VALUING NON-MARKET GOODS:
AN ANALYSIS OF ALTERNATIVE APPROACHES

by

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ABSTRACT

This study evaluates a number of different approaches which have been used to estimate the value of goods and activities which are not traded in conventional private markets. Experimental evidence is obtained from surveys of individuals' expressed preferences for a number of different goods and services, with emphasis placed on values associated with the natural environment. Both contingent and real questions are used, with subjects' responses to hypothetical situations shown to correspond closely to the behavior which is observed when real transactions are employed.

A central concern of this thesis is the comparison of measures of economic value based on an individual's willingness to pay to obtain or retain a good and the amount of compensation which is demanded if it is relinquished. In contrast to prevailing economic theory, these two approaches are shown to yield estimates of value which in many cases are systematically and significantly different. Four principal reasons for this disparity are advanced and each is discussed in the light of evidence developed as part of this as well as previous studies. These are the size of the good or payment level under consideration, the availability of substitutes, the perceived legitimacy of the transaction and the influence of responsibility costs, regret or other process considerations.

Empirical evidence is also developed on several other concerns which arise when hypothetical questions are used to value non-market goods. These include the selection of a preferred payment measure, the significance of motivational or cognitive biases, and the potential influence of both framing effects and a number of behavioral considerations. In each case the analysis

of individuals' responses leads to an improved understanding of key methodological considerations and suggests additional research opportunities.

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CHAPTER I

INTRODUCTION

People value everything that they do and use. When private markets exist, the price of a good provides an indication of its relative value. Individuals can then express their preferences by deciding whether to purchase the good or activity at a specified price. When markets do not exist and no prices are charged to individual users of a resource, other mechanisms must be employed to gauge the value of a good or activity. Decisions of this type are quite common, for example, when an item is distributed through the public sector.

This study evaluates a number of different approaches which have been developed to assist in estimating the value of non-market goods. A central concern is the comparison of two principal measures of economic value, which are based on an individual's willingness to pay for a good and the amount of compensation that is demanded if it is relinquished. In contrast to conventional theory, the resultant measures of value are shown to be systematically and significantly different. Four principal reasons for the disparity are advanced on the basis of experimental information obtained in surveys of individuals' expressed preferences for a number of different goods and services.

The discussion emphasizes values associated with the natural environment, and compares survey measures of individuals' expressed preferences for key environmental services--air and water quality, the protection of threatened environments or animal species, access to uninhibited views--

under a number of different experimental contexts. Both hypothetical and real questions are used to provide measures of individuals' values, with alternative approaches compared on the basis of subjects' responses. Hypothetical measures of value are shown to correspond surprisingly closely to estimates based on individuals' observed behavior when real transactions are employed. A number of difficulties which may arise when using hypothetical questions are also investigated and discussed in the context of questionnaire responses as well as previous approaches to the measurement of non-market values.

Experimental results are presented following a critical review of earlier research. The second chapter of this study examines a number of concerns which arise when hypothetical questions are used to measure the economic value of non-market goods. The discussion centers on the disparity between conceptual approaches, which suggest that differences between willingness to pay and compensation demanded measures of consumer's surplus should be negligible and the choice between methods therefore insignificant, and an increasing number of empirical results which suggest that differences between the two methods are both pervasive and substantial. Widely divergent explanations for this disparity have been advanced, and the implications of these are examined in some detail. Finally, the significance of entitlements and the perceived rights of individuals are discussed in the context of both legal and economic arguments regarding selection of the more appropriate measure of changes in social welfare.

Previous survey measures of non-market environmental values are considered in Chapter III. Studies which have employed hypothetical measures in the context of bidding games, open-ended and closed-ended evaluation approaches are reviewed and a number of questions are raised regarding both

experimental design and the interpretation of survey results. Particular attention is paid to the potential impact of several sources of bias on respondents' expressed measures of value.

The fourth chapter of this study stresses behavioral aspects of measuring non-market values, and attempts to delineate some of the more important assumptions which have been made regarding the process by which a person's values are formed and evaluated. A major emphasis of the chapter is the influence of motivational and cognitive sources of bias in the communication of systematically distorted expressions of preference.

A fifth chapter briefly explains the research design and survey procedures that have been used in this study. The discussion outlines six major problem areas for which empirical data has been obtained, presents the design of the experiments and reviews the implementation procedures which were employed. Chapter VI, which constitutes the heart of the dissertation, then presents the key results of the experimental tests and analyzes the major findings of the study. Statistical tests of significance are included for each comparison, along with a discussion of the principal implications.

The analysis of study results yields additional information regarding the basis of the disparity between payment and compensation measures of value. This discussion is presented in Chapter VII, which also examines the circumstances under which one measure is likely to provide a more accurate estimate of anticipated changes in social welfare. A final section reviews the role of hypothetical methods and concludes that, while attention must be paid to a number of specific concerns, contingent approaches will in many cases provide a preferred measure of the value which individuals place on a wide range of non-market goods.

CHAPTER II

EVALUATION CONCERNS IN THE MEASUREMENT OF NON-MARKET VALUES

MEASURES OF ECONOMIC VALUE

Benefits derived from the consumption of a good are based in four principal types of interaction, as shown in Figure 1. If use of the good can be rationed, so that its provision to one individual does not necessarily imply its provision to others, then it is utilized as a private good (Box a).

	exclusion	non-exclusion
rivalry	a	b
non-rivalry	c	d

Figure 1

Classes of Economic Goods

In the case of environmental goods this is typical of values derived from the conventional extractive or commodity-based natural resource industries whose output is sold in well-established markets. Exclusion is not possible in the case of true common-property resources (Box b) but rivalry among users--where consumption by one person impedes or prohibits the consumption of an undiminished quantity of the same good by others--remains. This is the source of the well-advertised common property problem which besets managers of, for example, ocean fisheries or oil pools. The occurrence of non-rivalry simultaneously with exclusion is characteristic of a collective good (Box c) such as a

campground or theatre with unused capacity.

The use of public goods (Box d), the general class of interaction with which this study is particularly concerned, is both non-exclusive and (up to some point) free of rivalry among users. As a number of authors have emphasized, these characteristics nearly describe many publicly or even privately provided (rather than pure public) goods such as higher education or sewage disposal which are produced under conditions of very low or negligible marginal costs (Dorfman, 1966). With a true public good, however, there are really no marginal costs that can be assessed against another individual's use: there is both non-rivalry in consumption and non-exclusion from consumption. In some cases--for example, flouridated municipal water supplies or airborne radiation--the users themselves may be unconscious or even unintentional consumers of the product.

For many private goods that are traded in reasonably competitive markets, directly observed prices can be taken as an initial measure of economic value. But for most public goods, information on relative prices will either be unavailable or can only be obtained from markets that have no real competitive basis. In such cases, more indirect estimation procedures must be employed to estimate the value of a good. Increases in welfare that are derived by individuals can then be added to obtain an estimate of anticipated changes in social welfare, although summation procedures will differ for private and public good benefits since only with a public good can a single unit be simultaneously enjoyed by many users.

The context for interpreting information on peoples' values will also differ according to the dominant type of interaction that occurs. If benefits are largely private then both the available quantity and the asking price of the good will theoretically reflect individual choices, and market behavior

may furnish at least a first approximation of people's true preferences. In the case of non-marketed goods, however, the individual has little or no choice regarding the quantity provided and no direct means of response to changes in price. As a result, much of the well-developed logic of economics must be set aside and decisions regarding the provision or use of non-marketed resources are forced to rely more heavily on political judgements and decision heuristics.

Three major approaches have been developed by social scientists to assist in estimating the value of goods which are not bought and sold in conventional markets. While each of these methods has contributed to this study, both the nature of the non-market goods under consideration and the desire to compare alternate valuation approaches have resulted in a primary reliance on interview and questionnaire measures of value.

The method of revealed preferences is based on the assumption that people have through trial and error arrived at a representative evaluation of their values in terms of comparable or component commodities and activities. Both the worth of a good and the degree of uncertainty or risk associated with its use are therefore assessed through comparison with other goods and activities whose perceived value and risks are similar or through the summation of the individual components of an experience. Revealed preference techniques are widely employed to estimate the value of non-market goods: examples of the approach include the Clawson-Knetsch travel cost method for pricing extra-market outdoor recreation experiences (Clawson and Knetsch, 1966) and numerous hedonic pricing studies of, for example, the relation between air quality levels and residential property values or human health (Lave and Seskin, 1977).

The validity of revealed preference techniques is dependent on the

equivalence of compared experiences, the analyst's ability to accurately observe and record their occurrence in the real world and the commensurability of the principal benefit and risk characteristics. Where regression analysis is employed it may prove difficult to specify the relevant variables and to obtain accurate measures of revealed preferences with respect to each. The approach may also not be responsive to undramatic events such as incremental environmental degradation or evolving social and cultural attitudes.

Implied preference methods evaluate non-market goods in terms of the legal and institutional arrangements which have been developed to govern their use. The approach works best when initial decision criteria and valuation procedures have been molded through time on the basis of economic, ecological and political feedback into widely accepted and generally satisfactory standards (Bardach and Pugliaresi, 1977).

However, an analysis based on implied preference methods must recognize that information regarding collective values is likely to be ambiguous: criticism of many implied preference evaluations has resulted from the apparent lack of coherency observed in political actions (for example, at different levels of government), legal statutes (and their interpretation by the courts) and collective ethical principles with regard to many questions of social preference. A related problem is concerned with the uncertain behavioral response of individuals and organizations to legal and political constraints, since formal rules may be misleading or even ignored and yet serve to stimulate action which is in keeping with an individual's true values.

Expressed preference approaches represent a third alternative in which individuals are asked to state their preferences directly. Well-known variations of the technique include in-person interviews and mail questionnaires, bidding games and public participation through referenda, hearings

and public meetings. Information derived from interviews and questionnaires has been used extensively in recent years to rank environmental preferences on ordinal scales (Miller, 1972), to calculate the economic value of recreational areas (Davis, 1963) and wildlife management policies (Bishop and Heberlein, 1979) and to analyze the risks and benefits accruing to society from different activities and technologies (Fischhoff et al., 1976). Results of iterative bidding techniques, which ask participants to respond affirmatively or negatively to a series of proposed prices, have been used to estimate the economic value of anticipated reductions in visibility associated with large resource development projects (Rowe et al., 1980). Information obtained directly from public participation in decisions regarding projects which promise to significantly alter environmental resources has in recent years been increasingly relied on by decision makers to provide rough estimates of the type and strength of a community's environmental preferences (Berger, 1977).

Certain advantages of the expressed preference technique are obvious: it facilitates the consideration of a wide range of qualities and indicators; it elicits current preferences and is highly responsive to changes in values; it may allow for interactive behavior and clarification between interviewers and respondents. In addition, hypothetical considerations may be explicitly included as part of the evaluation process. Each of these advantages, however, masks a potential for serious difficulties: the problem or indicators in question may be too complicated for many people to understand; respondents may adopt strategic behaviors in order to achieve or disguise unstated objectives; and results may fluctuate wildly or be inconsistent with observed behavior.

While some of the consequent problems are considered to be highly

subjective, others are thought to be fairly predictable: strategic behavior and the conscious understating of true values, for example, are thought to encourage the classic response of the so-called "free-rider," since with no one precluded from the consumption of most public goods it is in the interest of each to avoid contributing to their production. The presumed implications of these problems have frequently led to the blanket dismissal of expressed preference valuations, at least since the publication of Samuelson's (1954) influential reminder. However, the discussion of later chapters will stress that doubts regarding the accuracy of expressed preference measures of value rest on an empirical base which is surprisingly scanty and generally ambiguous.

CONCEPTUAL MEASURES OF CONSUMER'S SURPLUS

Questions relating to the definition and measurement of welfare changes, and to methods by which measures of individual preferences might be aggregated to provide a guide for social policies, have been discussed by generations of economists in great detail. In this section I briefly review several approaches to these questions within a framework appropriate to the understanding of welfare changes which might follow from the revelation of preferences for non-market goods.

Changes in welfare are generally measured in terms of money or wealth, and therefore refer to changes in the area under an individual's demand curve. This area is composed of two parts, one measuring the amount which must actually be paid for a good or activity and another the additional (maximum) amount an individual would be willing to pay. This "consumer's surplus" was first referred to by Dupuit in 1844, with the notion later popularized (and expressed in terms of an individual's utility) by Marshall,

Changes in demand can in turn result from changes in preferences, changes in money income (which directly translates into welfare changes) or changes in prices. It is with respect to price shifts that measurement problems are most frequently thought to arise, particularly since the contemplated changes may be very large. In the extreme case, prices may in fact change from zero (when an activity or good is publicly provided at no cost) to infinity (when the good is no longer available). If demand curves for all goods were uniquely defined--or alternatively, if the preference function of an individual reflected only goods bought and sold in conventional private markets--the description of consumer's surplus measures associated with changes in prices would be relatively straightforward. Unfortunately this is not the case, and five potential measures of welfare change must be considered (Pearce, 1976).

The first is the change in ordinary consumer's surplus, which is measured by the area above the (horizontal) price line but below the (Marshallian ordinary) demand curve. The other four measures, as delineated by Hicks (1939), can be defined with respect to whether payment (or reception) of the associated monetary sums will leave the consumer in his or her initial or final welfare position. These alternatives are shown in Figures 2 and 3, in terms of the demand and indifference curves for some commodity X_1.

