would be borne by all residents of British Columbia, then Victorians would have an incentive to overstate their WTP. The direction of this bias is dependent upon the type of question being asked and the attitudes of the respondents. If the survey explicitly states that respondents will be expected to pay an amount proportional to their response, the strategic behavior may result in an understatement of the respondent's true value.

It is also possible to have strategic bias when no payment is expected but where respondents believe their answers will affect policy decisions. For example, suppose the government were to use surveys to assist in its decision to either allow a logging company to harvest the timber in a specific region or to turn that region into a recreational park. Respondents to such a survey may be inclined to act strategically. An environmentalist who opposes logging may express a value for a park at an extraordinarily high level. Loggers, on the other hand, may state an artificially low value on such a park if they believe that the development of the park would result in a lack of available work.

If respondents do not believe that their answers will affect policy, the incentive to act strategically is diminished. The hypothetical nature of the survey may make the possibility of payment less believable and therefore could help to reduce, if not remove, this bias. This is not a solution for the potential problem, however, because the cost of reducing the strategic bias is an increase in the potential for hypothetical bias.

Despite the potential for such strategic behavior, empirical research seems to indicate that 'strategic behavior is the exception rather than the rule' (Anderson and Bishop, 1986, p. 126.). Bohm (1972), in an experimental approach utilizing actual payment for public television, failed to find strategic bias affecting the outcome. Scherr and Babb (1975) utilized three different mechanisms for valuing public commodities and found little evidence supporting the existence of this bias. Smith (1977) in a laboratory experiment also failed to find strategic bias.

2.2.3 Starting Point Bias

This bias may result if respondents are given a list of values, or value ranges, from which they must choose their value. Such a list does not necessarily elicit their true value but rather forces them to select a value they might otherwise not have considered. If a respondent feels that the good in question is of zero value but the lowest possible value on the questionnaire is $5000, the respondent may select the $5000 answer and therefore the results of the survey will be biased upward. Typically respondents are given a comments section or, 'other' section, where this dilemma can be resolved. The respondent may state a value of zero in this section if no such choice is made available in the list of possible responses. It is worth adding that the list of possible answers from which to choose may also bias the stated answer in the 'other' section. If the respondent believes that everyone else values the commodity at no less than $5000 then the respondent who places no value on the commodity may state a value greater than zero but less than $5000.

This bias is an even greater problem for surveys which are done in an interview format. Since the respondent does not have an opportunity to examine all of the potential value categories, it is possible that the initial value given in the interview will influence the response. Similarly when a bidding game format is used, valuations may depend on the price at which respondents are asked to start bidding. It is therefore advisable to choose starting bids at random. There is also a boredom factor whereby people may not want to listen to a long list of value ranges. While small ranges may provide a more accurate answer, wider ranges increase the probability that the respondent will listen to, or read, all possible choices.

2.2.4 Vehicle Bias

The magnitude of the expressed WTP, or WTA, may vary depending on the proposed payment mechanism. This variation in response is referred to as a vehicle bias. There are several possible methods of payment that can be proposed in the survey. However, some of the methods are more realistic than others and are therefore more likely to be believed by the respondents. Much like strategic bias, the more believable the payment vehicle, the greater the possibility for a biased response. For example, a recreationist may express a lower WTP for an improvement in park facilities if the vehicle of payment was an increased entrance fee as opposed to an increase in their income tax.

Vehicle bias differs from strategic bias, however, because the payment vehicle can include the possibility for substitutions. When the payment vehicle is structured to provide the respondent with a range of substitution possibilities, the respondent may be inclined to express a greater WTP for the provision of a specific recreation attribute because of the possibility to substitute other recreation commodities. The wider the range of possibilities the higher the WTP. Unfortunately, it is often the case that a payment vehicle that provides a wide range of substitution possibilities, is also less likely to be believed by the respondent than a payment vehicle that offers no opportunity for substitution.

2.2.5 Compliance Bias

Compliance bias is a phenomenon whereby the respondent responds in a manner consistent with what he/she believes the researcher wants to hear. For example, having informed the respondents that this is a study of the value of an ocean view respondents may assume that the researcher believes this value to be positive. A respondent who might otherwise have expressed a zero value, or even a negative value, for such a commodity may be inclined to give a positive response. The potential for this bias will become stronger as the personal contact level of the survey increases and as the anonymity of the surveyor is reduced and answers become more personal. Although interviews are arguably the most personal form of surveying, it is possible that a personalized cover letter may also increase the willingness for the respondent to comply. This is therefore a potential for bias in the survey used in this thesis. This bias can be minimized by ensuring that no misleading valuations are given. This is difficult but allowing a zero valuation is one possibility.

2.2.6 Information Bias

If the survey does not clearly describe the commodity that is being valued then the results may be subject to an information bias. Effectively describing what is implied by an 'ocean view' is an important task if information bias is to be minimized. The use of photographs by Randall et al (1974) is an example of describing a commodity in a consistent manner so as to alleviate the potential for such a bias. Without photographs it is important to describe carefully the commodity so that each respondent is evaluating the same good.

Information bias can also result if too much or not enough information is made available to the respondent. For example, a survey that gives no information regarding the final use of the results may achieve different results than the same survey where the end use in fully disclosed.

2.2.7 Sampling Bias

Sampling bias is a consequence of surveying a sample of a population instead of the entire population. Without surveying the entire population sampling bias cannot be avoided. However, the size of the bias can be reduced by increasing the sample size. Unfortunately the cost of surveying a large number of people is high and often prohibitive. A high response rate can help to offset the need for a large sample size. The response rates vary depending on the survey format. While the interview format, in person or by telephone, achieve relatively high response rates, mail surveys typically achieve the lowest response rate of all survey formats.

2.2.8 Interviewer Bias

Interviewer bias is the difference between the true answer and the actual response which can be attributed to the interviewer, or the interview techniques. The survey questions can invoke different responses depending on how they are worded in the survey or asked in the interview. For example, using favourable words such as beautiful or peaceful to describe an ocean view may elicit a higher willingness to pay response than an impartial description.

2.2.9 Nonrespondent Bias

This bias occurs because recipients of the survey do not respond. While the sample selection may have resulted in an accurate estimate of the population values, non-response can create less accurate results. This difference is referred to as non-response bias. Non-response bias cannot be measured and unlike sampling bias, it cannot be reduced by increasing the sample size.

There are several methods that can be employed to attempt to minimize the size of a non-response bias in mail surveys. Two examples are including a postage paid return envelope, and using a short survey which avoids the use of long introductions for each question.

2.2.10 A Summary of the Contingent Valuation Method

The potential for the foregoing biases has generated a great deal of skepticism regarding the validity of CV results. Many of the biases such as hypothetical, starting point, and information bias are important considerations in the planning and designing of a survey. Strategic bias on the other hand does not appear to have plagued contingent valuations to the extent that it was first envisioned by Samuelson (1954). Careful planning of surveys can minimize the impacts of these biases.

Despite the potential biases, the CV methodology remains a useful tool in the determination of nonmarket values. One of the great strengths of the CV methodology is its adaptability. The CV method can be used to value all nonmarket goods including goods that the other methods of intangible estimation cannot. Examples include the valuation of a species of animal that is threatened by extinction, or the value of environmental preservation. Contingent valuation studies also provide analysts with a methodological cross-check for different methods of intangible valuation.

Finally, the methodology may be subject to a bias because of the hypothetical market that is created for the good. However this does not make it less reliable than the market-based methods of intangible estimation because these methods are also subject to the distortions that may exist within a real market.

Chapter III

The Hedonic Pricing and Contingent Valuation Models

3.1 The Hedonic Pricing Model

Implicit in the selling price of a house are the prices of the individual characteristics that make-up the housing package. Recall the general equation from chapter 2:

$$P_h = f(X_i, X_j, X_k) \tag{4}$$

where P_h is the selling price of the housing package and X_i, X_j, and X_k represent the categories of different characteristics of the house structure, lot, and neighbourhood respectively.

These categories include the physical, or structural characteristics of the house itself such as the number of bedrooms, size of garage or type of heating system. There are the site influences, or characteristics related to the lot on which the house is built. Examples are street location and proximity to local amenities such as public transportation and shops. Finally there are the location, or neighbourhood, characteristics which include characteristics specific to the neighbourhood such as the availability and quality of local schools, the level of crime and the socioeconomic profile of the residents.

It is arguable that the location characteristics may not be a significant factor in this study because the sample of houses was taken from a relatively small municipality in which all of the houses are similar with respect to the location characteristics. For example all of the houses in Oak Bay are considered to have equal access to quality schools, and so on. However, the municipality does have distinct areas which carry a reputation within Oak Bay. The municipality is divided into six distinct geographic areas which describe the location in greater detail (see the map in Appendix A). This increased detail may capture a difference in area caused by reputation. This more specific location variable has been included in the model because it is believed that house specific location, within a specific section of Oak Bay, does contribute to the selling price of the home. In other words, people are willing to pay more for a house that is located in an area with a more prestigious reputation.

In order to successfully estimate the contribution of a specific characteristic to the selling price of a house it is important that the model is accurately specified. Once the model is specified and the appropriate characteristics are included in the model, the analyst must determine the functional form of the equation. Recall this thesis estimates the value of an ocean view using both the hedonic pricing technique and the contingent valuation method. The hedonic pricing model is estimated using both a linear and a nonlinear functional form.

3.1.1 The Nonlinear Model

The specific nonlinear model used in this study was derived from the work of Carbone and Longini (1977) who developed a feedback model for automated real estate assessment. The model was developed to provide property tax administrators with consistent assessments of real estate values. Carbone and Longini argued that the value of a house could be expressed as follows:

$$TV(t) = \left[(\Pi \alpha_i(t)^{Z_i(t)}) \; \Sigma \beta_j(t) X_j(t) \right] + \mu(t) \qquad (5)$$

where TV(t) represents the transaction value for a house at time t.