Following a per-unit price decrease, the consumer's budget line (Figure 2) shifts out from B_1 to B_2 and market equilibrium shifts from point X to point Y on a higher indifference curve. In order to measure the associated welfare gain, we can imagine that if the consumer were now taxed an amount equal to CV the initial level of welfare could still be achieved at point W. However, this would imply a different combination of purchases than at X. If the consumer were instead constrained to buy the amount of good X_1

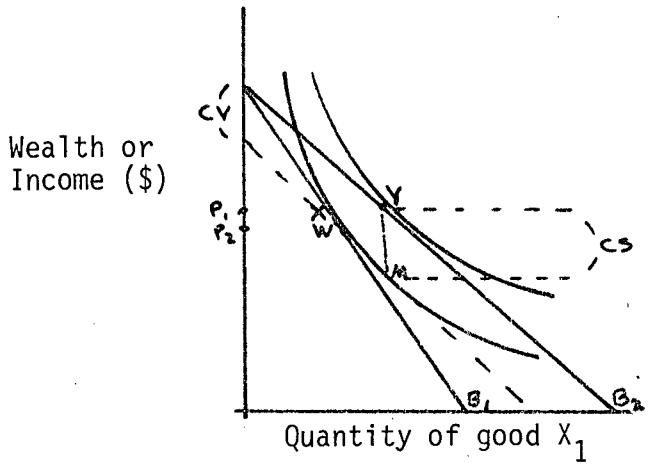

Figure 2

Consumer's Surplus Measures: Price Change

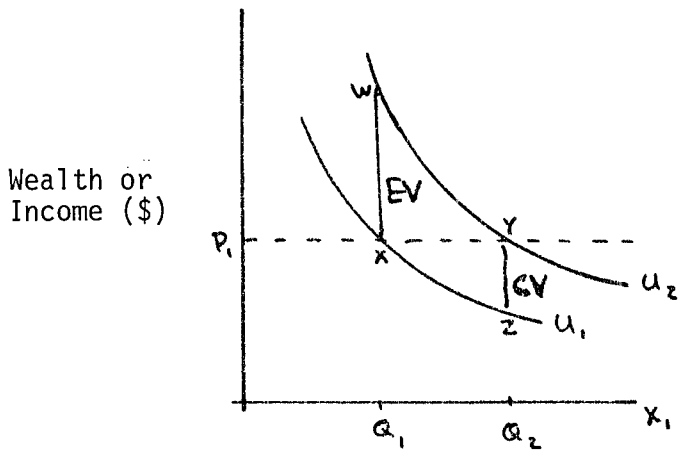

Figure 3

Consumer's Surplus Measures: Quantity Change

indicated at point Y, he or she could be taxed an amount equal to CS and retain the initial level of welfare at point M. These two closely related measures of welfare change are known as the consumer's compensating variation (CV) and compensating surplus (CS). Parallel measures of equivalent variation (EV) and equivalent surplus (ES) refer instead to final welfare positions.

From an individual's point of view, however, marginal adjustments in the quantity of most non-market goods are not possible. Instead, a central characteristic of many environmental (as well as other public) goods is that they are available only in fixed quantities and at a fixed or zero price. The application of CV or EV measures to unmarketed goods is illustrated in Figure 3, where it is assumed that new legislation has increased the available quantity of some good X_1 from Q_1 to Q_2 and the consumer is thus able to shift to point Y on the higher indifference curve (U_2). In such cases, where marginal adjustments in quantity are not possible for the individual, measures of CV and CS (or EV and ES) will coincide.

For a price increase or quantity decrease a CV measure therefore indicates the minimum amount of compensation that must be paid for an individual to willingly tolerate a price or quantity change. An EV measure, on the other hand, shows the maximum amount that an individual would willingly pay to avoid a proposed change. The framework for analyzing quantity (or price) increases is a mirror image of that suggested for quantity (price) decreases, whereby the CV associated with a potential welfare gain is equated to the EV associated with a potential loss. In other words, for a quantity increase the EV (CV) provides a measure of an individual's selling (buying) price while for a quantity decrease the CV (EV) provides a measure of his or her selling (buying) price (Mishan, 1976).[1]

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[1]In most cases, no differentiation is made between individuals who

Conventional economic theory suggests that, if the income elasticity for the good under consideration is positive, EV measures will be greater than CV for quantity increases (or price decreases) while CV measures will dominate EV in the case of price increases (or quantity reductions). In Figure 3, $\overline{WX}$ should exceed $\overline{YZ}$ because the quantity of the environmental good X_1 has increased; if the consumer were instead shifting from U_2 to U_1 due to a decline in the quantity (or increase in the price) of the good, the assignment of CV and EV measures would be reversed. In both situations, stated selling prices are therefore anticipated to exceed expressions of an individual's willingness to pay. So long as income effects are small, however, and the contemplated change in price or quantity of the item is relatively unimportant to real wealth, then differences between the two approaches are expected to be negligible and the choice between measures becomes insignificant. Henderson (1941:121), for example, writing shortly after Hicks' original journal article, stated that "...we shall normally expect the four results to be so close together that it would not matter which we chose."[2]

Following this assumption of equivalence, several of the key theoretical comparisons of CV and EV approaches have felt free to derive estimates of one measure from slight manipulations of the other. The influential analysis presented by Willig (1976), for example, follows this line of argument in providing a method for calculating upper and lower bounds on the differences

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are asked the most they would pay to retain a good currently held and their willingness to pay in order to obtain a desired good. Similarly, no distinction is generally made between the amount of compensation demanded to relinquish a good and the amount required to forego its use. However, it may be important for the researcher to carefully describe which of these situations is under examination.

[2]He then added that "...in any case, when we use the concept we do so without making any pretensions of accuracy," an appropriate comment in the days before consumer's surplus measures influenced the provision of unpriced public facilities.

between ordinary and CV or EV measures of consumer's surplus. He concludes that, in the absence of significant wealth effects, the difference will rarely exceed five percent. Freeman (1979:47) agrees with Willig that differences among the consumer surplus options "appear to be small and almost trivial" and that measures of ordinary consumer's surplus will generally provide a close estimate of potential welfare changes.

Only if the income elasticity of demand for the good in question is high, or alternatively if potential price or quantity changes are large, does conventional theory suggest that differences among the measures might prove to be substantial. Bockstael and McConnell (1980), for example, argue that Willig's calculations are correct but largely irrelevant for the case of public goods since they only apply to those situations where price changes are small and close estimation of the Marshallian demand curve is possible. Particularly under circumstances where a public resource may either be newly provided or wholly eliminated, both these assumptions will often be violated. Krutilla and Fisher (1975) also stress the potential significance of budgetary constraints, which limit an individual's estimates of willingness to pay but not willingness to sell and could therefore tend to make the latter larger.

These caveats have unfortunately provided only slight assistance in predicting how people will respond to potential welfare changes under less controlled or novel situations. Instead, the best they can offer is the disquieting reassurance that the theoretically anticipated equivalence of selling and buying prices should not be assumed in practice. Bockstael and McConnell (1980:58), for example, conclude that it "is impossible to say whether large differences between the two [buying and selling measures] should be expected ...". The approach is typical of most researchers in the field, who continue to argue that EV and CV measures <u>should</u> yield equivalent responses so long as

tests are properly designed and conducted and income effects are not large. This ability to walk conventional lines of argument, however squiggly they might be, is demonstrated by the following tortured explanation given by Blank et al. (1976:288) in their study of visibility preferences:

> Another contention...was that ES and CS values were nearly equal. Analytically, our findings support this. The estimated coefficients ...are such that the values should, theoretically, be nearly equal. In practice our ES and CS values were significantly different due to the difference between the 'willingness to pay' and 'willingness to accept' approaches.

EMPIRICAL MEASURES OF CONSUMER'S SURPLUS

The widespread adherence to an anticipated equivalence of EV and CV measures is all the more remarkable in light of the growing number of empirical results which suggest that differences between the two approaches are not only frequently encountered but of substantial magnitude. Evidence for this assertion comes from a number of recent evaluations of the value of non-market environmental goods. The well-known early study by Hammock and Brown (1974), for example, which attempted to measure the value of wetland and waterfowl resources to licensed hunters, found a four-fold difference between mean willingness to pay and willingness to sell responses. A 1975 study by Environment Canada (Sinclair, 1975) reported that the median compensation demanded by fishermen to permit destruction of a favourite freshwater fishing site was 2.7 times the corresponding measure of their maximum willingness to pay to preserve the area. Banford (1979/80) found that the average stated willingness to pay to preserve a saltwater fishing pier was only one-third the mean selling price. An application of bidding game procedures by Brookshire and Randall (1977), which attempted to estimate the value of elk hunting in Wyoming, found differences between willingness to sell and willingness to pay measures of approximately seven to one.

A more recent study by Rowe et al. (1980) of the potential welfare effects of air quality changes compared contingent measures of individuals' willingness to pay for improved visibility and their willingness to accept compensation in return for diminished visibility. For the four situations which they tested, CS measures derived in bidding games were from five to seventeen times as great as their ES counterparts. The authors attribute this substantial variation to the combined influence of an income effect and the fact that ES questions presented a survey respondent with an additional tax payment whereas CS questions presented the offer of a bribe. Either interpretation could create an incentive to bias bids, with taxpayers' resentment at a "victim pays" principle showing up as understated (that is, less than maximum) expressions of willingness to pay and their outrage at the bribe attempt resulting in large or infinite bids. As further evidence that CS respondents bristled at "being bought off to permit pollution," the authors cite the fact that "slightly over one-half of the sample required infinite compensation or refused to cooperate with the CS portion of the survey instrument." (Rowe et al., 1980:9).

This finding is striking,[3] and would appear to call into serious question the direct comparison of ES and CS measures. While Rowe, d'Arge and Brookshire (1980) imply that non-cooperation is due to a conscious refusal to be bribed, it seems possible that at least for some respondents the difficulty may be cognitive rather than motivational--in other words, that the type of exchange under consideration (money versus rights to environmental quality)

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[3]But apparently unsurprising, since a footnote to the 1980 study states that the 1974 and 1976 surveys "...encountered similar percentages of game rejection, zero bids, and percentages of cooperation." (Rowe et al., 1980:17).

perhaps makes little sense.[4] Certainly a non-response rate of this magnitude implies that there is something very different about the way in which ES and CS questions are perceived, and suggests that their specifications may prove to be substantially less similar than the authors maintain. In fact, there is a nagging sense throughout the article that they keep hoping these results will go away so that they can proceed with the fine-tuning of bidding approaches and not have to deal with the fundamental questions raised by seventeen-fold differences in value between equivalent measures or the implications of analyzing survey results when (for CS questions) non-respondents outnumber respondents.

A provocative comparison of alternate consumer's surplus measures was undertaken by Bishop and Heberlein (1979) as part of their study of the market for early season goose hunting permits in Wisconsin. CV and EV estimates are compared on the basis of commensurate survey data and, because they evaluated a public resource which was rationed in divisible units, the authors were also able to develop a direct comparison of hypothetical and actual measures of individuals' willingness to accept compensation through the creation of a simulated market for hunting permits.[5] Resulting differences in consumer's surplus were quite striking, despite the fact that both income effects and the income elasticity of demand for hunting permits should

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[4]This possibility was briefly noted in the study by Blank et al. (1976:281), which suggested that a respondent's utility map may "exhibit lexicographic ordering," so that he is simply unaware (in this context) of the implications of decreased visibility, or that the conditions of the bidding game may prove sufficiently novel so that respondents "may be unable to cooperate." (emphasis added). However, the authors of the study were not inclined to pursue the implications of these perceptions, nor did they clearly distinguish those situations in which such influences would prove to be asymetric.

[5]Actual measures of consumer's willingness to pay for permits could not be obtained due to the existence of a number of institutional constraints.

be quite small. Hypothetical responses ranged from an average willingness to sell valuation of $101.00 per permit to an average willingness to pay valuation of only $21.00. The average cash offer acceptance of $63.00 was intermediate to both hypothetical values and slightly more than double respondents' average estimate based on their travel costs.

Despite this accumulating evidence of substantial differences in observed estimates of equivalent and compensating variation, most researchers maintain their faith in the equivalence of properly measured payment and compensation prices and retain hope in an explanation of observed variation based on either undiscovered income effects or persistent response biases. Bockstael and McConnell (1980:61), for example, agree that economists should be cautioned "against the ready assumption that willingness to pay and willingness to sell are good approximations of one another" but remain willing to attribute empirical differences to an unidentified income effect. Since the presence of income effects has often been difficult to justify given the small sums of money in question, other researchers have leaned on response biases for their principal explanatory support. Dwyer and Bowes (1978:1008) speak for this group when they assert that "the precise explanation for the wide difference is not yet known, but weakness in the survey instrument seems likely." Bishop and Heberlein (1980:34) are also steadfast: while they conclude that "hypothetical measures of both willingness to pay and willingness to sell appear to be biased, but in opposite directions" they emphatically state that "our results do not support their[6] suggestion that such large differences are indicative of important economic relationships which traditional theory has overlooked."

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[6]The reference is to the earlier studies by Gordon and Knetsch (1979) and Meyer (1979).

However, a small number of economists have recently begun to question the robustness of both income effect and bias explanations while exploring the possibility that other factors might lie behind reported differences in payment and compensation responses. Gordon and Knetsch (1979:6), for example, reviewed a number of published empirical studies and concluded that observed differences in willingness to pay and willingness to sell responses must be attributable to more than "the normally suspected" income effect or response biases. Meyer (1979:227) makes a similar point, arguing that the contemplated changes in environmental quality are frequently sufficiently large so that Willig's conclusion of equivalence between payment and compensation measures "cannot be sustained from available empirical data."