The right hand side of the model contains two sections which divide the housing characteristics into two distinct categories according to an arbitrary classification. There is a multiplicative section in which the estimated coefficient is represented by (α_i) and the characteristics are represented by Z_i. This section contains characteristics that are classified as qualitative. Qualitative attributes include characteristics which are not common to every housing package and therefore can be used to differentiate properties from one another. An example of a qualitative variable is the type of exterior finish, or siding, on the house. While every house must have some sort of exterior finish, the quality of the different kinds of exterior finishes varies. Qualitative variables also contribute to the selling price of a house multiplicatively. Stucco siding for example, may add five percent to the value of a home as compared to the same house with a wood or vinyl exterior finish. The qualitative variables are represented in the above model by Z_i.

Qualitative variables are included in the model as dummy variables having either 0 or 1 values. In other words, for any particular qualitative variable, a house either has the characteristic or it does not have the characteristic. Looking at equation 5 above, note that the qualitative variables are included in the model as exponents on the coefficients. The qualitative characteristics are also included in the model multiplicatively implying that the resulting estimated coefficient for each variable is also multiplied by the estimated coefficients for all of the other variables in the model.

If a house does not have a particular qualitative characteristic (Z_i) then the coefficient (α_i) is raised to the exponent 0, resulting in an estimated coefficient value of 1. This implies that the estimated coefficient does not influence the other estimates. On the other hand, if the qualitative variable is a characteristic of the house then the exponent is 1 and the estimated coefficient may have a value that is different from 1 and therefore will contribute to the determination of the other estimated coefficient values.

For each qualitative variable included in the model one characteristic choice is suppressed. If aluminum siding, for example, is excluded from the regression, an observation with aluminum siding would result in the value of 0 for all of the remaining siding-type dummy variables leading to a product of 1 for the siding portion of the equation. Each of the suppressed variables combine to define a standard house. Therefore the estimated coefficient for each of the standard variables must be 1. The magnitude of the estimated coefficients assigned to the nonstandard characteristics within each characteristic group determines their value relative to the standard.

Therefore the estimated coefficient for a qualitative characteristic is interpreted as a percentage change, either an increase or decrease, in the selling price of a standard home which is attributable to the addition of the qualitative characteristic in question.[6]

The general model also includes an additive section in which the estimated coefficient is represented by β_j and the housing characteristic is represented by X_j. Quantitative characteristics are included in this section of the model. A quantitative characteristic refers to a characteristic which is common to all housing bundles but varies in the amount of the characteristic that is available within each housing bundle. An example of a quantitative characteristic is size. Each house contains a certain number of square feet but the actual number varies between houses.[7]

Quantitative variables contribute to the selling price of the house in an additive manner. Additional footage, for example, will increase the price by a lump sum amount per square foot. Although this amount may diminish as the total area increases, it is likely that the value of additional size will be

[6] The t-statistic must be calculated to determine whether the coefficient estimates are statistically different from one.

[7] A characteristic which meets the definition of a quantitative variable may be included in the model as a qualitative variable if it is changed to meet the definition of a qualitative characteristic. For example, the number of bedrooms may be divided into groups. Therefore a two or three bedrooms house may be compared to a house with four or more bedrooms.

fairly constant for most houses in the municipality. The quantitative characteristics are include in the above model as the X_j variables.

The estimated coefficients for the quantitative characteristics are also interpreted relative to the standard house. Therefore the quantitative coefficients are interpreted as the incremental value of the characteristic to the standard house.

For the purpose of this thesis it is not necessary to include a time variable because an ongoing assessment of values was not required. Instead the aim of this thesis is to determine the average value of an ocean view at a point in time. Removing the time component and expanding the generalized model to include the three categories of characteristics described in equation 4 yields the following equation:

$$TV = \Pi\alpha_i^{z_i} \left[\left(\left(\Pi\alpha_j^{z_j}\right) \Sigma \beta_j X_j\right) + \left(\left(\Pi\alpha_k^{z_k}\right) \Sigma \beta_k X_k\right)\right] + \mu \qquad (6)$$

Equation 6 separates the three categories of housing characteristics according to their influence on the selling price of a house. Characteristics in the first section, in front of the square brackets, are characteristics related to the location of the house and lot and are identified in the model by the subscript 'i'. These characteristics directly influence the price of the house through their influence on both the value of the structure of the house and the value of the lot.

Inside the square brackets there are two sections. The first of these sections contains variables which influence the price of the house indirectly through a contribution to the value of the structure of the house. Characteristics in this section are identified by the subscript 'j'. The other section includes characteristics which indirectly influence the price of the house through their influence on the value of the lot. Characteristics in this section of the equation are identified by subscript 'k'.

Having categorized the characteristics and divided them into three sections of the equation according to the manner in which they influence the value of the house, it is necessary to distinguish between the quantitative and qualitative characteristics within each of these categories. Each characteristic can then be included in the appropriate section of the model, and in the appropriate format, namely qualitative or quantitative.[8]

Separating the characteristics into the three sections outlined in equation 6 slightly alters the interpretation of the estimated coefficients. Recall, from the discussion following equation 5, the interpretation of the estimated coefficient varies depending on whether the housing characteristic is either quantitative or qualitative. Equation 6 requires that the estimates also be interpreted according to their position within the model.

Qualitative estimates are interpreted as a percentage change, either an increase or decrease, in the value of either the house, structure, or lot

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8 The first section of equation 6 does not include a quantitative, or additive, section because there are no quantitative housing characteristics that influence both the value of the structure and the value of the lot.

depending on the location of the variable within the equation. For example, stucco siding influences the value of the structure. If aluminum siding was defined as the standard siding characteristic, then the estimated coefficient for stucco siding is interpreted as a percentage change in the value of the structure relative to the value of aluminum siding. The interpretation of the quantitative estimates is also dependent on the location of the variable within the model. For example, the estimated coefficient on the lot-size variable is interpreted as a lump sum addition to the value of the standard lot. However, because this estimate is expressed as a lump sum value, the addition to the value of the standard lot is also the addition to the value of the standard house.

Therefore it is important that each characteristic be included in the model in a manner which reflects its relationship to the overall selling price of the house. For example, the number of bedrooms is specific to the structure of the house and influences the value of the house by increasing the value of the building. Other variables, such as the proximity to shops, are specific to the lot and contribute to the value of the house through the value of the lot specific characteristics. Characteristics such as the neighbourhood characteristics, however, affect both the value of the lot and the value of the building, or structure, and should therefore be included in the model in a way that reflects this relationship.

For some characteristics this categorization is not as straightforward. While it is obvious that the number of bedrooms is a variable that is associated with the structure of the house and the proximity to urban amenities influences the value of the lot, characteristics such as the type of, or quality of, view could arguably enter the equation in more than one place. For example, it could be argued that it is the lot that has the view and that any structure built on that lot would benefit from the view. This argument indicates that the view characteristics should be included in the model in the section related to the value of the lot. On the other hand, the value of the structure itself may also be influenced by the view. A housing structure with an ocean view from a small window at the side of the house may receive very little added value from the view. However, a structure which has been built to enjoy the maximum benefit of such a view will likely have views from different areas of the house. If this were the case it could be argued that the value of the structure itself is increased. In this case the view influences the selling price of the house through its contributions to the value of both the lot and the structure.

Since the aim of this thesis is to estimate the average value of an ocean view it is appropriate to position the view variable in the equation so that the estimated coefficient may capture the influence on the price through both the lot and the structure. Therefore the view variable is included in the first section of the model which contains the location influencing variables.[9]

3.1.3 The Linear Model

The linear model is a simplified functional form of the nonlinear model described above. The general form of the linear model includes the same three

9 Including the view variable in the location matrix also facilitates an appropriate comparison of the hedonic pricing and the willingness to pay results.

categories of characteristics, namely; structure, lot and location. The general form of the model is as follows:

$$P_h = \beta_0+\beta_i X_i+\beta_j X_j+\beta_k X_k \quad (7)$$

where X_i, X_j, and X_k represent vectors of different characteristics.

The interpretation of the coefficients in this model is much more straightforward as each of the characteristics in this model is assumed to contribute to the price of the entire housing package in an additive manner.

Quantitative and qualitative variables are included in the model as additive. However, the estimated coefficients for both types of characteristics are interpreted as the addition of value to a standard house. The standard house is defined by the list of dummy variables that are excluded from the regression.

3.1.1 The Hedonic Data

The convenience data for this model were obtained from the Victoria Real Estate Board. Included are listings of 376 houses in the municipality of Oak Bay which where sold between October 1989 and March 1991. The selling prices were adjusted to October 1989 levels by the use of an index derived from monthly averages. The index was generated by dividing each monthly average by the October 1989 average. The individual selling prices were then multiplied by the appropriate monthly ratio index to achieve constant prices.

Constant prices allow comparisons of value to be made without disturbances from market fluctuations.

The data contained a detailed description of each housing package. The details included information on the price of the house along with a description of some of the more significant structural and locational features of the home. Table 3.1 outlines the characteristics according to their category and provides a brief definition of each.

Table 3.1: The Housing Characteristics

Matrix	Variable	Type	Definition
Location	Area	Ql	Area within Oak Bay
	View Type	Ql	Existence of a view
Lot	Cul de Sac	Ql	Location on Cul de Sac
	Privacy	Ql	A private setting
	Distance	Ql	Walking distance to water
	Lotsize	Qn	Square footage of lot
Structure	Year Built	Ql	The age of the house
	Siding	Ql	Type of siding
	Parking	Ql	Type of parking facility
	Fuel	Ql	Type of heating fuel
	Roofing	Ql	Type of roofing material
	Kitchen	Ql	Is there separate sitting area
	Basement	Ql	Completeness of basement
	Levels	Ql	Style of house
	Bedrooms	Ql	Number of Bedrooms
	Bathrooms	Ql	Number of Bathrooms
	Size	Qn	Square footage inside

Table 3.1 also labels the characteristics as either qualitative or quantitative. Area, for example, is a qualitative variable (Ql) because it is a distinctive characteristic which differentiates one house from another. Lotsize, on the other hand, is a quantitative variable (Qn) because it is a common

characteristic. Houses, or more specifically lots, differ only in the amount of square footage they contain.[10]

3.2 The Contingent Valuation Survey

A survey was mailed to the same sample of households used for the hedonic pricing applications. A number of methods were employed to elicit a high response rate. The survey included an individually typed cover letter with an original signature which explained the purpose of the survey and emphasized the importance of a high return ratio. University of Victoria, Department of Economics letterhead was also used to increase the authenticity of the study and a postage paid return envelope was enclosed. The survey itself was short and included only a few simple questions. A copy of the survey and the accompanying cover letter are included in Appendix B.

The survey solicited values for ocean views from two distinct respondent groups. The first section of the survey aimed to elicit willingness to pay (WTP) and willingness to accept (WTA) values from respondents who had a view of the ocean from their present home. Respondents were first asked whether they had an ocean view from their home or property and whether, or not, their home was located on waterfront property. If the response to both of these questions was 'no', respondents were directed to question five where they were

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[10] Some lots were described as irregular in shape and were expressed as an acerage instead of square feet. In these cases the acreage was converted into an equivalent square footage.

asked to express their WTP for each of the five types of ocean views described in the survey[11].

Respondents with ocean views were then asked to select, from a list of five view descriptions which best matched the view from their home. Descriptions were labelled (a) through (e) and ranged in quality from "your view of the ocean from your home and property is totally unobstructed" to "you cannot see the ocean from your home but it is possible to see the ocean from parts of your property." An area at the bottom of page one was provided for those respondents who were not satisfied with these descriptions and wished to give a further description of the view from their home.

Respondents with ocean views were then asked to express both a WTP and a WTA for their ocean view. The WTP question was worded to attempt to elicit a WTP value with the condition that, without payment, they would be denied their view. The WTA questioned, on the other hand, was framed such that the respondent would receive compensation if they were to be denied their view.

In addition to simplifying the sampling process, it was hoped that using the same sample for both the CV and the HP studies would also help to increase the response rate as well as reduce the possibility of some of the potential biases. The hedonic data contained specific details about the home, such as the selling price, that did not have to be asked in the survey. Each survey was coded so that the survey data could be conveniently added to the existing

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[11] The five view descriptions were also listed below question five. A space was provided beside each description and respondents were asked to write their WTP for each type of water view.

data base. Consequently the survey was short and simple and therefore it was more likely to be answered than a survey that included too much detail and asked specific questions pertaining to the house.

Recall that the hedonic data consisted of houses that were sold between October 1989 and March 1991. Since these homes were purchased recently it is possible that the respondents would have recently considered their personal valuation of an ocean view in making their purchasing decision. This may reduce the potential for a hypothetical bias associated with never having considered the issue.

Prior knowledge about some of the housing characteristics also provides a ckeck against strategic bias. For example, if a respondent chose to mislead the surveyor by falsely stating that he/she had an ocean view, the hedonic data provide a guard against this behaviour.

To facilitate a comparison of the hedonic pricing and contingent valuation results it is convenient to express the WTP as a function of the selling price of the house. Respondents who have an ocean view from their present home were asked to attach a value to their view by stating both a WTA to give up the view and a WTP to preserve their current view. These expressed values are equivalent to the price for the view. Therefore it is possible to determine the percentage value of the characteristic in terms of the value of the house by simply dividing the WTA and WTP values by the price of the house as follows:

$$ {}_{view}WTA_{pc} = WTA/P_h \quad \text{or} \quad {}_{view}WTP_{pc} = WTP/P_h \tag{8} $$

where the ${}_{view}WTA_{pc}$ and ${}_{view}WTP_{pc}$ represent the percentage contribution of the ocean view to the selling price of the house.

Respondents who did not have an ocean view from their present home were asked to express their WTP for five views of differing quality. These values are interpreted as a lump sum payment that the respondent would pay in addition to the value of the home in order to attain each of the views in question. To compare these expressed values with the HP results it is necessary to express WTP as a percentage of the value of the house with the hypothetical view. This calculation is done using the following equation;

$$ {}_{view}^{\;i}WTP_{pc} = WTP_i/(P_h + WTP_i) \tag{9} $$

The expression ${}_{view}^{\;i}WTP_{pc}$ denotes the percentage increase, or decrease, in the value of the home that is attributable to view of quality i.

Chapter IV

Results and Implications

4.1 The Hedonic Pricing Results

4.1.1 The Nonlinear Model

The qualitative nature of much of the data lends itself to the use of dummy variables in the model. Qualitative characteristics, such as roofing, are mutually exclusive and therefore dummy variables are an ideal method for incorporating these characteristics into the model. The use of dummy variables requires that one of the possible choices is excluded from the model. In this particular model the group of qualitative characteristics that are excluded combine to define a standard house against which all comparisons of value are made. The standard house used in this model is presented in table 4.1 below.

Table 4.1: The Standard House

Matrix	Variable	Standard House
Location	Area	In either Gonzales or Uplands
	View Type	No view
Lot	Cul de Sac	Not located on a Cul de Sac
	Privacy	Not considered a private setting
	Distance	More than 2 blocks walk to water
Structure	Year Built	Between 60 and 80 years old
	Parking	Street parking
	Heating Fuel	Oil
	Roofing	Asphalt shingles
	Bedrooms	Three
	Bathrooms	Three or more
	Kitchen	Separate eating space
	Basement	Half basement

In theory the selection of standard housing variables should not influence the results. In other words, choosing asphalt shingles as the standard roof instead of shake shingles should not alter the results of the model. The actual coefficient estimates may be different but the interpretation of the coefficients relative to one another should be consistent regardless of the standard characteristics chosen.

Recall that the dummy variables are assigned a value of 0 or 1, and that the qualitative characteristics are included in the nonlinear model as exponents on the coefficients. When a coefficient is raised to the exponent 0 the result is 1 and there is no impact on the estimated coefficient by that observation. If, on the other hand, the dummy variable is 1 then the coefficient is raised to the exponent one and the coefficient estimate is influenced by the observation.

Therefore the variables that make up the standard house must have an associated coefficient of one. This implies that each of the estimated coefficients for each of the variables within a characteristic bundle is interpreted relative to this standard coefficient. A coefficient which is statistically greater than one implies that the characteristic is valued at a higher level than the standard characteristic. A coefficient which is statistically less than one means that the opposite is true. However, if the coefficient is not statistically different from one then, statistically speaking, the characteristic choice and the standard characteristic are equivalent in terms of their contribution to the selling price of the house. For example, if the standard home has an asphalt shingle roof and the estimated coefficient associated with a tar and gravel roof is not statistically different from one then an asphalt roof and a tar and gravel roof contribute equally to the price.

Table 4.2 details the coefficient estimates as well as presenting two different t-ratios. The first t-ratio indicates the statistical significance of the variable in general and applies to both the qualitative and the quantitative characteristics. In other words, if the characteristic is statistically and significantly related to the selling price of the house then the estimated coefficient for that characteristic will have a t-ratio indicating that it is statistically different from zero. The second t-ratio is calculated to determine whether the qualitative estimates are statistically different from one. While a qualitative characteristic may indeed be positively correlated with the selling price of the home it is necessary to use the second t-ratio to determine if its contribution is significantly different from the standard characteristics in its category. If the coefficient is not statistically different from one then the characteristic's contribution is statistically equivalent to the contribution made by the standard characteristic.

When testing for statistical significance it is important to use the appropriate test. For example, a t-test can be used to evaluate the statistical significance of individual coefficient estimates by comparing the difference between the estimated coefficient and the value stated in the null hypothesis. A two-tailed t-test determines whether a coefficient estimate is statistically different from the null in either a positive or negative direction. A one-tailed t-test, on the other hand, tests for significance in only one direction. In situations where it can be safely assumed that the addition of a variable will either increase the value of the house or leave the value unchanged, then a one-tailed t-test is appropriate.

Recall that the variables within the X_l, or location, matrix contribute to the selling price of the house by adding value to both the lot and the structure. Two characteristics were believed to contribute in such a manner, namely; area and the type of view.

The municipality of Oak Bay was subdivided into six smaller map areas. These areas are Henderson, South Oak Bay, Gonzales, Uplands, Estevan and North Oak Bay (see the map in Appendix A). There were only a small number of observations in Gonzales and Uplands. Therefore these areas were combined to make one area bringing the total number of areas to five. Combining Gonzales and Uplands should not alter the overall results because these areas are similar in many respects. For example, both areas are considered to be the more prestigious areas within the municipality. It was believed that people would be willing to pay more for a house within an area with a more prestigious reputation. Therefore combining the two areas should not reduce the usefulness of the results in testing this hypothesis. The combined area variable was also used as the standard which allows an analysis of the other four areas relative to the combination of the more prestigious areas.