One criticism of several empirical studies which have observed large variations in equivalent and compensating variation measures of value is that both the payment and compensation alternatives posed hypothetical courses of action. In a recent discussion paper, Knetsch (1981) reported the results of a simple experiment which addressed this criticism by having participants choose between alternative luncheon offerings in a situation involving either an immediate cash payment or the acceptance of actual monetary compensation. Although the test was conducted under conditions which would be expected to diminish their divergence, the average actual buying price was significantly less than the reported measure of average compensation demanded. Furthermore, the influence of income or wealth effects must have been negligible due to the small magnitude of the value at issue (which, as Knetsch dryly observes, amounted to only "a single portion of cooked fish").

Thaler (1980) asserts that reported differences in payment and compensation measures may in part be attributable to a perceived distinction between out-of-pocket and opportunity costs, with the former viewed as losses and the latter viewed as foregone gains. Referring to the differential

evaluation of losses and gains predicted by the value function of prospect theory, Thaler argues that goods included in a person's endowment (and therefore capable of being sold) will be more highly valued than those not held. He refers to this underweighting of opportunity costs as the "endowment effect."

Both Knetsch and Thaler regard their findings as preliminary and acknowledge the need for additional experimental tests of how people actually behave when faced with the opportunity to purchase or to sell a particular good. However, both researchers imply that key elements missing from conventional explanations of divergences in alternative consumer's surplus measures are likely to be concerned with behavioral aspects of the way in which preferences are formed and communicated. I agree with this argument, and attempt to add to the evidence in support of this position in the subsequent chapters.

CONSUMER'S SURPLUS AND THE SIGNIFICANCE OF ENTITLEMENTS

Two relevant and closely linked sets of questions have been largely ignored in the previous discussion. Although both issues are enormously complex, I believe that they require at least a cursory notice in the context of the present inquiry. A first question asks what individual measures of welfare can assert regarding changes in social welfare and choices among public resource policy options. A second question asks what measures of social welfare can assert regarding choices between willingness to pay and compensation demanded as the basis of resource policy decisions.

Three basic approaches to the first question have been developed by economists. A first criterion was advocated by Vilfredo Pareto, writing in the early part of this century. His rule is straightforward: a policy

represents an unambiguous improvement in social welfare if it makes no one worse off and at least one person better off. The criterion avoids any interpersonal comparison of welfare change, but is of limited usefulness since nearly every potential action of government unavoidably imposes costs on some party.

Thirty years later, Kaldor (1939) and Hicks (1943) addressed this limitation through development of a second criterion based on the concept of compensation: a policy is said to increase social welfare if those who gain can fully compensate (using money payments) those who lose and still consider their final position to represent a welfare improvement. Maximization of the net value of output (that is, allocative efficiency) is therefore assumed to form the basis of social policy choice. However, the compensation need not actually be paid and as a result some individuals will likely experience an actual welfare loss (that is, the position is one of potential rather than actual Pareto improvement).

The Hicks-Kaldor criterion has undergone a number of refinements in order to improve its usefulness as a basic tool of modern cost-benefit analysis. Scitovsky (1941), for example, recognized that the criterion may not only advocate a change from policy A to B to increase welfare but that under some circumstances (particularly if the change is large) moving back again from B to A would also bring about a welfare improvement. He therefore suggested that compensation tests must work in only one direction. Little (1957) later argued that adopted policies must also improve income distribution. Haveman and Weisbrod (1975) asked whether a project could be said to unambiguously increase economic welfare unless compensation were actually paid (which would restore Pareto conditions) or unless an explicit decision were made that redistribution should be imposed (that is, that losers should

have been made worse off). In addition, they explicitly recognized the significance of transactions costs and warned that informational, political and administrative requirements associated with the determination and distribution of payments may be sufficiently high so as to bring into question the desirability of an otherwise attractive project.

Both the Pareto and Hicks-Kaldor criteria seek to address the question of welfare changes without making explicit value judgements regarding the relative deservingness of affected individuals. Bergson (1937) and others advocated a third approach by arguing that the formulation of just such a social welfare function may be a necessary part of public policy formation. Although the determination of any weighting function is fraught with obvious problems, its creation would allow the approval of projects whose net benefits are negative (and would therefore be rejected under the Pareto or unadorned Hicks-Kaldor criteria) but which nevertheless result in an improvement in a desired indicator (for example, income distribution).

All three approaches have contributed to the development of modern cost-benefit analysis as a tool for choosing among alternative courses of action on the basis of their anticipated contribution to net social welfare. In those cases where legal rights of individuals are clearly defined or widely acknowledged, social cost-benefit analysis can be viewed as a decision technique which is conventionally employed when the absence of a market or the presence of significant transactions costs, free rider preference revelation problems and the like have effectively prevented private individuals from undertaking an action of potential social benefit.

Under most circumstances, the determination of values associated with specific goods or activities will not depend on the assignment of legal rights. Only if an individual is faced with a choice between paying a speci-

fied sum to obtain the rights to an additional asset or accepting compensation for the loss of one which is presently owned will a question regarding entitlements generally emerge. In such cases, however, the measurement of changes in welfare associated with alternate actions may be intimately linked with the assignment of rights to the affected resource uses. Moreover, in a large number of critical social issues--whether the construction of nuclear power plants should be permitted; whether population limits should be enforced in this city--the resultant differences between measures of individuals' willingness to pay and compensation demanded are likely to be large.

This is where the second of my two questions enters the picture: what can measures of social welfare tell us about choices between payment and compensation prices as the basis for public resource policy decisions? The question arises in the case of users' rights governed either by property rules, under which the value of an asset is determined by the seller's minimum voluntary asking price, or by liability rules, under which an asset's value is determined by the state. The conventional practice of both cost-benefit analysis and the courts favors the set of existing rules as the basis for deciding whether payments should be made to purchase a good or to compensate for its loss. Once a specific interpretation of the status quo has been taken as a baseline, increases in the quantity of the good (for example, environmental quality) beyond that point should in most cases reflect an individual's willingness to pay for the improvements, whereas measures of a person's compensation demanded should generally be employed if decreases in the good are at issue.

Many of the basic analytic tools employed by the two disciplines also appear to be quite similar (Calabresi, 1968). For example, the Hicks-Kaldor criterion of potential compensation has been widely employed by the courts in

order to help determine whether moving from one set of entitlements to another would increase social welfare to the extent that the advantages to those who gain outweigh the disadvantages to those who lose (Kennedy, 1981). In such cases, values are generally set by the individuals involved as it is assumed that they know what is best for themselves; if not, the state may paternalistically intervene and make the required determinations. In either situation, the economically efficient (Pareto optimal) solution will vary with the initial distribution of wealth, part of which is reflected in the initial distribution of entitlements.

Moreover, recent interest in both professions in this general type of question follows in part from application of the influential Coase theorem (Coase, 1960). Coase, an economist, argued that in the absence of transactions costs resources would be allocated efficiently regardless of how entitlements were initially set. In a real world replete with transactions costs, it follows that entitlements may be set inefficiently and that application of the Hicks-Kaldor criterion would then provide a means by which to prefer one allocation of entitlements over another (Calabresi, 1972). While the logic relies on economics, the actual decision regarding the setting of entitlements must be undertaken by the state or the courts. This is also consistent with Coase' prescription, which called for the state to intervene on a case by case basis whenever a free process of negotiation was inhibited in order to attempt to create an actual allocation (in the presence of transactions costs) corresponding to the hypothetical outcome that costless bargaining would have produced in the presence of existing entitlements.

Some economists, notably Fisher and Krutilla (1975), have argued that in the case of publicly owned resources for which explicit property rights have not been allocated, their assignment should favor the environmentally least

destructive use. As previously noted, property rights can be distinguished from lesser forms of legal entitlement on the basis of the presumption that an owner's minimum voluntary selling price is the proper measure of value. Accordingly, any developer who wished to impose a move from the status quo would need to meet the asking price of current users or their agents (Heller, 1976): an efficient change would then only be possible if the CV of the developers exceeded the EV received by the resource owners. Fisher and Krutilla argue that the distinction is particularly important when an irreversible development is contemplated; that is, one for which no feasible technical means of restoration exists within an acceptable period of time. Alternatively, priority could be assigned to current users of the area in question, which would require an explicit decision regarding third-party effects or the rights of non-users who might nevertheless experience a change in welfare. In this case, the accompanying measure of benefits would again be the amount of compensation required to induce current beneficiaries to willingly forego their subjectively perceived uses of the area.

In many cases involving non-market goods, however, the rationale for a unique assignment of entitlements is neither clearly defined nor clearly pertinent to the disparity between buying and selling measures of value. For example, it is likely that many individuals tend to assume that a wide range of environmental resources are theirs by virtue of implicit rather than explicit rights, which they define not in a strictly legal sense but rather in terms of the welfare or satisfaction obtained through their use. What is at stake for them is therefore not a legally recognized right but rather their perception of a potential welfare loss.

Even though I have no legal guarantee to the maintenance of an unhindered view, for example, I may still consider it within my rights to

protest when a neighbour's trees grow sufficiently high that it becomes obstructed or when a high-rise apartment is built between my livingroom window and the sea. Furthermore, this conception of personal rights would appear to be consistent with both the economic principle of consumer sovereignty and the legal definition of entitlements: both recognize the right of the individual to assert his or her private, subjective valuation of the resource use in question and guarantee that a very high level of compensation will be demanded before one willingly gives up one's right to prevent an action considered to be objectionable or immoral (Kennedy, 1981).

In the past few years questions of individual rights associated with environmental amenities have begun to intrude into several areas previously assumed to be the sole province of governments. As a result, once individuals become aware that the habitual condition of a resource or environmental amenity regarded as in some way "theirs" is threatened with significant alteration, aspects of their preferences which have previously been latent and, for all intents and purposes, non-existent may suddenly become well-defined. Furthermore, an individual's subjective definition of his or her rights may be substantially different from the assignment a court would consider or the aspects of welfare change that are normally measured by economists.

Two examples may help to clarify this point. First, if individuals are given an opportunity to contribute to public policy regarding wilderness preservation, they may well decide--in a decision that could have little to do with their own current preferences--that they must be richly compensated for taking on the responsibility of deciding on behalf of all future generations whether or not a particular wilderness environment or animal species will continue to exist. The results of an experiment designed to test the significance of a similar "responsibility cost" component of perceived values

will be presented in Chapter VI. Secondly, a decision based on current welfare positions implies that whether or not a person has a legal right to prevent something being done to themselves (or to their environment) should determine the question of whether their willingness to pay or compensation demanded should be employed as a measure of value. Yet this approach encourages those interests which are not granted legal recognition--altruism, spiritual values, bequest motivations and emotional states such as dignity or tranquility--to be omitted from the decision calculus. Both examples argue that criteria based on legal entitlements may be conceptually unable to align with considerations of individual welfare; measurement of the objective change in status of a property right will therefore fail to coincide with the perceived change in status of an individual's welfare.

The point at issue here is not only the possible indeterminancy or irrelevance of present entitlements but the possible conflict between the allocation of rights under the status quo and their allocation under a cost-benefit framework of social welfare maximization. Whether the winners could compensate the losers has as much to do with what measures and whose opinions are used to establish the magnitude of the values at issue as it does with the identification of winning and losing parties, particularly insofar as the winners from a change of status may also be those who see themselves as losers if no change is made. Moreover, the best that any analysis based on current entitlements could hope to achieve would be an accurate depiction of some of the values which the community holds at one point in time. As Tribe (1973) and others have emphasized, the analysis could never assist a community's residents in thinking about what their values should be, despite the fact that addressing this issue (for example, through the establishment of inalienable entitlements) might result in a substantial increase in net social welfare.

Before these issues are seriously considered by either the economics or legal professions, answers to two basic questions regarding differences in payment and compensation prices must be more clearly established. First, are differences in the two measures real in the sense that they reflect significantly different perceptions of the value of some good rather than merely technical artifacts of accompanying changes in income or biased measurement procedures? Second, if neither income nor response effects lie behind the variation, can contributing factors be sufficiently clearly distinguished so as to facilitate the prediction of changes in value that would accompany a given potential change in status? Partial answers to both questions have already been suggested, and additional experimental evidence will be presented in the following chapters.

CHAPTER III

SURVEY MEASURES OF NON-MARKET ENVIRONMENTAL VALUES

Empirical studies of the economic value of non-market environmental preferences are few in number: interest in the area is fairly new, the task is difficult, and results are carefully scrutinized by a skeptical professional and political audience. Two principal research techniques have been employed to estimate the net economic benefits associated with maintaining or improving present environmental conditions in the face of a proposed development or other source of environmental change. A first approach utilizes observed changes in the prices of market-valued commodities and is exemplified by hedonic pricing studies of such diverse goods and bads as air pollution, climatic variation and noise levels. An alternative approach utilizes survey research techniques and asks individuals to directly state the value they place on a particular public good or activity. Since hedonic measures do not rely on direct expressions of preference and cannot reveal differences in payment and compensation prices, I will only review studies which develop survey measures of value for non-market goods.

Three different types of survey methods have been used to estimate the economic value of non-market goods. A bidding game or auction approach posits an initial value which is then varied by specified amounts until the price charged is considered to be excessive or the payment offered is deemed insufficient. The closed-ended or all-or-none approach asks subjects to respond affirmatively or negatively to a proposed monetary payment, with the level varied across respondents. An open-ended approach asks participants

to state the maximum (minimum) amount they are willing to pay (willing to accept) to purchase or retain (forego) a good or activity.