Table 4.2: The Nonlinear Results

Matrix	Variable	Coefficient	t-ratio (0)	t-ratio (1)[12]
Location				
Area	Henderson	0.83526	15.196	2.99718**
	S. Oak Bay	0.96488	16.629	0.60527
	N. Oak Bay	0.85779	15.520	2.57305**
	Estevan	0.87007	17.146	2.56049**
	Combarea	1.0000		
Viewtype	Noview	1.0000		
	landview	1.0325	18.778	0.59107
	waterview	1.0690	22.118	1.42762+
	waterfront	1.4382	13.942	4.24818++
Structure				
Parking	street	1.0000		
	single garage	1.0534	19.390	0.98293
	mult. garage	0.97717	17.052	0.398402
	single carport	1.0152	11.768	0.17619
	mult. carport	0.9398	14.214	0.910476
Heating Fuel	Electric	1.0896	26.099	2.14615**
	Oil	1.0000		
	Gas	1.3270	11.067	2.72704**
	Mixed Fuel	0.70793	6.2053	2.56022**
Roofing	Shake	1.1562	22.702	3.066954**
	Tile & Wood	1.3212	19.179	4.66257**
	Asphalt	1.0000		
	Tar & Gravel	0.91068	10.745	1.05478
Kitchen	Separate	1.0000		
	Nook	0.91544	21.175	1.95314*
Basement	No Basement	1.1576	19.940	2.71471**
	Half Basement	1.0000		
	Full Basement	0.92554	26.515	2.13315**
Style	Ranch	1.0113	21.471	0.23991
	Split	1.0000		
	Two storey	0.92733	22.104	1.73213*
Bedrooms	Two or less	1.0550	20.457	1.06651
	Three	1.0000		
	Four or more	0.90415	26.159	2.77311**
Bathrooms	Two or less	1.1776	22.979	3.46550**
	Three or more	1.0000		
Quant. Structure	Finished Area	95.121	9.9771**	
Lot				
privacy	no privacy	1.0000		
	privacy	1.1368	7.1104	0.85564
distance	No walk	1.0000		
	walk	0.70044	5.1000	2.18115**
Quantitative Lot	Lotsize	4.6936	5.0535**	
	Constant term	2.1513	2.131	
R-Squared	0.7711			

12 **, *, ++ and + imply significance at the 5 and 10 % level using a two and one-tailed test respectively.

Examining the estimated coefficients for the four nonstandard areas reveals that they are all positive and less than one. Also, the t-ratios indicate that they are all significantly different from zero and therefore are positively correlated with the selling price of the home. However, although the estimated coefficients are less than one, the t-ratios which test for significance relative to one indicate that only three of the four areas are statistically different from the coefficient on the standard area. A house in Henderson, is worth almost 17 percent less than the same house in Gonzales or the Uplands. Similarly, homes in Estevan and North Oak Bay are worth nearly 16 percent and 13 percent less respectively than the same homes in the standard area. While the estimated coefficient for South Oak Bay was less than 1, a t-ratio of 0.605 implies that it is not significantly different from 1. Therefore, a standard house is worth approximately the same in South Oak Bay as in the standard area.

The other characteristic that is believed to contribute to the selling price of a house by adding value to both the structure and the lot is the type of view. Views were divided into four mutually exclusive categories, namely; no view, nonwater view, non-waterfront water view, and a waterfront view. For the purpose of comparison the no view category was labelled as standard and given a coefficient of 1.

The estimated coefficients were all positive and greater than 1 as expected. Each was significantly different from 0 implying that a view is positively and significantly correlated to the selling price of a house. A one-tailed t-test reveals that only the waterfront coefficient of 1.4382 was significantly different from 1 at the 5 percent level. The waterview coefficient, however, is significant at the 10 percent level. These results indicate that the selling price of a house without a waterfront view, but otherwise identical, will increase by over 43 percent if the house and lot were on the waterfront. Similarly, the selling price of a home without a waterview, but otherwise identical, will increase by almost 7 percent if the house and lot were given a non-waterfront water view.

The estimated coefficient for a nonwater view was 1.0325 but was not significantly greater than 1 at either the 5 percent or 10 percent level. This result implies that a nonwater view does not significantly contribute any additional value to the house.

The coefficient for a water view was 1.0690 and had a t-ratio of 1.428 implying that it is not significantly different from 1 at either the 5 percent level. However, a one-tailed t-test indicates that it is significant at the 10 percent level. One possible explanation for the lower level of significance is the fact that the variable is defined to include all types of water views. While this definition includes views of the ocean which are completely unobstructed it also includes views that are not so unencumbered. In many cases views of the ocean are partially obstructed by other structures, hydro wires, or trees. Views which are not completely free from obstruction will not be valued at the same level as unobstructed water views and therefore may lower the average value of a water view.

It is interesting that the average nonwater view is not significant at the 10 percent level. This indicates that, statistically speaking, the addition of a nonwater view to an otherwise identical home will not alter the selling price of the standard home. The use of average views as opposed to a more narrowly specified nonwater view variable may have generated more significant results.[13]

The next category of characteristics in the model is structure. These characteristics contribute to the selling price of the house by influencing, or adding value to, the physical structure. Unlike the estimated coefficients for the variables in the X_i matrix which express the value of the characteristic as a percentage of the selling price of the house, the estimated coefficients in this matrix are only applicable to the value of the structure. For example, the estimated coefficient for a qualitative variable such as the type of roofing on the house is interpreted as a percentage change in the value of the structure.

The qualitative variables used in this model include; the type of roofing, the type of heating fuel used, the parking facilities, the kitchen eating facilities, the style of the house, the number of bedrooms and the number of bathrooms. There was only one quantitative characteristic included in the structure matrix, namely; the total finished area in the house.

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13 When all of the view types were combined to create one view variable the estimaed coefficient was positive (1.0875) and significant at the 5 percent level. Another model was tested using a water view variable that included both non-waterfront and waterfront properties. This variable (wvwf) was included in the model on its own and had an estimated coefficient of 1.0868 and was also significant at the 95 percent confidence level.

The parking facilities variable was broken down into five categories. These categories include a no parking option, which includes parking on the street, a single carport, a double carport, a single garage, and a double garage. The no parking option was chosen as the standard for comparison. As expected, all of the estimated coefficients were positive. However, none of these were significantly greater than 1 at either the 5 percent or 10 percent level.

There were four types of heating fuel in the sample of Oak Bay homes. These included electric, oil, natural gas, and a mixture of natural gas and electric. The oil variable was used as the standard. Two of the remaining three fuel choices were greater than 1 and significant at the 5 percent level. Electric and natural gas were greater than one and significant indicating that they contribute more to the value of the structure than oil. The mixed fuel variable was less than one and had a t-statistic of 2.56 implying that mixed fuel contributes significantly less to the value of the housing structure than oil. This result is different than what was expected. It was expected that a mixture, or combination, of electricity and natural gas heating fuels would contribute more to the value of a house than an oil furnace because such a mixture is less expensive and more efficient. One possible explanation for this result is that there were only a small number of houses in the sample that used the mixture of fuels.

There were five categories of roofing material, namely; shake, wood, tile, asphalt and tar and gravel. A lack of houses with wood and tile roofing necessitated the creation of a combination variable (combshng) which included both the wood and tile observations. The asphalt shingle roof was selected as the standard and it was found to be of less value then both the combination variable and the shake shingle alternative. The coefficient on the tar and gravel variable was less than one but not significantly less. Shake had an estimated coefficient of 1.1562 and a t-ratio of 3.067. The combination variable had an estimated coefficient of 1.321 with a t-ratio of 4.663. Although there were not many tile or wooden roofs these results indicate that they contribute more to the value of the housing structure than any of the other roofing materials available.

The kitchen variable was included in the model because it was thought that a separate eating space in the kitchen would have a greater value than a kitchen nook. The separate eating space was used as the standard. The estimated coefficient representing the nook variable was 0.91554 and had a t-ratio of 1.953 implying that a nook is significantly less valuable than a separate eating space at the 5 percent level using a one-tailed test.

The style variable refers to the type of housing structure such as a rancher,[14] or one level home, a split level house, or a two storey house. Of these three basic style-types the split level type was used as the standard. The coefficient on the rancher variable was 1.0113 and had a t-statistic of 0.239. This suggests that a rancher is statistically equivalent to a split level house. The two storey house, on the other hand, had an estimated coefficient of less than one implying that a two storey house is not as valuable as a split level house. Although this result was not significant at the 5 percent level, a t-ratio of 1.732 indicates that it is significant at the 10 percent level.

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[14] Also referred to as a bungalow.

The fact that the coefficients on rancher, split level and two-storey houses are not very different from one another may be explained by the fact that, given houses of equal size, peoples style preferences are greatly varied. If, for example, ranchers were always preferred to split level homes, then it would be expected that ranchers would be more valuable than split level homes. However, the results indicate that there is no such preference.

The number of bedrooms was included in the model as a qualitative variable because it was thought that an individual would decide on the number of bedrooms desired in a house prior to beginning a search. Once the decision had been made that a three bedroom house was desired, for example, the individual would begin to search for the 'best' three bedroom house available within the household budget.

The number of bedrooms were grouped into three categories. The first category is the two bedroom house which included both one and two bedroom houses. The second category is the three bedroom house and the third category included all of the houses in the sample containing four or more bedrooms. Three bedroom houses were used as the standard. The coefficient on the two bedroom variable was 1.055 and had a t-statistic of 1.066. This result indicates that a two bedroom house is not statistically less valuable than a three bedroom house for the same square footage. The estimated coefficient on the variable representing houses with four or more bedrooms was 0.90415 and had a t-statistic of 2.77 indicating that, when square footage is held constant, houses with four or more bedrooms were significantly less valuable than three bedroom houses.

This result is not inconsistent with our expectations. If the square footage of the house is held constant it is possible that the size of one or more of the bedrooms in the four bedroom house is less than the size of the bedrooms in the three bedroom house. The addition of a small bedroom may not add value to the house. Also, a large number of the houses which were described as having four or more bedrooms, may have contained bedrooms in areas of the house that are not desirable such as the basement. These bedrooms may have also been make-shift rather than part of the initial structure plans.

Another possible explanation for this result may be that the demand for three bedroom homes is greater than the demand for homes containing four or more bedrooms. A high demand for three bedroom houses may increase the selling price of these houses relative to the selling price of the houses containing more than three bedrooms, therefore making the larger number of bedrooms less costly.

The number of bathrooms was included in the model as a qualitative variable for the same reason that the number of bedrooms was included as a qualitative variable. The number of bathrooms were divided into two distinct groups. One group included all of the observations that had two bathrooms or less and the other group, which was used as the standard, included the houses which had three or more bathrooms.