The field is dominated by a series of four articles published in the Journal of Environmental Economics and Management over the past seven years. Although a number of different researchers have been involved, each study makes use of an iterative bidding survey technique and subjects' on-site responses to photographic information to examine the economic benefit (cost) of potential improvements (reductions) in visibility. This is accomplished by comparing current visibility levels to one or more possible future situations which could result from increased energy development in the region. Subjects are asked either their willingness to pay to improve air quality levels or their willingness to accept compensation in return for lower standards. As discussed in Chapter II, the consumer (whether buying or selling) is generally constrained by the quantity of the good which is publicly supplied and is not free to purchase any desired quantity. As a result, measures of equivalent and compensating surplus (rather than variation) have usually been derived.

The first of these studies, by Randall, Ives and Eastman (1974), estimates the benefit of reducing the aesthetic environmental damage associated with operation of the Four Corners power plant in New Mexico. The type of bidding game which was employed asked interview subjects if they would be willing to pay a specified dollar amount to improve the quality of the visual environment. Potential air quality and other aesthetic losses were verbally and visually described and an attempt was made to create hypothetical market conditions which were easily understandable (for example, utilized a familiar method of payment) and believable (in an institutional or policy sense). This hypothetical payment was then increased or decreased

by identical amounts in a series of repetitive verbal questions and the highest positive response recorded by the interviewer.

Results of a second study by Brookshire, Ives and Shultze (1976), which again used a bidding game approach to estimate potential aesthetic damages associated with construction of a power plant, were published in 1976. Although minor differences--related to the preferred payment vehicle (in this case, an entrance fee rather than a sales tax increase), characteristics of the sample population, and the scope of impacts considered--were present, both survey procedures and the magnitude of mean responses were similar to those of the 1974 study. On the basis of this correspondence, the authors concluded that they had successfully achieved "confirmation of bidding games as a useful and consistent tool for eliciting consumer preferences." (p. 388).

The 1976 study gave explicit attention to a number of problems which the authors felt could arise in the application of bidding games. Of particular concern were problems of strategic bias (in which individuals exaggerate their true feelings in order to influence cumulative survey results), the relationship between equivalent variation or surplus (EV, ES) and compensating variation or surplus (CV, CS) measures of welfare change, and the translation of individual to aggregate social bids. An attempt was made to first discuss theoretical aspects of each of these issues and to then evaluate their empirical significance on the basis of survey responses.

Both the 1974 and 1976 studies represent early attempts at the refinement and extension of techniques designed to elicit individual preferences for environmental quality.[1] While their contribution is beyond

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[1]Following the lead, for example, of R.K. Davis' earlier surveys of recreationists in Maine (1963) and P. Bohm's studies of Swedish subject's willingness to pay to view a videotaped TV program (1971).

dispute, hindsight shows a number of questionable conceptual and empirical assertions. Three major issues require further discussion before turning to the subsequent articles in the series.

First, the basic question asked of participants in the two studies is fundamentally different. Although both asked respondents to compare three conditions of the visual environment, the 1974 study used the highest level of damage as its starting point and asked respondents to state the maximum amount they would be willing to pay to improve the aesthetic environment. In the 1976 study participants began in the most pristine situation and were asked if they would be willing to pay to prevent deterioration of the visual environment. Under the framework established by prospect theory, these two formulations of the payment question stress either losses or gains and therefore could yield substantially different responses: the possibility will be tested in Chapter VI.

Second, it appears that the similarity of numerical results obtained in the 1974 and 1976 studies led to a false sense of security in the accuracy of responses to a bidding game procedure. With the 1976 study in many ways simply a replication of its predecessor, the strong possibility exists that both efforts were liable to identical errors. Yet no systematic comparison of control (bidding) with other (closed- or open-ended) survey approaches was undertaken. Two types of potential errors, associated with the introduction of a starting point bias and the hypothetical nature of the questions asked, were briefly noted; however, other types of bias--associated with the specific wording of survey questions, frustration with the multiple bidding procedure itself ("so he doesn't believe me..."), the use of photographic data or the form of interview procedures--were not discussed. And basic to both studies is the implicit assumption that people not only

hold quite definite values regarding visual qualities of the environment but can overcome the structural limitations of the particular survey format which is employed to accurately express their preferences in monetary terms.

Third, the three problem areas raised in the second article were addressed much less vigorously, and certainly less on the basis of actual survey responses, than indicated by the authors. Three discrepancies are briefly noted:

1. The test for strategic bias associated gaming with the presence of low (zero) or extremely high (undefined) bids relative to the sample mean, which was itself assumed to have magically escaped any biasing influence. While the test is intuitively appealing, the authors failed to establish any firm criteria for strategic behavior beyond (a) their largely subjective evaluation of the relative (to what?) flatness of the distribution of responses, and (b) their unsurprising failure to identify many dishonest bidders who were sufficiently skilled intuitive statisticians to quickly calculate the amount that their bid should deviate from the mean response so as to successfully affect the survey average.[2]

2. Measures of compensating surplus were not directly obtained from survey respondents but were instead derived from ES responses using a conventional deductive utility formulation. Surprisingly, the authors state that the approach was selected not on the basis of its descriptive capability but rather for its statistical self-justification and because it provided a convenient interpretive context. Since the selected functional forms assume that the two measures of consumer's surplus are identical in

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[2]In this light, the report that the one strategic bidder was an economics professor is more a source of concern illuminating inappropriate test procedures than it is a source of comic relief.

their arguments and ignore a large number of possible sources of variation, test results showing ES and CS differences of less than one percent are neither surprising nor particularly informative.

3. The successful aggregation from individual to social bids is said to require that both income effects and the perceived change in environmental quality are relatively small. Yet no direct survey evidence is obtained for the second issue, while the first is assumed to be trivial for the range of values under consideration. Several other questions--were respondents stating their individual preferences or those of the household?; why should individual responses necessarily be additively summed?--are also potentially important and should be addressed before an aggregation procedure can be confidently defended.

Several of these concerns are discussed in the third and most comprehensive article of the series, published in 1980 by Rowe, d'Arge and Brookshire.[3] The basic survey instrument is similar to that used in the 1976 study, with respondents asked to state their willingness to pay to remain in the highest of three contingent visibility situations. In this case, however, a second set of survey participants was asked to state their willingness to accept (hypothetical) compensation in return for moving to a lower quality environmental status. A direct comparison of ES with CS measures of consumer's surplus was therefore possible, as has already been discussed in Chapter II. In addition, tests for the influence of strategic bias, so-called "information bias" (which covers an ill-defined host of factors that could potentially be introduced by the survey design, interviewer or survey respondent), payment vehicle bias and hypothetical bias

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[3]The article uses survey data previously collected for an unpublished study by Blank et al. (1978), prepared for the Electric Power Research Institute.

(arising from the fact that the individual is confronted with a contingent rather than actual situation) are included.

Strategic bias was tested by analyzing whether participants characterized as environmentalists (or developers) increased (decreased) their stated willingness to pay after being given information regarding a hypothetical mean bid or after being told their bid was insufficient to maintain present air quality standards. Since most respondents did not significantly alter their bids, the authors concluded that strategic bias generally has a negligible effect. This result is not surprising, in part since behavior such as that traditionally known to characterize the free rider (for which some empirical evidence was obtained) would encourage a bid closer to, rather than farther away from, the supposed mean bid of the sample. However, several aspects of the test procedure fail to inspire confidence.

First, the background study by Blank et al. (1978) reports that fully one-third of respondents did choose to revise their willingness to pay bid when confronted with the possibility that it was insufficient. This may simply be a natural response to new information, or it may be indicative of strategic (downward) bias in initial bids. Similarly, the two-third's who stuck with their stated amounts may have strategically biased their initial bids and therefore not required revision. Second, participants were told that the information given them on mean bids had been obtained in other studies (rather than, for example, earlier tests of the present study), which might decrease its perceived relevance and influence. Third, the test seems to present a readily transparent game that could discourage a respondent from changing his or her bid ("I'm not as dumb as they think!") without telling us anything about the accuracy of an initial response. Finally, no evidence is presented to suggest that those individuals sophisticated

enough (and sufficiently highly motivated) to give strategically biased bids would necessarily be naive enough to immediately thereafter characterize themselves as being pro-conservation[4] or pro-development.

The implications of the two types of survey instrument (or information) biases, relating to the influence of (a) different starting bids and (b) prior information concerning the preferences of other respondents, were also tested with reference to both the ES and CS bid curves. The possibility of starting point impacts had been noted but was not investigated in the two earlier bidding game studies; both Randall et al. and Brookshire et al. used $1.00 starting bids, with the 1974 study employing 25¢ bidding increments and the 1976 study $1.00 increments. The 1980 study used starting bids of $1.00, $5.00 and $10.00 and employed $1.00 bid increments.[5]

The influence of starting point bias was found to be highly significant for ES responses, with each increase of $1.00 in the specified amount leading to an average increase of over $0.60 in the subsequent bid within the $1.00 to $10.00 range that was examined. These results, along with the respective mean bids, are shown below for each of the four levels of environmental quality.[6] Information presented on other (supposed) respondent's low mean bids was also influential, with those who received the information

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[4]Measured in terms of their answer to a statement regarding previous contributions to environmental causes, which may not provide a reliable indicator of a person's attitude toward the environment or toward the particular cause under consideration.

[5]Blank et al. (1978:284) report that the interviewers "...used $1.00 increments but were allowed to make adjustments according to the responses received." However, no additional reporting on the influence of bid increments is provided.

[6]From Blank et al. (1978), Table 7.12.

bidding (on average) $1.70 per month less than the control group.

Starting Bid	Conditions			
	A——B	A——C	B——C	A——D
$ 1.00	2.40	4.08	2.27	4.19
$ 5.00	5.31	6.99	4.25	7.40
$10.00	8.23	10.43	4.40	10.97
Mean Bids	4.75	6.54	3.53	6.85

CS bids were sufficiently large so as to mask the observed effects of starting point or survey instrument influences as demonstrated by test results. The possibility that larger mean or starting bids might have resulted in testable biases was noted but not empirically investigated.

On the basis of this evidence, Rowe, d'Arge and Brookshire (1980:18) conclude that both suggested starting bids and the structure of the survey instrument "may seriously distort valuations derived from the iterative bidding technique." Potential changes aimed at debiasing the bidding process are weakly posed,[7] and despite the optimistic finding that comparisons with other studies "indicate estimates of [ES] surplus measures are within 10% of each other" the reader is left with a discouraged feeling that the influence of the above mentioned problems is pervasive and that perhaps earlier studies are in close agreement only because they also reflect the same biases.[8]

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[7]For example, the background study by Blank et al. (1978) suggests that starting bids could either be selected by the respondent or by the researcher through pre-sampling, but fails to present an accompanying rationale as to why these procedures might minimize biases. Similarly, it suggests that no extraneous information should be presented without providing criteria to help the next researcher decide what is, and what is not, necessary.

[8]A similar point was made in the background study by Blank et al. (1978:288): "Logically this similarity [of results] does not prove that

What was needed was a new burst of confidence, and this was furnished by M. Thayer in his 1981 study of environmental preferences conducted in New Mexico's Jemez Mountain recreation area (Thayer, 1981). The general approach is similar to that of the preceding studies with the following exceptions: (a) the hypothetical development is a geothermal power plant, larger in scale but otherwise similar to others already developed in the region; (b) only two states of the environment are considered; (c) the damages which accompany development could include the emission of noxious gases and an increased noise level as well as visual degradation of the environment.

Thayer explicitly states that his objective is to "address the three biases [starting point, hypothetical, and information] which have undermined the general acceptance of the contingent valuation method." (p. 28). He develops a general model in which consumers, whose preferences are assumed to be identical, seek to maximize the utility derived from a specified outdoor recreation activity and income level.[9] This model is then extended to investigate each of the three sources of potential bias.

The analysis of hypothetical bias assumes that the contingent nature of the bidding approach will not influence responses in any specific direction but could decrease a participant's incentive to answer accurately.[10]

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bidding games elicit true measures of willingness to pay. It only demonstrates the similarity with which respondents react to the process." However, the report then terms this "a sociological rather than an economic question" and proceeds onwards, as if the shifting of responsibility provided a vindication of tunnel vision.

[9]Paying to preserve the existing natural setting is equivalent in utility terms to not paying the bid and thereby allowing development to proceed, after which the number or quality of recreational visits would be diminished.

[10]Freeman (1978) shares this concern, arguing that in a hypothetical framework an individual will not have to live with the consequences of his response and therefore incurs no real loss of utility for giving inaccurate answers. He raises the additional concern that hypothetical willingness to

Thayer therefore equates the hypothetical nature of the bidding game with a possible random error in survey responses rather than with the introduction of a systematic bias. His test of hypothetical bias, which involves estimation of the additional travel costs associated with recreation plans at a substitute (post-development) site, could provide an internal check on response accuracy but is no more closely related to actual respondent behavior.[11]

Thayer's test of information bias evaluates whether asking survey questions which include a description of alternative recreation sites might alter a respondent's perception of the relative quality of the study site. This is a very specific example of information bias, and although it leads to intuitively appealing predictions--correction of a misconception that the next nearest site was farther away (closer) than it really is should bias bids downward (upward)--we learn nothing about other influences of the survey design or biases introduced by the specific form of the survey questions. Furthermore, since 64 of 65 respondents were from nearby cities and all were recreationists, it is to be expected that most individuals would possess a good general knowledge of substitute recreation sites in the immediate area. The prior hypothesis that information bias is not a significant determinant of bid behavior therefore should be, and is, confirmed.