The estimated coefficient on the non-standard variable was greater than one and significant at the 5 percent level. This implies that having more than two bathrooms is less correlated with the price of the house than having two bathrooms or less. This result is different from the expected result but may be explained by a number of factors including the demand for houses with more than two bathrooms.

Total finished area is measured in square feet and was the only quantitative variable included in the structure category. The quantitative nature of the variable implies that the estimated coefficient of 95.121 is interpreted as an increase in the price of the house of over 95 dollars per square foot increase in total finished area in the standard house.

The final matrix contains characteristics which affect the price of the lot. There were two qualitative characteristics included in the model, namely; the privacy of the lot, and the length of time required to walk to the water.

The estimated coefficient on the privacy of a lot characteristic was 1.1368 and had a t-statistic of 0.8556. This result suggests that privacy is not a significant contributor to the value of a lot. However, many of the lots in Oak Bay are private relative to housing lots in other municipalities. The insignificance of the additional privacy may indicate that the level of privacy was already great enough to satisfy the average purchasing agent.

The time required to walk to the beach was included in the model because it was believed that individuals may value water access as well as, or instead of, an ocean view. The houses were divided into two distance groups, namely; within 2 blocks to the water, and greater than two blocks from the water. Lots that were within two blocks of the water were used as the standard. The estimated coefficient on the distance variable was 0.70014 and was significantly different from 1 at the 5 percent level. This result indicates that the distance to the water, when categorized into the two described groups, was a consideration in the valuation of the lot.

The size of the lot was measured in square feet and was the only quantitative variable related to the lot. The estimated coefficient was 4.694 and significant at the 5 percent level indicating that the value of an additional square foot of lot for the standard housing package is 4.69 dollars.

4.1.2 The Linear Model

As discussed in an earlier section, model specification and functional form are two key elements in regression analysis. For the purpose of comparison the housing price function was also expressed in a linear format. The results of the linear regression are presented in the table 4.3.

Recall from chapter three the general form of the linear model is;

$$P_h = \beta_0 + \beta_i X_i + \beta_j X_j + \beta_k X_k \qquad (10)$$

where X_i, X_j, and X_k represent the vectors of characteristics, namely; the house structure, lot, and neighbourhood respectively.

Table 4.3: The Linear Results

Variable	Coefficient	t-ratio
Map Area		
Henderson	-41414	-2.5008
S. Oak Bay	-17990	-1.1099
Estevan	-42894	-2.4762
N. Oak Bay	-31992	-1.8996
View type		
Nonwater	26867	2.1509
Waterview	12452	1.1345
Waterfront	171280	6.7301
Fuel type		
Electric	-23656	-1.2621
Oil	-38291	-2..0574
Natural Gas	66756	2.1164
Roofing		
Shake	24323	2.7744
Wood & Tile	49060	4.1834
Tar & gravel	37861	2.4636
Age		
<20 years	31706	2.8070
20<X<40 years	8407.4	0.9278
40<X<60 years	9589.6	1.3584
>80 years	8111.4	0.60207
Other Qualitative		
Fireplace	10241	1.9524
Private lot	8093.6	1.4872
Distance	-43572	-5.4074
Two storey	2704.3	0.42614
Quantitative		
Finished Area	41.432	8.8106
Lotsize	3.1707	5.4167
Constant	161960	5.8645
R-Squared	0.7651	
Adjusted R-Squared	0.7497	

Unlike the nonlinear model, the linear model does not differentiate between impacts on the complete housing package and the lot or the structure. Instead the estimated coefficients in the linear model are each interpreted as an amount of correlation between the characteristic and the selling price of the house.

The linear model also used a number of dummy variables. This implies that the interpretation of the estimated coefficients must also be compared to a standard house. The standard house is defined by the list of characteristic choices that are excluded from the regression.

Many of the qualitative variables used in the nonlinear model were also used in the linear model. These qualitative characteristics include; the location, the type of view, the type of heating fuel, the roofing material, the privacy of the lot, the distance to the water, and the style of the house. The linear model also included the same quantitative characteristics used in the nonlinear model namely; the size of the lot. In some cases, however, characteristics that were included in the nonlinear model were found to be insignificant in the linear model and were therefore not included in the final specification of the model. For example, the number of bedrooms, and the number of bathrooms were excluded from the linear model. On the other hand, there were also variables that were included in the linear model that were found to be insignificant in the nonlinear model. For example, the fireplace variable was excluded from the nonlinear model because it was found to be insignificant.

An analysis of the results of the linear model reveal that a number of the characteristics are correlated with the price of the house. The adjusted R^2 of 0.7497 also implies that the model describes the fluctuation in house prices fairly well.

The combination of the Uplands and Gonzales areas was the excluded area variable. The estimated coefficients for each of the included location, or map area, variables were all negative as expected. The coefficients on Henderson and Estevan were -41414 and -42894 respectively and were both significant at the 5 percent level. This suggests that the average value of a house in each of these areas is over $40,000 less then the standard house. The coefficient on north Oak Bay was -31992 and had a t-statistic of -1.899 indicating that the average value of a house in this area is almost $32,000 less than a the average value of a standard house but that this result is only significant at the 10 percent level. Consistent with the results found in the nonlinear model, the estimated coefficient for south Oak Bay was negative and insignificant at both the 5 percent and 10 percent levels.

The estimated coefficients on the different view variables were all positive. However, only the nonwater view and waterfront estimates were found to be significant. The value of a nonwater view was $26,867 while waterfront was worth $171,280. The coefficient on non-waterfront water view was 12452 but the t-statistic of 1.1345 implies that this result is not significant at the usual levels.

One possible explanation for this result may be the fact that the majority of the ocean views used in this study were partially obstructed and therefore of less value than a completely unobstructed ocean view. Combining the different qualities of ocean views results in an average ocean view. It is the value of this average ocean view that this study was attempting to derive. The greater the percentage of views that have some degree of obstruction the lower the expected value of the average ocean view.

Mixed fuel was the variable that was excluded from the regression. The estimated coefficients on the electricity variable was negative but insignificant. The coefficients on the remaining fuel variables were significant at the 5 percent level. The coefficient on the oil variable was -38291 implying that house heated with oil was worth $38,291 less than the standard house. Natural gas, on the other hand, had a positive coefficient implying that a house heated with natural gas had an average value of $66,756 more than the average house.

The estimated coefficients on the roofing variables were all significant at the 5 percent level. Asphalt roofing was excluded from the regression. Shake and the combination variable had coefficients of 24323 and 49060 indicating that houses with a roof of either one of these materials are worth more than houses having other types of roofing shingles. The tar and gravel roof, on the other hand, was found to be worth $32,861 less than the average.

The age of the house was included in the linear model as a qualitative characteristic. Houses were divided into five distinct 20-year age ranges where the age of the house was calculated as the difference between the year the house was built and the year the house was sold. These ranges are listed in table 4.4 except for the range between 60 and 80 years old which was excluded from the regression. The results indicate that only the estimated coefficient on the variable representing houses that are less than 20 years old was significant. According to this finding a house that is less than 20 years old is worth $31,706 more than the standard house.

A dummy variable representing a fireplace was included in the linear regression. A one-tailed t-test indicates that the estimated coefficient of 10241 was significant at the 5 percent level. This implies that a house with a fireplace is worth approximately $10,000 more than an otherwise identical house without a fireplace.

The variable representing distance to the water was also included in the linear model. The estimated coefficient was -43572 and significant at the 5 percent level. This result suggests that a house which is greater than two blocks from the water is worth an average of more than $43, 000 less than the average value of a standard house that is within two blocks of the water.

The estimated coefficient on the privacy variable was again found to be positive but insignificant at the 5 percent level. The fact that houses in Oak Bay are relatively more private than houses in an average municipality may have reduced the significance of added privacy.

Housing styles were grouped into two categories for the linear model, namely; two storey and other. Other, which was defined to include both ranch style and split level houses, was excluded from the regression. The estimated coefficient on the two storey variable was positive but insignificant.

Finally the estimated coefficients on the quantitative variables used in the linear model were both positive and significant at the 5 percent level. The results indicate that the value of a house increases by $41.43 per square foot of finished area and by $3.17 per square foot of lot.

4.1.3 A Comparison of the Hedonic Results

In general the results found using the linear model were similar to those found using the nonlinear model. For example, each model found the combined area of Gonzales and Uplands to be the most valuable. The results of the fuel, roofing, privacy and distance to water variables were also similar. Natural gas was found to be the most valuable fuel type, and a tile and wood roof was the most valuable type of roofing material. The results of each model also indicate that the privacy of the lot is not significant at the 5 percent level, however, the linear model estimate was significant at the 10 percent level. Both models also found that the value of a house is an inverse function of its distance from the water.

The view estimates were slightly different. The waterfront variable was the most valuable of the view variables in both models. However, nonwater views were found to be significant in the linear model and insignificant in the nonlinear model. Non-waterfront water view estimates were also found to be different. While a one-tailed t-test indicated that the estimated coefficient for waterview in the nonlinear model was significant at the 10 percent level, the equivalent coefficient in the linear model was not significant at this level.

Finally, both the linear and nonlinear models found the lotsize variable to be positive and significant. However, the magnitude of the estimates were different. The estimated coefficient for the lotsize variable in the nonlinear model was five dollars while the value in the linear model was only three dollars.

4.2 The Willingness to Pay Results

Of the 376 surveys that were mailed 113 responses were returned.[15] There were 108 acceptable responses including 21 from respondents that had ocean views and 87 respondents that did not have a view of the ocean. 5 of the surveys were returned in protest and an additional 12 surveys were returned by the post office because the houses were unoccupied.

Recall that the survey asked respondents without ocean views to express a willingness to pay for each of five different view descriptions. The average response for each of these five descriptions is presented in table 4.4. To facilitate a comparison of willingness to pay values and the results found using the hedonic pricing model it is necessary to express the willingness to pay values as a function of the selling price of the house. For respondents without ocean views this implies that the expressed value must be divided by the sum of the expressed WTP and the selling price. Recall equation (9) from chapter 3;

$$_{view}^{\;\;\;\;\;i}WTP_{pc} = WTP_i/(P_h + WTP_i) \qquad (11)$$

where the expression $_{view}^{\;\;\;\;\;i}WTP_{pc}$ denotes the percentage increase, or decrease, in the value of the home that is attributable to view of quality i.

15 This represents a response rate of almost 29 percent.

This value may be directly compared to the results of the hedonic pricing model.

Table 4.4: The WTP Results

View Description[16]	WTP	WTPi/(Ph + WTPi)
Description A	65632	0.19079
Description B	41689	0.13722
Description C	28962	0.098736
Description D	13682	0.045414
Description E	10444	0.038912
Average of A ,B, C	45428	0.14648
Average of all	32082	0.11142

As expected, the average expressed WTP declined as the quality of the view declined. The totally unobstructed view had an average expressed valuation of $65,632 while the lowest quality view received an expressed valuation of only $10,444. In terms of percentage value of the selling price, the highest quality view was worth over 19 percent and the lowest quality view was worth slightly less than 4 percent of the house value.

The average of all of the expressed willingness to pay values for all five water view descriptions was calculated to capture the value of an average ocean view. This value is more useful than the individual view descriptions because

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16 The type, or quality, of water views are described by descriptions A through E. Description A is the highest quality water view and quality declines down through E. The different descriptions are explained on page one of the survey in Appendix B.

the hedonic data did not provide enough detail to value anything other than a water view of average quality.[17] The average for the first three view descriptions, namely descriptions A, B, and C, was also calculated because many of the respondents stated a zero value for descriptions D and E. Including only the best three views in the average will allow another comparison with the hedonic model. The average value was $32,082, or 11 percent, for the average calculated using all 5 view descriptions and $45,428, or almost 15 percent, for the average calculated using only descriptions A, B, and C.

The results of the 21 respondents who had an ocean view from their home are presented in table 4.5. To facilitate a comparison of these willingness to pay values with the results found using the hedonic method it is necessary to express them as a percentage of the selling price of the home. Unlike the other expressed willingness to pay values these values are not additions to the value of the house, but rather are values that respondents believe that they paid when they purchased their home. Recall equation 8 from chapter 3;

$$ {}_{view}WTA_{pc} = WTA/P_h \quad \text{or} \quad {}_{view}WTP_{pc} = WTP/P_h \qquad (12) $$

where the ${}_{view}WTA_{pc}$ and ${}_{view}WTP_{pc}$ represent the percentage contribution of the ocean view to the selling price of the house. This value may be compared with the values estimated using the hedonic pricing model. The average expressed willingness to pay values of the 21 respondents with ocean

[17] The hedonic data did differentiate nonwater views, non-waterfront water views, and waterfront property.

views are presented in the table 4.5. These respondents were also asked to express the minimum amount that they would be willing to accept in the event that they were to be completely denied this view. These values are also presented in table 4.5 as willingness to accept (WTA) values.[18]

Table 4.5: WTP with an Ocean View

WTP	86286
WTA	167380
WTP/P_h	0.21
WTA/P_h	0.43

Therefore the average view was valued at $86,286 by respondents who have a view from their home. This is equivalent to 21 percent of the value of their home.

It is also interesting to note that the respondents expressed a WTA that is much larger than their expressed WTP. WTA was $167,380, or 43 percent of the value of their house. The findings of this study are consistent with the findings of several empirical studies (Bishop and Heberlein, 1979; Gregory, 1986). In a review of several empirical studies, Knetsch (1990) found that, 'the minimum compensation people demanded to give up a good or asset was reported to be several times larger than the maximum amount they were willing to pay to keep or acquire a commensurate entitlement' (p. 228). This

18 The survey asked these respondents to identify the type of view that they had from their home. The small number of responses, however , reduced the usefulness of this information. Therefore it was decided not to present this information.

implies that WTP is a more reliable CV measure because the respondent is constrained by his/her budget when considering a WTP value. WTA, on the other hand, should be interpreted cautiously because the budget constriant is not operative when WTA values are considered by the respondent.

4.3 A Comparison of the Results

Table 4.6 provides a summary of the different values found by the different methods and the different model specifications. The nonlinear hedonic pricing model found that the value of an average water view was around 6.9 percent of the value of the standard house. The linear hedonic pricing model, on the other hand, found an average water view to be worth around $12,452, or 5.9 percent of the value of a standard house. The results found using the contingent valuation method varied depending on whether or not the respondent had an ocean view from his/her existing home. For respondents who did not have such a view the average expressed WTP value was $32,082, or 11 percent of the value of their home. If the respondent had a water view then the average expressed WTP for that view was $86,286, or 21 percent of the value of the home.

Table 4.6: Value of a Water View: A Comparison of Results

Methodology	Amount[19]	Percent of P_h[20]
Nonlinear Hedonic	N/A	6.9
Linear Hedonic	$12,452	5.9
CV WTP (no view)	$32,082	11.14*
CV WTP (view)	$86,286	21*
CV WTA (view)	$167,380	43*

A comparison of the expressed WTP values reveals that respondents with ocean views from their present home expressed a greater WTP than respondents without an ocean view. When only the three highest quality ocean views are considered by those who do not have an ocean view the percent increases from 11 to almost 15 percent. However, this value is still less than the 21 percent expressed by the respondents with an ocean view. This difference may have been caused by the fact that respondents without ocean views were unable to properly imagine a water view from their present home.

It is also interesting to note the difference between WTP and WTA by those respondents with an ocean view from their present home. The average

[19] A lump sum amount is not applicable to the nonlinear model because we do not know the average price of the standard house.

[20] * expressed as a percent of the average house price of those who responded and not the average of the entire sample.

difference was \$81,095. A matched pairs t-test found this difference to be significantly different from 0 at the 10 percent level.

The correlation between the contingent valuation and the nonlinear hedonic pricing model was calculated using the following equation;

$$WTP_{VIEW} = \beta_0 + \beta_1 (P_h \times 0.0690) \qquad (13)$$

where WTP_{VIEW} is the willingness to pay expressed by respondents that have an ocean view, P_h is the selling price of the house, and 0.069 is the value of an average ocean view that was determined in the nonlinear hedonic pricing model. The results of this regression are presented in table 4.7.

Table 4.7: Actual versus Expressed WTP

Variable	Coefficient	t-ratio
β_1	8.1963	3.2266[21]
β_0	-85638	1.6467
Adjusted R^2	0.3847	

The estimated coefficient, β_1, is 8.1963 and is significantly different from one at the 5 percent level. The adjusted R^2 indicates that there is a positive and

21 This t-ratio is calculated to test for a significant difference from one instead of zero.

relatively strong correlation between the expressed WTP and the amount actually paid.

Finally, it should be noted that some of the difference between the results found using the different methods may be explained by the fact that the hedonic pricing method does not capture any willingness-to-pay reflected in annual tax commitments.

Chapter V
Conclusions

The average value of an ocean view in the municipality of Oak Bay is dependent on the method used to estimate the value. Expressing the value as a percentage of the value of the home, this thesis achieved values which varied from a high of 43 percent to a low of 4 percent. Narrowing the definition of an ocean view and excluding WTA results decreases this range considerably. When only the average of view qualities A, B and C are used, the range of possible values is reduced to between 21 percent and 5.9 percent.

The estimates achieved using the contingent valuation method were consistently higher than the results achieved using the hedonic pricing method for view quality description A, B and C, and among CV values WTA was higher than WTP. Respondents without an ocean view expressed a range of WTP values for views of different quality descriptions. For each of the top three view quality descriptions, respondents expressed a value greater than the average value estimated using the hedonic pricing method. The lowest quality of view that was described in the survey received an expressed valuation of 3.89 percent. This was lower than the 6.9 percent estimated using the nonlinear hedonic model and the 5.9 percent estimated using the linear hedonic model.

Relatively few studies have used more than one approach to estimate the value of an intangible. Blomquist (1980) estimated the value of a pleasant view in the Chicago area using both the hedonic pricing and contingent value methods. Data were collected from residences along the shore of Lake Michigan. The hedonic data and contingent valuation data used in his study were also drawn from the same sample of households. For respondents that did not have a view from their home, Blomquist found that the hedonic results and the survey results were not significantly different from one another. However, for respondents that had a view from their home, Blomquist found the expressed WTA to be on average five times greater than the results found using the hedonic technique. This finding is consistent with the results found in this thesis where WTA greatly exceeded both WTP and hedonic results.

In another study which applied both the hedonic and contingent methods to estimate the value of air quality improvements in the Los Angeles area, Brookshire, Thayer, Schulze and D'Arge (1982) found the results of the hedonic method to be significantly less than the results found using the survey technique.

This difference between the market-based and nonmarket-based approaches has also been found in studies that compared the travel-cost model and the survey method. In their estimation of water quality improvements, for example, Desvouages, Smith and McGivney (1983) found contingent valuations to be up to four times larger than the estimates found using the travel cost method.

There was a positive correlation between the expressed WTP values and the values estimated using the hedonic pricing model. Although the correlation was positive it was not a perfect correlation. The adjusted R^2 of 0.3847 may indicate that while an individual expresses a certain value for a view, the same individual is influenced by other factors when it comes time to purchase the house with the view. However, the R^2 is a strong indication that people's WTP is not independent of their actual behaviour in the market place.

While a comparison of estimated values across methodologies does not reveal large similarities, a comparison of the different results achieved using different applications of the same method reveal more similar results. The CV method used a survey to elicit values from respondents with, and without, an ocean view from their current house. The WTP expressed by those respondents that did not have a view from their home was slightly greater than $32,000, or 21 percent of the value of their home. Those respondent who had an ocean view from their home expressed a WTP of over $86,000, or 11 percent. However, when the two lowest quality views were removed, the expressed WTP for the average of views A, B and C was $45,428 or almost 15 percent.