Thayer's test of starting point bias assumes that the respondent in

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pay questions designed to minimize the influence of biases may simultaneously eliminate an individual's incentive to take the time required to frame an accurate response.

[11]A related study by Brookshire, Thayer, Schulze and d'Arge (1981) attempts to validate the iterative bidding survey procedure through comparison with a standard hedonic analysis of the effect of air quality on housing values in Southern California. However, the study evaluates preferences for a conventional privately owned market and the results are therefore not directly comparable to an outdoor recreation or other public good context.

a bidding game faces conflicting desires. On the one hand, we are told that he wants to bid honestly and in accordance with his true preferences (that is, strategic behavior does not exist). At the same time, the respondent wants to minimize the time spent in answering survey questions, which is consistent with minimizing the number of stepwise bids. Within Thayer's utility maximization framework the problem therefore becomes a straightforward attempt at cost minimization.

Respondents were asked if they would pay an entrance fee of either $1.00 or $10.00 in order to prevent the occurrence of environmental damage associated with the proposed geothermal development; the amount was then increased (or decreased) by $1.00 at a time until a negative (positive) response was obtained. As Thayer notes, the recreational experience to be valued was in most cases well known from previous visits and well defined in physical characteristics; similarly, the payment vehicle employed was both familiar to respondents and clearly conveyed the real possibility of exclusion for non-paying individuals. As suggested by both Randall et al. (1974) and Bohm (1973), these factors would be expected to decrease the influence of starting point (as well as other) biases.

This is exactly what was found, with no significant differences observed between average bids starting at $1.00 and at $10.00; in fact, the mean bid proved to be slightly lower with a $10.00 starting point. The interpretation of these results is difficult: two concerns will be noted here and discussed in more detail in Chapter VI. First, both $1.00 and $10.00 represent relatively low levels of payment. If the respondent views the starting point as representing a socially desirable estimate of what willingness to pay should be, the difference (for an average family size of four) between a 25¢ and a $2.50 per person visit may well prove insignificant.

If the starting points were instead $1.00 and $50.00, a significant starting point bias might be introduced. Second, it is not at all clear that any relation necessarily exists between respondents' stated willingness to pay an entrance fee and the value they place on preservation of (in this case) the Jemez Mountain recreation area. Instead, the similarity of bids with $1.00 and $10.00 starting points may simply reflect a common understanding of how large entrance fees commonly are. Thayer's claim that vehicle payment bias "can be countered by using a device which is familiar and requires routine behavior" (p. 27) may therefore be substantiated only at the expense of sacrificing the survey instrument as a mechanism for eliciting relevant expressions of value.

In summary, the results reported in Thayer's 1981 study are deceptively fragile. He does present additional evidence that if the payment mechanism implies routine behavior, the contingent situations are easily understandable and the non-market commodity under consideration is familiar, then alternative starting points should exert a negligible influence on respondents' bids. However, these conditions are highly restrictive. For more abstract contexts, with less familiar modes of payment or with novel development options, his results tell us little about the confidence to be placed in iterative bidding measures of value or what to do if serious biases are present. The relation of hypothetical to actual behavior remains unaddressed, and we still cannot differentiate between bids which might represent a respondent's valuation of the non-market commodity under consideration and bids which might merely reflect the form of the selected survey procedures. And on the major question of the present inquiry, the divergence between empirical estimates of equivalent and compensating surplus or variation, no new information has been gained.

Despite both their acknowledged and their ignored limitations, these four articles have greatly enhanced the respectability accorded survey measures of the value of non-market environmental goods. They have also provided a readily accessible model for additional studies of related resource policy issues on the part of both government agencies and private consultants. Utility companies and research groups such as the Electric Power Research Institute have been particularly interested in using similar procedures to estimate the benefits and costs associated with the installation of emission controls at planned power generation facilities.[12]

One other application of the bidding game procedure will also be discussed because it attempts to extend the technique to derive expressed preference measures of non-user values.[13] This study, conducted by Walsh et al. (1978), evaluated residents' willingness to pay for improved water quality in the South Platte River basin of Colorado. Photographs of three different levels of water quality were employed to derive estimates of four components of value, associated with user's recreational activities and three types of arguably separable non-user demands (option, existence and bequest). The study also compared two methods of payment, with an individual asked to state either the maximum percentage increase in sales taxes or the maximum monthly increase in water bill payments which the household would agree to pay to preserve water quality at present levels.

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[12]For example, a major study was recently completed by Charles River Associates Inc. for the EPRI. Entitled "Visibility Impairment at Mesa Verde National Park: An Analysis of Benefits and Costs of Controlling Emissions in the Four Corners Area" (EPRI, December 1980), the report develops estimates of consumer's willingness to pay for various levels of air quality on the basis of an ordered logit model. Questions of bias and alternative consumer's surplus measures are noted but not explored.

[13]The term refers to demands which exist for a large class of goods that are not directly "consumed" on site by individuals. Such "non-user"

Selection of the payment mechanism was found to significantly influence the resulting bids,[14] and interesting results were obtained regarding the relationship between individual bids and a number of socio-economic variables. However, tests for the presence of bias were not undertaken and, with the exception of a general caveat regarding the hypothetical nature of the questions asked, the possible influence of bias and other sources of error was not even discussed. This absence of context, especially in light of the relatively novel and complex subject matter, implies an undeserved confidence in the accuracy of survey results and their use in the formulation of public policy. Starting point bias would appear to be a particularly important concern, since the mean bids which are reported for option, existence and bequest values are all relatively close to the initial amounts which were employed.

Other studies of non-market environmental goods have employed either closed-ended or open-ended measures to derive survey estimates of economic value. The survey of duck hunters by Hammack and Brown (1974) employed open-ended questions to determine respondents' maximum willingness to pay or minimum compensation demanded to preserve a wetland habitat. A 1975 survey of anglers in northern British Columbia, conducted by Environment Canada (Sinclair, 1976), also used open-ended questions to estimate the value to

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values are frequently associated with benefits conferred by the preservation of environments in their natural state, the conservation of endangered species, or the protection of indigenous cultures threatened by the spread of modern society.

[14]Average willingness to pay values for improved water quality on the basis of a sales tax measure were approximately three times as great as values obtained on the basis of a proposed increase in consumers' water bills. The interpretation of this difference is complicated by the fact that it is not clear whether respondents would have viewed the stated tax increase as a total (that is, in addition to current tax contributions) or incremental payment.

residents of preserving their favorite freshwater fishing site.

Stoll et al. (1982) employed both open-ended and closed-ended questions in their study of subjects' willingness to pay for recreational boating permits on four East Texas lakes. While they reported that responses to the two formats appear to be within the same range, their findings remain preliminary pending the results of additional analysis. Stoll et al. also report that a higher precentage of subjects find it possible to give what seem to be accurate responses to the hypothetical closed-ended than to the open-ended questions.

A widely-quoted recent experiment, by Bishop and Heberlein (1979), utilized a closed-ended approach to estimate the value of goose hunting permits in Wisconsin. Permits are ordinarily issued upon request without charge: in order to derive an estimate of their value, Bishop and Heberlein established three randomly selected groups of hunters who either (a) received non-negotiable cash offers for their permits in the mail, with payments varying between $1.00 and $200.00; (b) received questionnaires designed to provide a hypothetical measure of permit value; or (c) received questions designed to develop a travel cost measure of value.

While the response to cash offers indicated an average compensation demanded of approximately $63.00 per permit, hypothetical measures averaged $101.00 for participants' willingness to sell and only $21.00 for the willingness to pay alternative. These differences prompted Bishop and Heberlein to conclude that both strategic and hypothetical biases "do have significant impacts on HV (hypothetical) and TC (travel cost) values for recreation and other extramarket goods" (p. 929). While this argument appears justified on the basis of their experimental results, it is difficult to evaluate the relative effect or magnitude of individual sources of bias.

Moreover, their discussion implies that the actual value of $63.00 per permit provides an accurate measure of individuals' average willingness to pay. Yet it is clear that a closed-ended approach represents only one of several possible evaluation techniques: without a straightforward comparison of alternatives, it is not possible to state which method might provide the best measure. The results of several comparisons of closed-ended, bidding game and open-ended measures of consumer's surplus will therefore be presented in Chapter VI.

CHAPTER IV

BEHAVIORAL CONCERNS IN THE MEASUREMENT OF NON-MARKET VALUES

THE PERCEPTION OF UTILITY

The assertions of utility theory are so fundamental to most studies of preference revelation and decision making that their authors have long since assumed that readers will accept its major tenets as given. In fact, modern economics now uses the terms "utility" and "welfare" almost interchangeably to signify the satisfaction or well-being that is created for an individual through the consumption of a good or the pursuit of an activity.

The assumptions of utility theory were first rigorously defined by Von Neumann and Morgenstern in the early 1940s. With an impressive sense of elegance they formally demonstrated that the utility of an uncertain act is equal to the mathematical expectation (an objective probability-weighted average) of the (cardinal) utilities of the associated outcomes. The theory has been considerably extended since that time, with Savage (1954) advancing the notion of subjective probabilities and numerous authors suggesting alternative approaches to the specification and weighting of utilities. In general, however, all of these methods offer a prescriptive analysis of rational choice, advance a single criterion for decision makers and propose maximization of the criterion as a guide to selecting among options. So long as an individual's preferences also satisfy certain basic axioms of rational behavior, this theory says that the way in which individuals assign utilities to outcomes will be consistent with the maximization of expected utility.

These requirements of rational behavior include the conditions of consistency and coherency. For choices to be consistent, a person must exhibit preferences which are transitive and obey the rules of dominance, so that if one of two alternatives is superior in all dimensions it will always be selected. Implicit in these criteria is the sense that present actions reflect a set of values which will still be relevant when their outcomes are realized. For choices to be coherent, an individual must exhibit well-ordered preferences (characterized by non-intersecting indifference curves) and know what he or she wants in the sense of being able to compare alternatives and decide whether one is preferred or both are equally desirable. Values must also be independent of choices and a person's resultant behavior in the sense that what one believes is going to occur must be distinguished from what one would like to occur (Hogarth, 1980).

This picture of a person as a complete rational decision maker really addresses two sets of concerns: what do we think will happen in the future and how do we think we will feel about it at the time. It is elegant, consistent and logically satisfying. As demonstrated by both careful observation and a large number of empirical tests, however, it is also in some ways wrong and in other ways only partially correct. The required adjustments would be less severe if utility theory had remained a prescriptive analysis, since few have claimed that people actually go through the mechanistic step-by-step maximization procedures envisioned by normative models. But because of the close links between modern economic thought and utility theory, the application of economic analysis has unavoidably led to the widespread employment of utility theory as a description of actual decision making and preference evaluation behavior. Stripped of its normative basis, the framework suggested by utility theory--or, as Fischhoff, Shapiro and

Goitein (1979) have said, the "experienced utility of expected utility approaches"--requires a more fundamental re-interpretation.

Adjustments to the first question, which concerns decision making under conditions of uncertainty, form the basis of the arguments of Simon (1956; 1979), March (1978) and others which fall under the heading of bounded rationality. The approach emphasizes that the complexity of the environment and cognitive limitations of the decision maker may dictate the construction of more simplified, sequential (or lexicographic) preference evaluation models based on a desire to satisfice rather than to maximize. In contrast to utility theory, models of bounded rationality suggest that the valuation of preferences for non-market goods will likely be characterized not by the accurate assessment of potential risks but by their misrepresentation or denial; not only by probabilistic thinking but also by its avoidance and subjective adjustment; not by the full consideration of consequences or alternatives but by a partial and biased choice of data consistent with the preconceptions of the individual decision maker.

Although a connection is obvious, the focus of the present study is more closely aligned with the second question, which asks how future choices are likely to be evaluated on the basis of an individual's present and anticipated preferences. This immediately involves the possibility of change, both in a person's values and in the type of choices which are presented. However, neither utility theory nor the adjustments proposed under models of bounded rationality have explicitly addressed values which are inconsistent or ambiguous, which may change over time in response to an individual's behavior and strategic considerations, or which vary in response to slight alterations in the framing of choices.

One of four responses is likely. First, recalcitrant behavior may be considered to be the artifact of a biased or contrived observational

procedure and dismissed as uninteresting. Second, observed preferences may encounter a Procustean theoretical structure which amputates, elongates, twists and turns the incoming data so that it fits the assigned conceptual bed. A third and more satisfactory approach is simply to establish a list of adjustments which must be made to the expected utility descriptions under this or that condition. Much of the literature on social judgement (Nisbett and Ross, 1980) and behavioral decision theory (Slovic et al., 1977), Kunreuther's studies of low probability events (Kunreuther et al., 1978), Grether and Plott's (1979) work on preference reversals and Thaler's (1980) description of consumer choice behavior may all be viewed in this light. However, it is obvious that as the list of exceptions grows, so too does the strain placed on the original model.

A fourth approach would involve the introduction of a new integrative paradigm, and in 1979 this appeared in the form of Prospect Theory. As developed by Kahneman and Tversky (1979a) and Tversky and Kahneman (1981), the proposed descriptive framework for analysing choices made under uncertainty is able to successfully accommodate many of the observations of preference which were incompatible with a strictly utility maximization framework.