The variation in the definition of an ocean view across methodologies could have accounted for some of the variation in the estimated results achieved using the different methodologies. Recall that the survey respondents were given a list of different qualities of ocean views. The hedonic pricing model had to rely on a more generalized description of ocean views that were provided by the Victoria Real Estate Board. This generalized description necessitated the estimation of the average value of an average ocean view instead of a more quality-specific valuation.

A more descriptive view quality variable in the hedonic data set would have allowed a more accurate comparison of the results of the two methodologies. However, given the view quality data used in this study, the value of an average view as estimated by the hedonic method is best compared to the average values estimated using the contingent valuation method. Since many of the respondents stated a zero value for view descriptions D and E, it is likely that the value estimated using the the hedonic models is most like the survey valuation of the average of views A, B and C. A comparison of these estimates indicates some similarities across the methodologies.

There is a very fine line between keeping a survey simple so as to elicit a high response rate and providing enough information to achieve a meaningful result. While the questionnaire used in this thesis achieved a relatively high response rate, a more detailed survey would have doubtless generated still more robust results. The use of photographs, for example could have provided the respondent with a consistent description of an ocean view. This would have allowed a stronger comparison of the different expressed valuations.

Just as the results of the survey are contingent on the survey design, it appears that the results of the hedonic technique are dependent on the model specification. This is especially true in the case of the nonlinear model where the estimated coefficients on some of the variables varied depending on the particular combination of multiplicative variables included in the model.

The results of the two hedonic models are supported, however, by the fact that the results of the two models were consistent with one another in the estimation of several variables. Although the estimated values were different in some cases, the value ordering within characteristics groups was consistent between the two models. For example, both hedonic models found that the combined area of Gonzales and Uplands had a greater value than the other areas in Oak Bay.

In spite of the different results achieved by the different methodologies, the results do provide a range of likely values for the intangible commodity. A more accurate description of the different view qualities in both the hedonic and contingent procedures would have allowed a closer comparison of results from the different methodologies and possibly helped narrow the range of values. While it is apparent that there are several factors which influence a person's valuation of an ocean view, the use of two different methodologies in this thesis has shown that there is a correlation between an individuals WTP and an individuals actions in an open market.

Bibliography

Anderson, Glen D., and Bishop, Richard C. 1986. 'The Valuation Problem.' Natural Resource Economics Edited by D.W. Bromley, Kluwer-Nijhoff Publishing, Boston, pp. 89-137.

Anderson, Robert J. Jr., and Crocker, Thomas D. 1971. 'Air Pollution and Residential Property Values.' Urban Studies Vol. 8, No. 3, pp.171-180.

Bishop, Richard C., and Herberlein, Thomas A. 1979. 'Measuring Values of Extramarket Goods: Are Indirect Measures Bias?' American Journal of Agricultural Economics Vol. 61, No. 5, pp. 926-930.

Bishop, Richard C., Herberlein, Thomas A., and Kealy, Mary Jo. 1983. 'Contingent Valuation of Environmental Assets: Comparisons with a Simulated Market.' Natural Resource Journal Vol.23, No.3, pp. 619-633.

Blomquist, Glenn. 1988. 'Valuing Urban Lakeview Amenities Using Implicit and Contingent Markets.' Urban Studies Vol. 25, No. 4, pp. 333-340.

Blomquist, Glenn, and Worley, Lawrence. 1981. 'Hedonic Prices, Demands for Urban Housing Amenities, and Benefit Estimates.' Journal of Urban Studies Vol. 9, No. 3, pp. 212-221.

Brookshire, David S., and Crocker, Thomas D.1981. 'The Advantages of Contingent Valuation Methods for Benefit-Cost Analysis.' Public Choice, Vol. 36, No. 3, pp. 235-252.

Brookshire, David S., Ives, Berry C., and Schulze, William D. 1976. 'The Valuation of Aesthetic Preferences.' Journal of Environmental Economics and Management, Vol. 3, No. 4, pp.325-346.

Brookshire, David S., Thayer, Mark A., Shulze, William D., and D'Arge, Ralph. 1982. 'Valuing Public Goods: A Comparison of Survey and Hedonic Approches.' American Economic Review Vol. 72, No. 1, pp.165-177.

Brown, Gardner M. Jr., and Pollakowski, Henry O. 1977. 'Economic Valuation of Shoreline.' Review of Economics and Statistics Vol. 59, pp. 272-278.

Butler, R.V. 1982. 'The Specification of Hedonic Indices for Urban Housing.' Land Economics Vol. 58, No. 1, pp. 96-108.

Carbone, Robert, and Longini, Richard L. 1977. 'A Feedback Model for Automated Real Estate Assessment.' Management Science Vol. 24, No. 3, pp.214-248.

Clawson, Marion, and Knetsch, Jack L. 1966. Economics of Outdoor Recreation. Baltimore: The John Hopkins University Press for Resources for the Future.

Coulson, Edward N. and Bond, Eric W. Year. 'A Hedonic Approach to Residential Succession.' The Review of Economics and Statistics Vol.LXXII, pp. 433-443.

Coursey, Don L. 1987. 'Markets and the Measurement of Value.' Public Choice Vol. 55, No. 3, pp. 292-297.

Cummings, Ronald G., Schulze, William D., and Mehr, Arthur F. 1978.'Optimal Municipal Investment in Boomtowns.' Journal of Environment Economics and Management Vol. 5, No. 3, pp. 252-267.

Cummings, Ronald G., Brookshire, Don, and Schulze, William D, eds. 1986. Valuing Environmental Goods: An Assessment of the Contingent Valuation Method. Totowa, N.J.: Rowman and Allanheld.

Davis, Robert K. 1963. 'The Value of Outdoor Recreation: An Economic Study of Maine Woods.' Ph.D. dissertation, Harvard University.

Dubin, Robin A, and Sung, Chein-Hsing. 1990. 'Specification of Hedonic Regressions: Non-nested Tests on Measures of Neighborhood Quality.' Journal of Urban Economics Vol.,27, No.1, pp. 97-110.

Desvouages, W. H., Smith, V. Kerry, and McGivney, M. P. 1983. 'A Comparison of Alternative Approaches for Estimating Recreation and Related

Benefits of Water Quality Improvements.', EPA-230-05-83-001. Washington, D.C.: Environmental Protection Agency.

Feenberg, D., and Mills, E. S. 1980. Measuring the Benefits of Water Pollution Abatement. New York: Academic Press.

Follain, James R., and Jimenez, Emmanuel. 1985. 'Estimating the Demand for Housing Characteristics.' Regional Science and Urban Economics Vol. 15, No. 1, pp. 77-107.

Freeman, A. Myrick. 1974. 'On Estimating Air Pollution Control Benefits from Land Use Values.' Journal of Environmental Economics and Management Vol. 1, No. 2, pp.74-83.

Freeman, A. Myrick. 1979. 'The Hedonic Price Approach to Measuring Demand for Neighborhood Characteristics.' The Economics of Neighborhoods, D. Segal Ed., Academic Press, New York, pp. 191-217.

Freeman, A. Myrick. 1979b. 'Hedonic Prices, Property Values and Measuring Environmental Benefit: A Study of the Issues.' Scandinavian Journal of Economics Vol. 81, No. 1, pp. 154-173.

Giannias, Dimitrios A. 1991. 'Housing Quality Differentials in Urban Areas.' Journal of Urban Economics Vol. 29, No. 2, pp. 161-181.

Gramlich, Frederick W. 1977. 'The Demand for Clean Water: The Case of the Charles River.' National Tax Journal, Vol. 30, No. 2, pp.183-194.

Gregory, Robin, and Furby, Lita. 1987. 'Auctions, Experiments, and Contingent Valuation.' Public Choice Vol. 55, No. 3, pp.273-289.

Grether, D. M., and Mieszkoski, Peter. 1974. ' Determinants of Real Estate Values.' Journal of Urban Economics Vol. 1, No. 2, pp. 127-146.

Griliches, Z. 1961. 'Hedonic Price Indices for Automobiles: An econometric analysis of quality change.' Price Statistics of Federal Government, Washington, D.C.: U.S. Government Printing Office.

Harrison, David Jr., and Rubinfeld, Daniel L. 1978. Hedonic Housing Prices and the Demand for Clean Air.' Journal of Environmental Economics and Management Vol. 5, No. 1, pp.81-102.

Hoch, Irving, and Drake, Judith. 1974. Wages, Climate, and the Quality of Life.' Journal of Environmental Economics and Management Vol. 1, No.4, pp. 268-295.

Horowitz, Joel L. 1987. Identification and Stochastic Specification in Rosen's Hedonic Price Model.' Journal of Urban Economics Vol. 22, No. 2, pp. 165-173.

Knetsch, Jack L. 1990. 'Environmental Policy Implications of Disparities Between Willingness to Pay and Compensation Demanded Measures of Value.' Journal of Environmental Economics and Management Vol. 18, No. 3, pp. 227-237.

Knetsch, Jack L., and Davis, Robert K. 1966. 'Comparisons of Methods for Recreation Valuation.', in Kneese, Allen V., and Smith, Stephen C. eds., Water Research., Baltimore: The John Hopkins University Press for Resources for the Future.

Knetsch, Jack L., and Sinden, J. A. 1984. 'Willingness to Pay and Compensation Demanded: Experimental Evidence of an Unexpected Disparity in Measures of Value.' Quarterly Journal of Economics Vol. 99, No. 3, pp. 507-521.

Linneman, Peter, 1981. 'The Demand for Residence Site Characteristics.' Journal of Urban Economics Vol. 9, No. 2, pp. 129-148.

Loomis, John B. 1987. 'Expanding Contingent Value Sample Estimates to Aggregate Benefit Estimates: Current Practices and Proposed Solutions.' Land Economic, Vol. 63, No. 4,pp. 396-402.

McConnel, K. E., and Phipps, T. T. 1987. 'Identification of Preference Parameters in Hedonic Models: Consumer Demands and Nonlinear Budgets.' Journal of Urban Economics Vol. 22, No.1 , pp. 35-52.

Michaels, Gregory R., and Smith, V. Kerry. 1990. 'Market Segmentation and Valuing Amenities with Hedonic Models: The Case of Hazardous Waste Sites.' Journal of Urban Economics Vol. 28, No. 2, pp. 223-242.

Mitchell, Robert, and Carson, Richard. 1989. 'Using Surveys to Value Public Goods: The Contingent Valuation Method.' Washington D.C.: Resources for the Future.

Mendelsohn, Robert, and Brown, Gardner M. Jr. 1983. 'Revealed Preference Approaches to Valuing Outdoor Recreation.' Natural Resources Journal, Vol. 23, No. 3, pp. 607-618.

Murray, Michael P. 1983. 'Mythical Demands and Mythical Supplies for Proper Estimation of Rosen's Hedonic Price Model.' Journal of Urban Economics Vol. 14, No. 3, pp. 327-337.

Nelson, Jon P. 1979.' Airport Noise, Location Rent, and the Markets for Residential Amenities.' Journal of Environmental Economics and Management Vol. 6, pp. 320-330.

Ohsfeldt, Robert L., and Smith, Barton A. 1990. 'Calculating Elasticities from Structural Parameters in Implicit Markets.' Journal of Urban Economics Vol. 27, No. 2, pp. 212-221.

Palmquist, Raymond B. 1984. 'Estimating the Demand for the Characteristics of Housing.' Review of Economics and Statistics Vol. 61, No. 1, pp. 394-404.

Quigley, John M. 1982. 'Nonlinear Budget Constraints and Consumer Demand: An Application to Public Programs for Residential Housing.' Journal of Urban Economics Vol. 12, No. 2, pp. 177-201.

Randall, Allan, Ives, Berry C., and Eastman, Clyde. 1974. 'Bidding Games for Valuation of Aesthetic Environmental Improvements.' Journal of Environmental Economics and Management Vol. 1, No. 2, pp.132-149.

Ridker, Ronald G. 1967. Economic Costs of Air Pollution: Studies in Measurement. New York, Praeger.

Ridker, Ronald G., and Henning, John A. 1967. 'The Determinants of Residential Property Values with Special Reference to Air Pollution.' Review of Economics and Statistics Vol. 49, May, pp. 246-257.

Rosen, Sherwin. 1974. 'Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition.' Journal of Political Economy Vol. 82, No. 1, pp. 33-55.

Rowe, Robert D., d'Arge, Ralph C., and Brookshire, David S. 1979. 'An Experiment on the Economic Value of Visibility.' Journal of Environmental Economics and Management, Vol. 7, No. 1, pp. 1-19.

Samuelson, Paul. 1954. 'The Pure Theory of Public Expenditures.' Review of Economics and Statistics Vol. 36, No. 3, pp.387-389.

Schnare, Ann B. 1976 ' Racial and Ethnic Price Differentials in an UrbanHousing Market.' Urban Studies Vol. 13, No.1, pp. 107-120.

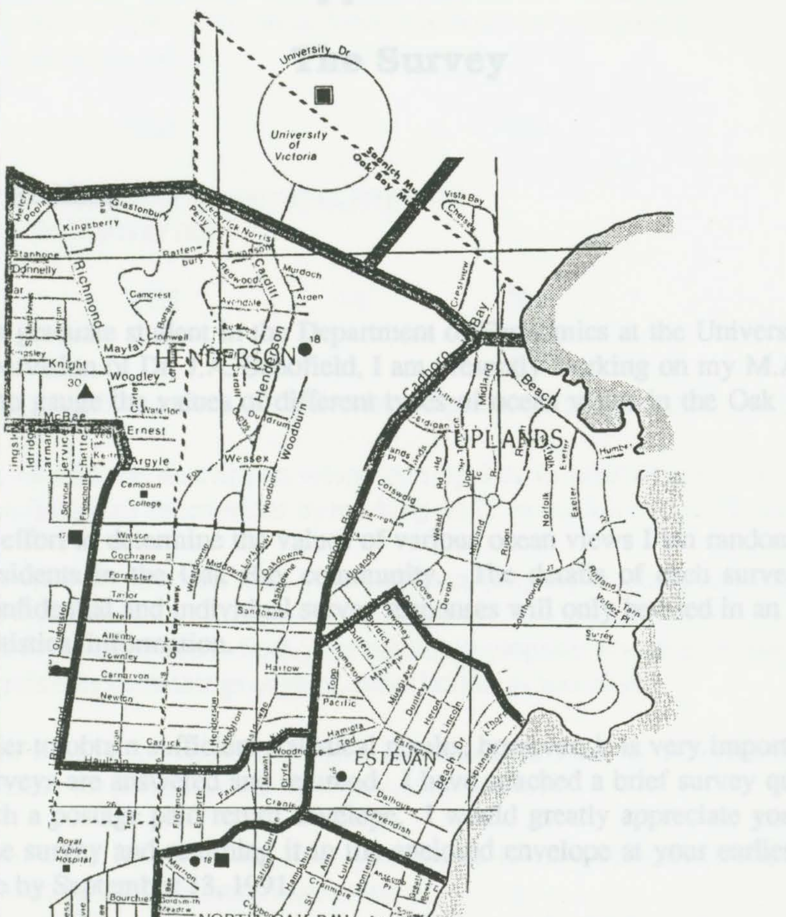
Schulze, William D., d'Arge, Ralph C., and Brookshire, David S. 1981. 'Valuing Environmental Commodities: Some Recent Experiments.' Land Economics, Vol. 57, No. 2, pp. 151-172.

Schulze, William D., Brookshire, David S., Walther, Karen Kelley MacFarland, Thayer, Mark A., Whitworth, Regan L., Shaul, Ben-David, Malm, William, and Molenar, John. 1983. 'The Economic Benefits of Preserving Visibility in the National Parklands of the Southwest.' Natural Resources Journal, Vol. 23, No. 1, pp. 149-173.

Smith, V. Kerry, and Gilbert, C. C. S. 1985. ' The Valuation of Environmental Risks Using Hedonic Wage Models.' Horizontal Equity, Uncertainty and Economic Well Being Ed. M. David and T. Smeeding, National Bureau of Economic Research. Chicago: University of Chicago Press.

Appendix A

A Map of Oak Bay



Area boundaries defined by Victoria Real Estate Board.

Wednesday August 21, 1991

Appendix B
The Survey

Dear Oak Bay Resident,

I am a graduate student in the Department of Economics at the University of Victoria. Under the supervision of Dr. J.A. Schofield, I am presently working on my M.A. thesis which is an attempt to gauge the values of different types of ocean views in the Oak Bay residential area.

In an effort to determine the values of various ocean views I am randomly surveying a number of residents in the Oak Bay community. The details of each survey will be kept completely confidential and individual survey responses will only be used in an aggregate form to compile statistical information.

In order to obtain sufficient statistical results, however, it is very important that a large number of surveys are answered and returned. I have attached a brief survey questionnaire for you along with a postage paid return envelope. I would greatly appreciate your assistance in completing the survey and returning it in the enclosed envelope at your earliest convenience, and if possible by September 13, 1991.

If you would like to confirm the authenticity of this study you may phone the Department of Economics at 721-8532 during regular business hours. Thank you for your cooperation. Your help is appreciated.

Yours truly

Ian Wardley

Ocean View Questionnaire

Question

1. Do you have a view of the ocean from your home or your property?
(Please circle yes or no)

YES NO

2. Is your home located on waterfront property?
(Please circle yes or no)

YES NO

If your answers to **both** questions 1 and 2 were **no**, please go to question **5.**

3. Please choose the description which best applies to your ocean view. (Please choose only **one** of the following descriptions by marking an 'X' in the left margin beside your choice)

____ (a) Your view of the ocean from your home and property is totally unobstructed.

____ (b) Your view of the ocean from your home and property is very good and is only partially obstructed by such things as trees, other buildings and so on.

____ (c) Your view of the ocean from your home is obstructed to the point that you can see only approximately 50 percent of the total unobstructed view.

____ (d) Your view of the ocean from your home is very obstructed and you have only glimpses of the ocean through these obstructions.

____ (e) You cannot see the ocean from your home but it is possible to see the ocean from parts of your property.

If there is any additional information regarding the quality or description of your view which you believe is relevant please write it here. (If more space is required please use the back of this page)

____

____

4. (i) How much would you be willing to accept, at minimum, by way of compensation in the hypothetical event that you were to be deprived completely of this view?

$______________________________.00

(ii) How much would you be willing to pay, at maximum, in order to retain this view in the hypothetical event that without payment you would be completely deprived of this view? (The payment is a one time lump sum payment)

$______________________________.00

The remaining question is for those people that do not have a view of the ocean from their home or property. If you have any additional comments about the survey that you believe to be relevant please write them in the space provided at the bottom of this page and/or on the back of this page.

5. What would you be willing to pay in the form of a one time lump sum payment in order to have an ocean view from your present home? Please state your willingness to pay for each of the following types of ocean views.

____ (a) Your view of the ocean from your home and property is totally unobstructed.

____ (b) Your view of the ocean from your home and property is very good and is only partially obstructed by such things as trees, other buildings and so on.

____ (c) Your view of the ocean from your home is obstructed to the point that you can see only approximately 50 percent of the total unobstructed view.

____ (d) Your view of the ocean from your home is very obstructed and you have only glimpses of the ocean through these obstructions.

____ (e) You cannot see the ocean from your home but it is possible to see the ocean from parts of your property.

Additional Comments? ____

____

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Title of Thesis: The Value of an Ocean View in Oak Bay, Brithish Columbia: A Comparison of the Hedonic Pricing and Contingent Valuation Methods for Estimating Intangibles

Author [redacted]

April 20/93.

Ian Wardley