Prospect theory addresses the same two key aspects of decision making which are expressed in utility theory by cardinal utilities and by statistical probabilities. However, a value function, $v(x)$, now links each possible outcome of a gamble or prospect with an appraisal of its subjective worth while a weighting function, $\pi(p)$, identifies the subjective importance which is attached to the probability of obtaining each possible outcome. The attractiveness of a choice that either yields outcome x with probability p or a chance of q to gain or lose y is therefore equal to $\pi(p)v(x) + \pi(q)v(y)$.

Outcomes are expressed not in terms of final asset positions but in

terms of the gains or losses (positive or negative deviations) which they represent from some neutral reference outcome. This subjectively defined reference point, assigned a value of zero, could represent a person's perceived current status, his or her anticipated future status or any other psychologically significant outcome. A second specification of the value function is that it is steeper for losses than for gains, so that an unpleasant change in status elicits a more extreme response than a desirable change. A person's value function is also considered to be S-shaped, so that it is concave above the reference point and convex below it (see Figure 4). As a result, a person becomes increasingly less sensitive to a given monetary difference or change in outcomes as the total prices or stakes that are involved increase.

The probability weighting function replaces the statistical probabilities employed in utility theory by behaviorally more realistic decision weights. In accord with Kahneman and Tversky's earlier empirical findings, the redefined non-linear function (see Figure 5) has the effect of giving special consideration to both certain and low probability events while underweighting intermediate and high probability outcomes. One important consequence is that the attractiveness of gains or the aversiveness of losses which are certain is exaggerated relative to gains or losses that are merely probable. For example, the prospect of losing $x with probability 1.0 is more than twice as aversive as possibly losing the same amount with probability .5. However, a .5 chance of winning $y is not perceived to be twice as attractive as a .25 chance of winning the same amount.

The characteristic nonlinearities of the value and probability weighting functions employed in prospect theory imply that the specific perspective that an individual utilizes to evaluate a decision problem can affect

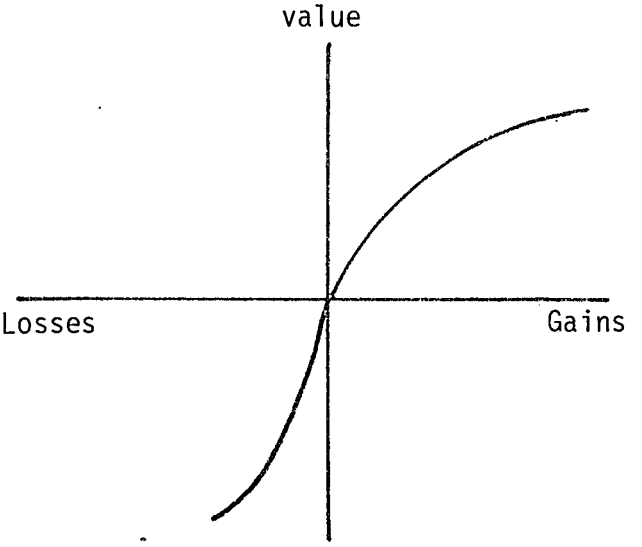

Figure 4

A Hypothetical Value Function

Source: Tversky and Kahneman, 1981.

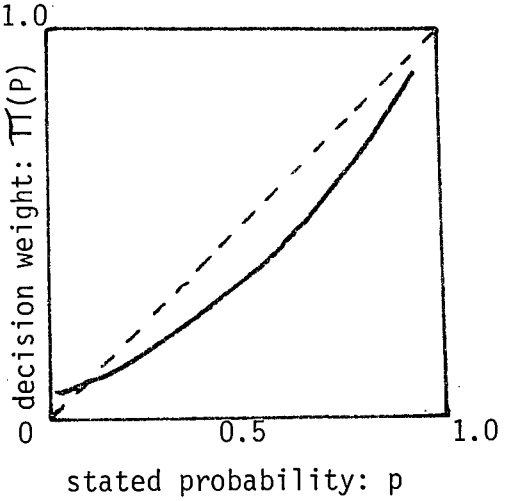

Figure 5

A Hypothetical Weighting Function

Source: Tversky and Kahneman, 1981.

his choice. The term "decision frame" is used by Kahneman and Tversky to describe a decision maker's subjective conception of the acts (options), outcomes (consequences) and contingencies (conditional probabilities) associated with a particular choice situation. Although the frame which is adopted will in part reflect an individual's personal characteristics and habits, it is also often possible for a given decision problem to be framed in a number of alternative ways. As a result, changes in revealed preferences can accompany conscious or unconscious changes in the framing of acts, outcomes or contingencies. Specific examples of consequential manipulations of decision frames, which are predicted under prospect theory but anticipated to be irrelevant under an expected utility framework, will be presented in Chapter VI.

A related implication of prospect theory is that the way in which decisions are made can exert a significant influence on a person's observed behavior. As a result, the potential effect exerted by the specific process which is employed in addressing a decision problem--what Kahneman has termed "manner variables" and I later refer to as "process" considerations--must be considered as part of any preference valuation procedure.

In fact, the manner in which an action is performed may prove to be more important than the actual good that is eventually obtained. Although this view is considered as part of some travel-cost models and is implied in assessments which recognize the state value of environmental resources, process considerations have generally tended to be either ignored by modern economic thought or inelegantly lumped together under the heading of "transactions costs." This lack of attention will be found in most expected utility models, which have minimized the significance of an individual's subjective balancing of mental costs. It is as if there were thought to be two distinct measures of value, an external account (worthy of study) dealing with

the objective benefits and costs which arise in connection with the direct acquisition of goods and a second internal account (not worthy of study) concerned with the psychic benefits and costs associated with a particular manner of action.

For a substantial number of goods and activities, however, not only might emotional and ethical considerations form an integral part of the perceived product but the manner in which an end-state is achieved may also exert a significant influence on an individual's true preferences. Prospect theory removes the protective veil of expected utility models and provides an initial conceptual base for the incorporation and further exploration of process considerations. Chapter VI will discuss the subject of transactions costs in more detail and report on the results of several experiments which test the significance of process variables in the context of survey measures of value.

THE SIGNIFICANCE OF BIAS

This section will explore a number of ways in which biased responses can arise when information obtained from interviews or questionnaires is used to estimate the value of non-market goods. Such distortions are said to result in bias rather than merely confusion when deviations from statistical prediction are systematic rather than random. The sources of bias considered in this section are all endogenous in the sense that they arise within the context of the measurement process itself, in contrast to a wide range of exogenous factors (such as income levels, age or sex of participating individuals, residency and the like) which could also be responsible for distorted expressions of environmental preferences.

Biases are significant because they represent one cause of inaccurate

responses. This implies that the reported values of non-market goods will differ from their true values, which are thought to be consistent with the behavior that would be revealed if the good in question were offered in a market where exclusion was possible. In most survey research literature a person's true values are considered to be an objective magnitude which can be independently identified and measured. However, it is precisely the impossibility of obtaining objective measures of value for most non-market goods that has given rise to the present research.

Justification for this review is based on the inadequate acknowledgement and treatment of bias in most existing studies of non-market values. Despite an emergent literature in micro-economics and environmental management which addresses the significance of motivational biases (discussed in Chapter III) and a rapidly growing literature in cognitive psychology and behavioral decision theory which examines the influence of cognitive biases, few attempts have been made to investigate their joint effect in the context of valuing preferences for specific non-market goods. The presence of a communications gap is not surprising, since the fertile working ground of cognitive psychology must appear as quicksand to the economist steeped in the rational maxims of utility theory.

Because of the significance of these concerns for the later analysis of survey results, the discussion will seek to establish a relatively comprehensive framework for the identification and classification of bias. A first section examines major sources of motivational bias, defined as those intentionally introduced during the measurement process. A second section will review major forms of cognitive bias, whose distortive effect is unintentional and highly resistant to change. A third section will briefly summarize a number of strategies which seek to limit or offset--that is, debias--some of

these effects.

Motivational Biases

Motivational biases are intentionally introduced distortions of what the respondent feels are his or her true preferences. The conscious nature of motivational biases results in their appearance as part of directly expressed measurements of non-market values such as those obtained through interviews, questionnaires, bidding games or referenda. The deliberate distortion of true preferences may also appear as part of other preference measurement approaches--for example, court rulings or government legislation may be intentionally biased so as to compensate for anticipated interpretations or to set an example.

Although the incentive for intentionally distorting responses is recognized in economic theory (for example, "strategic behavior" and "free rider" problems associated with the provision of public goods), few applied studies have examined the relative influence of biases or looked at how individual or social incentives might discourage the communication of true preferences. Several published articles which do address the influence of bias (for example, Rowe et al., 1980) develop an explanation based on a utility maximization framework and implicitly assume that distortive behavior is intentional, rational, and related to perceived end states. As has been discussed in Chapters II and III, these assumptions describe only one of several alternative models of preference formation and valuation and fail to explain a number of widely observed empirical findings.

The discussion of this section therefore seeks to suggest ways in which conventional explanations of bias in studies of non-market and particularly environmental values might profitably be extended. Three major classes of motivational bias are considered.

Strategic bias. Strategic bias arises through the attempt of individuals to impose their preferences on others by exaggerating their true feelings, thereby hoping to influence the cumulative representation of average preferences. At least three requirements must be met: (a) subjects must suspect that their response will differ substantially from those of others; (b) they must perceive that the exaggeration of their own responses will affect the evaluation of others' responses but not be detrimental to their own cause; (c) subjects must be willing to be dishonest. These requirements can be restated in terms of the individual exhibiting (a) some conception of a hypothetical mean bid, (b) an understanding of study procedures, and (c) sufficient trust in one's own preferences and objectives to sanction lying in order to obtain them.

Strategic bias has received quite a bit of attention since Samuelson (1954) rediscovered Wicksell's 1869 argument that preference revelation may be biased in the case of an individual's expressed willingness to pay for public goods. Bohm (1972) compared the influence of strategic bias in five different experimental situations, while Maler (1974) was among the first to discuss response bias in expressed preference evaluations of environmental services. Several more recent studies (Brookshire et al., 1976) have focussed on strategic biases which arise when using bidding games to develop willingness to pay measures of aesthetic damages. Rowe, d'Arge and Brookshire (1980), for example, ask survey participants a simple question regarding their environmental stance and then evaluate whether environmentalists increase (and developers decrease) their bids relative to those previously stated after being presented with information regarding the sample mean. If strategic bias is present, it is expected that false expressions of value (constrained to non-negative values and some upper limit of credulity) will be advanced in

order to offset the unsatisfactory bids of others. For example, if a respondent's true evaluation is $10.00 but he or she feels (or is told, as in Randall et al., 1974) that, in a sample of nine other persons, the mean response will be (was) only $6.00, the prediction is that the strategic bidder will quickly come up with a dishonest value of $46.00.

Despite the widespread acceptance of strategic effects there is little empirical evidence to support their existence. Bohm (1972), for example, evaluated differences in strategic biases among five sample groups and found the influence to be surprisingly small. Several more recent articles (Randall and Brookshire, 1978) assert that incentives for "free-riding" can be minimized through a carefully designed preference revelation strategy. An attempt to influence mean bids is more difficult to isolate but also more difficult to undertake as it requires some access to information regarding survey design as well as an adequate computational ability. At present it appears safe to say that strategic behavior is better viewed as an isolated malady rather than a universal epidemic, and that care in survey design and implementation should insure that the effect will rarely prove terminal.

Information bias. Several principal sources of information bias can be distinguished, although care must be taken not to confuse conscious distortions of information with unintentional cognitive biases. The first and most frequent type of information bias arises from the interaction between the survey interviewer and respondent, with bias introduced by either party. For example, to the extent that an interviewer is flippant, arrogant or boring a respondent may become frustrated, annoyed or fatigued and purposefully begin to make things difficult for the analyst by introducing erroneous data or by stating extreme judgements which reflect a false sense of clarity and confi-

dence. Individuals may also reason that anyone asking questions about environmental options, for example, is an activist and in order to please him assume a similarly preservationist stance. On the other hand, an intentionally raised eyebrow, dubious "hmmmmm" or altered tone of voice on the part of an interviewer can severely distort (either randomly or systematically--that is, results may be confused rather than biased) the responses which are obtained.

A second form of information bias is rooted in the nature of the survey issue itself. Particularly in the case of highly contentious environmental disputes, both parties may have formed such clearly established battle lines that accurate responses are impossible to obtain and results instead represent charicatures of true preferences. In this case questions of timing (for example, before/after an election) or sponsorship (for example, whether the survey is conducted by a nature club or a utility) could prove significant. A related form of this bias derives from an implicit sense of social norms, so that the city shopkeeper who hates wilderness or the backwoods farmer who would be secretly pleased if brownouts disrupted urban life may both feel constrained to misrepresent the strength of their true preferences when surveyed.

Hypothetical bias. This type of motivational bias is thought to arise because of the hypothetical nature of the survey questions which are employed. For example, when people are asked to state the maximum entrance fee they would be willing to pay to visit a park or their maximum annual tax contribution to improve air quality, there is generally an implicit recognition on the part of both interviewer and subject that the verbal response which is obtained will not be translated into an immediate demand for corresponding overt behavior. As a result, the respondent does not have to abide by or

live with the consequences of his answer. Many researchers have felt that subjects' motivation to formulate an accurate response will be correspondingly decreased, so that the later use of these same survey measures to help formulate public policy could result in a biased representation of social preferences. Since both psychologists and economists have been concerned with the problem, evidence from both sides will be briefly reviewed.

Social psychologists have framed the discussion in terms of the relation between an individual's attitudes and his subsequent behavior. For many years, attitudes were viewed as "evaluative predispositions" (Cohan, 1969:137) and were thought to provide an accurate indication of how a person would behave. In fact, it was not until LaPiere's classic 1934 study of discrepencies between the attitudes and behavior of hotel and restaurant owners toward minorities that the relation was widely questioned.

In recent years, a large number of published studies have raised doubts about the use of attitudinal measures to describe behavior. Some authors take the position that there is "little evidence to support the postulated existence of stable, underlying attitudes within the individual which influence both his verbal expressions and his actions" (Wicker, 1969:173). Others retain the link between attitudes and behavior but stress that researchers must be careful to specify that both the target and the type of action under consideration remain the same.[1] In addition, there is a recognition that other factors--such as an individual's normative beliefs, his motivation to comply with these norms and a variety of situational factors--may also figure prominently in a person's overall response to an object or

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[1]A group of economists based at the University of Wyoming, whose work is reviewed in some detail in Chapter III, have perhaps pushed this viewpoint farthest. As outspoken proponents of survey approaches, they employ this Fishbein-Ajzen argument and assert that attitudes will closely predict behavior so

activity (Ajzen and Fishbein, 1977).

Economists seem to fall into two unequally-sized schools of thought on this issue. The larger group clings to the supremacy of market-generated data and holds a gut-level feeling that responses to hypothetical questions should be mistrusted. Fromm (1968:174), for example, stated that "it is well known that surveys that ask hypothetical questions rarely enjoy accurate responses." Although the logic has a certain visceral attraction--ask a hypothetical question and you get a hypothetical answer--the study by Bishop and Heberlein (1979) provides one of the few published examples and the position generally appears to rely less on observation or objective science than on largely untested preconceptions.

A second group has focussed on analyzing the costs, in terms of both time and mental energy, that are associated with gathering and processing information about a hypothetical situation. The general feeling here seems to be that while some individuals are inherently lazy or would derive satisfaction from misleading a researcher, most people would prefer to tell the truth and do. The attitude of Kurz (1974:333) appears typical. He assumes that "in the absence of any reward or loss due to the revelation of true preferences, individuals have the intrinsic desire to tell the truth and thus [are] prepared to reveal their true demands." The comment hints at both informational biases, which do confer rewards and losses, and cognitive biases, which may result in an inability to tell or even know the truth despite a sincere desire to the contrary. But as long as people are assumed to have well-formed preferences and a desire to reveal them, the implied pres-

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long as the context and level of available information remain the same. In the case of a hypothetical question regarding the value of a public good, they argue that verbal expressions of preference refer to only one point in time, and that if additional information later becomes available it is to be expected that behavioral choices might be altered (Blank et al., 1978).

cription is that the attention of economists can properly centre on such factors as improving the instruments used in data collection and revising the training programs for enumerators.

Several other aspects related to the hypothetical nature of survey situations are briefly noted and will be discussed in more detail in later sections. Most importantly, the more hypothetical--or less familiar--is a situation, the more difficult it generally is for individuals to formulate a clear sense of their own preferences. Hypotheticality is also a concern in the perception of payment mechanisms, as is demonstrated by both the "endowment effect" and the "real exchange" effect. The first term refers to the different importance which is consciously attached to foregone income gains and to out-of-pocket losses, a reflection of the fact that consumers consistently underweight the importance of opportunity costs relative to actual (realized) costs (Thaler, 1980). The second behavior refers to a closely related phenomena whereby hypothetical exchanges may be valued differently from real (in general, cash) exchanges. The implication of both effects is that people tend to value goods in their possession more highly than equally-costly goods which are not and appear more willing to spend "opportunity cost" than "realized" incomes.

Both effects are consistent with the S-shaped value function suggested by prospect theory, which serves to highlight a final aspect of hypothetical behavior. As the preceding discussion has suggested, a recurrent concern for those asking hypothetical questions is that it may prove impossible (a cognitive problem) or not worth the time and effort (a motivational problem) for the subject to really imagine the specific future consequences under examination. Prospect theory's explicit recognition of process variables raises the possibility that not only might individuals not know whether they will like what they have asked for when it arrives (a dilemma familiar to waiters

around the world), either because of new information obtained in the interim or because of a shift in preferences, but also that the act of expressing a particular preference and living with the psychic consequences may in itself help to define a person's true values.

In this sense, the economists' reply that hypothetical questions will yield biased answers because an individual "incurs no actual utility loss for an inaccurate response" (Freeman, 1979:97) is often incorrect. Once process variables are brought into the picture, not only might the psychic costs associated with a change in status be significant but a large number of other behavioral considerations may be intimately linked to the expression of revealed preference. For many persons, present responses concerning hypothetical options may be strategically managed so as to modify future preferences or to help the individual (discover) what his or her true values really are, or they may represent short-term goals which conflict with longer-term objectives. Perhaps only the most simple minded or the most sophisticated of subjects would be sufficiently confident of their self-knowledge to consider any single honest statement of value as representing a comprehensive expression of their preferences.

Cognitive Biases

Cognitive biases are unintentional distortions of true preferences which result from limitations in an individual's ability to perceive, process, and evaluate uncertain or unfamiliar information. These limitations tend to be pervasive (that is, shared by both lay persons and experts), resistant to change (that is, do not disappear when known) and systematic (rather than random). The influence of cognitive biases is more extensive when requisite evaluation tasks are complex and require highly specialized intellectual and perceptual equipment. These characteristics generally exist in the evaluation of environmental goods and activities, since both the identification and

valuation of preferences will in most cases involve reference to uncertain conditions or events, the assessment of information of limited validity and the weighing of competing or incommensurate factors.

Early models of preference formation tended to view people as veridical observers and competent intuitive statisticians who could successfully select and evaluate information obtained from their environment to form representative choices (Petersen and Beach, 1967). In recent years, however, this picture has been subjected to increasing criticism: normatively appropriate decision strategies, it appears, may be underutilized and as a result man's inferential capabilities may prove inadequate for some of the cognitive tasks at hand (Nisbett and Ross, 1980). In particular, it appears that we seek to reduce the complexity of the tasks involved in assessing probabilities and establishing values by relying instead on a number of more primitive judgemental heuristics. As stressed in the influential studies of Tversky and Kahneman (1974; 1981), the employment of heuristic principles is generally efficient, often useful, and frequently necessary, but at the same time can be responsible for the introduction of significant and systematic bias.

Five major potential sources of cognitive bias, which relate to the limited ability of an individual to accurately process unfamiliar or uncertain information and employ it to inform himself and others of his true preferences, will be noted in this section.

Representative bias. In making decisions of causation (will A generate B?) or relation (is A part of B?), Kahneman and Tversky (1974) have hypothesized that individuals tend to examine essential features of A and B and evaluate the degree of similarity between them. If B is representative of A, its probability of occurrence is then judged to be high. The representativeness bias tends to violate principles of rationality in that it encourages (a) the neglect of prior probabilities (in contrast to the description given by

Bayes' rule); (b) an insensitivity to sample size and (c) over-confidence in the general applicability of results from small samples; (d) an excess of trust in predictions based on redundant, or non-independent, input variables (that is, exhibiting multi-collinearity); and (e) an insensitivity toward the occurrence of regressive behavior (so that predictions fail to reflect a proper consideration for mean values). Representative biases incorporate both the well-known gambler's fallacy ("if it happened last time it shouldn't happen next time") and the dramatically titled "fundamental attribution error" (by which the role of personal dispositions is over-weighted relative to situational influences) and raise substantive questions about our ability to function as veridical observers or rational evaluators of surprise or chance events.

Availability bias. Statistical notions of frequency and probability are reflected in the ease with which events can be recalled, but so too are a number of more subtle subjective factors such as recency, familiarity, imaginability, and salience. These factors, which tend to vary significantly among individuals, can be subjected to either unconscious or intentional manipulation by the media (which tends to emphasize certain classes of events) or the specific wording of a survey question. The notion of availability has been widely applied in the analysis of distortions which occur in the perception of natural hazards (Kates, 1977), where individuals tend to rely heavily on experience and to view the future as a faithful mirror of the perceived past.

Anchoring bias. Adjustments from an initial value tend to be both imprecise and insufficient; as a result, subsequent perceptions and valuations tend to be strongly influenced by, or anchored in, first impressions. The existence

of this bias tends to (a) encourage the formation of overly narrow confidence intervals and leads to excess optimism in (b) estimating the probability of what are perceived as conjunctive events (for example, the successful completion of a mitigation project) or (c) understanding the likelihood of disjunctive events (for example, the cumulative probability of failure for a complex enhancement plan). The unintentional aspect of this bias means that we may misrepresent our true preferences even though we have made a sincere attempt to overcome the anticipated influence of a particular starting point or initial assumption: both ourselves and our plans, the bias suggests, may be less adaptive than we hope.

Overconfidence bias. In a sense, each form of cognitive bias presents a potential source of overconfidence regarding our ability to perceive and evaluate information. However, four sources of overconfidence merit special attention in the context of expressed preference measures of value. The first arises in the evaluation of unfamiliar or labile values, where an individual may feel compelled to quickly respond to an interviewer's question (rather than admit his ignorance of the subject or his genuine lack of a well-defined attitude) and thereafter remains committed to maintaining that position, even though this involves the suppression of other inconsistent or competing views. A related aspect of overconfidence biases leads to the outspoken denial of uncertainty ("earthquakes don't happen here") so that an uncertain or unfamiliar activity may come to be viewed as perfectly known and safe. A third source involves the underweighting of outcomes that are probable in comparison with those obtained with certainty. This tendency, termed the "certainty effect," is familiar from the previous discussion of prospect theory where it was shown to contribute to both the well-known behavior of risk aversion in choices which involve certain gains and the surprising but parallel presence

of risk seeking in choices involving certain losses. Finally, Fischhoff (1977) and others have found that, once told that an event has occurred, individuals tend to believe (without realizing it) that they "knew it would occur" all along. Not only can hindsight biases affect the evaluation of decisions which have been made in the past by emphasizing a sense of "cognitive conceit" (Dawes, 1976) but they may encourage an unwarranted sense of optimism concerning predictive and forecasting abilities. Such overconfidence can of course only be maintained if (a) environmental feedback is not structured so as to demonstrate, or punish us for, errors (which in part explains why weather forecasters are generally fairly accurate), or (b) we are able to neutralize or otherwise ignore incoming information (for example, through employment of the hindsight bias).

Contextual bias. A number of cognitive biases combine to emphasize the significance of context in the perception and evaluation of non-market goods. The sequential analysis of alternatives, for example, has been found to result in a valuation different from their simultaneous presentation (Tversky, 1969). Similarly, an individual's willingness to take on risks appears to be higher when a prospect is viewed as belonging to a class of problems rather than as an isolated or unique event. In a more general sense, decisions may differ dramatically if a problem is viewed as one requiring a judgement (on individual options) or a choice (selecting from two or more options) (Slovic et al., 1981). These considerations suggest that so obvious a factor as the order in which information is presented may significantly affect the estimation of preferences. The common practice of overloading a decision maker with extraneous information may similarly serve only to ensure confusion and a consequently inaccurate valuation of preferences.

A second source of contextual bias arises from the unconscious ten-

dency of individuals to simplify choices among alternatives by disregarding shared traits and focussing instead on distinguishing characteristics. This phenomena, which Kahneman and Tversky (1974) have termed the "isolation effect," can lead to inconsistent preferences when different aspects of a choice are emphasized; for example, the same issue may be viewed in a substantially different light by a government bureaucracy which sees the problem as one of many and the local citizenry which view the circumstances as unique. This aspect of contextual bias is related to a sort of Gresham's Law of information, by which values which are better known or measured in terms of easily commensurate indicators (for example, dollars) are granted preferential treatment over "softer" or less familiar values. A third form of contextual bias suggests that an individual may state a preference for one activity (for example, a good gamble) but value another more highly (for example, one which has a large winning payoff), as if different (incompatible) cognitive strategies were used for the two activities of setting prices and making choices (Lichtenstein and Slovic, 1971).

Debiasing Strategies

The significance of motivational and cognitive biases in the measurement of expressed values remains a matter of some debate. On the one hand, a number of psychologists and decision analysts have strongly emphasized the role of non-motivational sources of error in judgemental tasks. Nisbett and Ross (1980:12), for example, warn the reader of their recent text that "We proceed from the working hypothesis that inferential and judgemental errors arise primarily from non-motivational--perceptual and cognitive--sources. Such errors, we contend, are almost inevitable products of human information-processing strategies." Others, such as Slovic, Fischhoff and Lichtenstein, stress "...the strong effects of framing and information-processing considera-

tions" and argue that in many cases "the method becomes the message." (Slovic et al., forthcoming).

In the economics literature--for example, as part of the extensive aesthetic valuation studies of Rowe, d'Arge and Brookshire (1980)--discussions of bias have emphasized motivational rather than cognitive influences and generally fail to distinguish between the two sources. Following normative prescriptions, debiasing procedures are generally based on the assumption of a rational respondent who seeks to maximize a clearly defined personal utility function by employing moderately complex statistical reasoning. Furthermore, this individual is assumed to be educable and hence responsive to corrective information which is given concerning potential sources of bias. A comparison of before and after responses should therefore, they reason, serve to identify the magnitude of biases which are present.

This conception of preference formation and revelation is substantially different from one which recognizes both motivational and cognitive sources of bias and which views deviations from rational or statistically appropriate judgements as being systematic (rather than merely confused) and widespread (rather than the product of individual carelessness), sometimes useful and appropriate (rather than necessarily "wrong") and highly resistant to change (or re-education). Nor is it surprising that approaches which acknowledge the influence of both sources of bias yield substantially different corrective prescriptions which generally "attempt to retain what is most valid in the intuitive process while correcting some errors to which it is prone." (Kahneman and Tversky, 1979b:314).

In particular, the survey instruments suggested by such studies reflect an increased emphasis on the identification of situations where anti-intuitive statistical thinking would be helpful since the usual decisions of

a normal individual may prove to be misleading. Fischhoff (forthcoming), for example, categorizes debiasing procedures according to whether the subject, the task, or the relation between them is to be held responsible for the judgemental errors under consideration. While traditional survey methods envisage neutral interviewers who minimize their interactions with representative respondents, a recognition of cognitive and motivational biases suggests that preferred elicitation methods can point out implications of responses, discuss how the results obtained relate to those of similar studies or reference groups, and offer alternative perspectives for viewing the problem (Fischhoff et al., 1980). Increased attention should also be paid to the specific wording and timing of questions, the order and manner in which questions are presented, and the cognitive capabilities implicitly assumed of respondents by survey procedures.

A more general point is that studies of bias need to proceed in parallel with an analysis of their robustness and significance (to avoid the label of contrived experimentation) and should help point the way to possible debiasing initiatives. Fischhoff's (forthcoming) clever assertion that "the study of biases clarifies the sources and limits of apparent wisdom, just as the study of debiasing clarifies the sources and limits of apparent folly" serves to emphasize that the development of an effective debiasing effort requires insights from both directions. It is hoped that the experimentation and subsequent analysis of the present study will prove faithful to this reminder.

CHAPTER V

RESEARCH DESIGN AND SURVEY PROCEDURES

This chapter outlines the key problem areas for which empirical data has been obtained, presents the design of the experimental tests and briefly reviews the implementation procedures which were employed. Each of these three subjects will be considered in turn.

SELECTED PROBLEM AREAS

The discussion of the preceding chapters has attempted to critically review some of the major considerations which arise when estimating the value of non-market goods on the basis of individuals' expressed preferences. The majority of these concerns owe their continued existence to the relatively small base of careful empirical studies which have been conducted: as a result, available information is in many cases scanty, inappropriate, or contradictory, and leaves the analyst little closer to the knowledge of an accurate method for estimating non-market values.

I have selected six problem areas to serve as the focus of my empirical research. It has not proved possible to group these concerns on the basis of any tidy differentiation: each problem involves both conceptual and methodological considerations and no concern can be viewed in isolation. Instead, each of the selected topics reflects a decision which must be made in the course of designing a survey of non-market values and interpreting the responses which are obtained. In each case, the questions which interest me are ones of difference and degree: for example, is the choice between

purchase and compensation measures of value, different starting points or different question wordings likely to significantly affect the magnitude of survey results, and if so what are the implications for survey design?

In no case was sufficient evidence obtained to support the existence of one right approach, but such a quest is well beyond the present state of the art. Since the existing literature on each topic is inconclusive, what appears to be most needed is additional experimental data on specific conceptual and technical concerns rather than final judgements or conclusive theories. In many respects, the methodology used in the valuation of non-market goods is still searching not for answers but for appropriate questions. For each of the following six problem areas I am therefore primarily interested in obtaining additional empirical evidence regarding the importance of each concern in the design of non-market surveys.

Differences in Payment and Compensation Measures of Value

A fundamental choice must be made between the competing measures of value represented by an individual's willingness to pay to retain or obtain a good or to enjoy an experience and his or her willingness to accept compensation to relinquish or forego the same good or activity. While economists have traditionally argued that differences in the approaches will be insignificant, recent empirical evidence suggests that under certain conditions the variations may be substantial. Central to this study is the case of non-market environmental goods, for which I investigate the magnitude of observed differences in consumer's surplus based on payment and compensation measures of expressed values.

Comparison of Alternative Hypothetical Measures

Three major survey approaches have been used to estimate the value of

non-market goods. The closed-ended or all-or-none approach asks participants to respond affirmatively or negatively to a specified monetary payment with the level varied across individuals. The open-ended approach asks respondents to state the maximum (minimum) amount they are willing to pay (willing to accept) to purchase or retain (forego) a good or activity. The bidding game or auction approach proceeds in successive increments until a maximum buying or minimum selling price is ascertained. Although each of the three measures has been employed to estimate the value of non-market goods, no systematic comparison has yet been made. I attempt to do this for both the willingness to pay and the compensation demanded alternatives.

Comparison of Hypothetical and Actual Responses

Both economists and psychologists have advanced the argument that hypothetical measures of preference will bear little resemblance to actual consumer behavior. If this is true, the results of a contingent valuation survey would furnish an unreliable base for the establishment of public policy. In these tests I compare actual and hypthetical responses to bidding game and closed-ended formats of both the payment and compensation valuation alternatives.

Influence of Framing Effects

Common sense suggests that changes in the way in which valuation questions are asked may alter an individual's response. As the transaction becomes less familiar or the context more complex, it is expected that the influence of framing effects might increase. In these tests I ask whether a number of slight manipulations in the phrasing of the survey question might exert a substantial influence on survey results: for the particular changes which are investigated, most preceding studies as well as the implications of

utility theory suggest that the differences should not prove to be significant.

Influence of Anchoring Biases

Previous studies which value non-market goods disagree as to whether the particular values which are selected as the starting point of a bidding game or closed-ended valuation procedure will significantly affect the magnitude of estimated average payment or compensation prices. Several tests have therefore been designed to investigate the influence and robustness of such anchoring biases.

Influence of Process Variables

A large number of process or manner variables have been advanced as being potentially significant determinants of an individual's expressed preferences. In the context of non-market environmental goods, both responsibility costs and the avoidance of regret appear to be particularly potent contributors to an individual's expressed valuation of a good or activity. Variations in the perceived responsibility placed on a respondent or in his or her potential for future regret might therefore be expected to signficantly alter the magnitude of associated responses, and could provide a partial explanation for observed differences between equivalent and compensating variation measures of value.

SURVEY INSTRUMENT CHARACTERISTICS

Two different sets of experimental tests have been developed to explore these problem areas. The first and larger group investigate the valuation of non-market goods in the context of an individual's willingness to make trade-offs between different levels of environmental quality or some

other good and monetary gains or losses. Information relevant to all six problem areas was obtained from the results of these surveys. A total of forty-three different test questions were run in the series, with the sample populations in each case largely composed of undergraduate students enrolled in economics classes at the University of British Columbia. Sample sizes for this first group of tests averaged about fifty persons.

A second set of tests was administered to adult visitors to the Provincial Museum in Victoria, British Columbia. These questions were concerned with the valuation of unpriced goods in the context of visitor's stated willingness to pay for, or willingness to accept compensation in return for giving up, an opportunity to view the exhibits of the Museum. Due to a number of contraints, information relevant to only two problem areas was obtained from the results of these surveys. A total of nineteen different tests were conducted in the series, with average sample sizes for each experiment of about one hundred persons.

The test questions administered to the Univerity of British Columbia student groups were designed to be self-explanatory, short and easy to comprehend. In each case an introductory description of general study objectives and rationale was followed by the valuation questions, which in all cases but one required only a yes or no response. The majority of the surveys were conducted during the months of October and November, 1981.

A randomly selected cross-section of the questionnaires was passed out prior to the beginning of a class session, with each participant receiving one form from each of two non-interfering sets. Students were told only the name and status of the administrator (in all cases myself) and informed that their participation was wanted to assist in the completion of a study being conducted through the University of British Columbia. A total of five to ten

minutes was then allotted for completion of the questionnaires. Once all forms had been collected, a brief explanation of consumer's surplus measures was usually given to the class and in some cases a short discussion followed.

The Provincial Museum tests were carried out by four trained researchers during the months of August through November, 1981. Personal interviews were conducted using random sampling procedures; the interviews took place at different times of the day in a number of different locations in order to obtain a representative range of respondents. Most questionnaires were filled in by the participants, although in some cases the interviewer wrote down the verbal responses of subjects. Clarification of the concepts or instructions was provided only upon request in order to minimize the influence of information biases. All interviews with Museum visitors were carried out at the site, while separate questions were asked of non-visitors at a second Victoria site, in Vancouver, and in two other British Columbian cities (Nelson and Chilliwack).

All versions of the tests were kept short (one page only), with an introductory description of Museum services and selective study objectives followed by three to five questions. All but one of these required only a yes or no response, with the exception being an open-ended question designed to elicit more general comments. Visitors to the Museum were questioned both before beginning and after completing tours of the exhibits in order to see if a consistent difference in between-subject responses was obtained. In some cases, the interviewer also orally inquired (and subsequently noted) whether the respondent had previously visited the Museum, and one group of tourists was asked their intended length of stay in Victoria.

SELECTION OF SURVEY QUESTIONS

This section briefly describes the key features of the test questions used in both the University of British Columbia and Provincial Museum sets of experiments. Additional information is given in the subsequent chapter, which presents an analysis of survey results. A complete set of questionnaires is included as part of the Appendix.

Surveys Conducted at the University of British Columbia

The University of British Columbia surveys can be divided into three general groups. A first set of twenty forms asked individuals' willingness to pay for, or willingness to sell their right to, different levels of environmental quality. In each case, an introductory paragraph first described the link between industrial growth and declining air quality and emphasized that protection of the environment costs money. This same initial description was included for all surveys in the group. The willingness to pay questions next described the hypothetical existence of a special environmental quality tax which would require all students and other local residents to pay equal amounts in order to prevent a decline in average air quality levels or to maintain present area air quality standards. The willingness to sell questions suggested that a willingness to allow declines in local air quality could result in decreases in Provincial taxes for all area residents or equivalent annual compensation payments. This information was extensively pre-tested and interviews showed that the frameworks which were employed appeared believable and were readily understood by most students.

Two introductory questions of general interest followed the initial description, primarily as a means of getting the students involved in answering survey questions. A third question, of primary significance to study

objectives, then asked for information regarding the individual's willingness to pay for higher levels, or willingness to accept lower levels, of environmental quality. Five versions of this question were employed:

1. A first proposed a $10.00 payment and, depending on the answer, subsequently presented either $25.00 or $5.00;

2. A second version followed this same form but varied the amount of monetary payment;

3. A third format asked the maximum (minimum) amount that people were willing to pay (willing to accept);

4. A fourth provided a frame of reference by preceding the payment question with a short list of the average annual expenditures made by Provincial residents for a number of other types of goods and services; and

5. A final version asked that either current or desired payments for environmental quality be ranked relative to a number of other expenditure claims.

A second set of seven forms utilized an aversiveness scale developed by Kahneman and Tversky to explore the role of responsibility costs and regret in the valuation of non-market goods. Subjects were asked to score the aversiveness of ten different unpleasant events on a scale of 0 to 20, relative to an invariant reference event which was assigned a score of 10. Two versions of the question compared the aversiveness of environmental degradation--in one case a decline in environmental quality, in the other the potential extinction of several rare species of mammals--in a hypothetical situation where the individual was in part to blame and in one where he or she was not. A third version looked at the influence of survey design on responsibility costs by comparing the effects of prior hypothetical telephone and in-person contacts with survey participants.

A third set of sixteen forms compared individuals' responses to the three major alternative versions of hypothetical questions for both the payment and compensation approaches. In each case an introductory paragraph described study objectives and established the general context within which the good or experience could be purchased or sold. The same series of ten events or activities was then presented to all respondents. Of the eight payment and compensation versions, two questionnaires asked for the participant's response to an open-ended question, four forms presented all-or-none payment alternatives and two forms involved the subject in a bidding game using different increments. In addition, one of the ten questions was chosen so as to facilitate a separate comparison of participants' responses to hypothetical and to actual offers of monetary payment or compensation.

Surveys Conducted at the Provincial Museum

The surveys developed for use at the Provincial Museum are of three general types. A first set of twelve forms presented an introductory description of Museum services and a brief introduction to the rationale for using willingness to pay as a measure of economic value. Following three short introductory questions, designed to provide basic information regarding respondents' place of residence and length of stay in Victoria, the questionnaires either asked visitors' willingness to pay an entrance fee to visit the Museum or asked the maximum annual provincial tax payment that they would be willing to pay to ensure the quality of Museum exhibits. In some cases the entrance fees which must be paid to visit a number of other regional or international exhibits were also shown in order to test the influence of varying frames of reference on visitors' expressed preferences. All versions (except, of course, open-ended options) were presented using payments of differing

amounts as a test for anchoring biases, and concluded with a general question designed to elicit broad-ranging oral responses concerning the role or duties of the Museum.

A second set of three questionnaires was designed to estimate the amount of compensation that would be required if the Museum were to be closed or the quality of Museum services were allowed to decline. The question therefore assumes that present users of the Museum consider their right to visit the exhibits a part of their entitlement as provincial residents and implies that they could deserve compensation if the experience were no longer available. Following the same introductory description, the idea was introduced that closure of the Museum or a decline in its quality could result in substantial financial savings for the Provincial Government. Individuals were then asked whether specified monetary payments or equivalent reductions in annual provincial taxes would be accepted as compensation for a curtailment in the present level of Museum services.

A final set of four forms was designed to estimate the value of the Museum to provincial residents who were not at present visiting and who might never visit its exhibits in person. A brief description of both Museum services and survey objectives was first provided for participants, who were then asked if they would be willing to make an incremental tax payment in order to preserve their opportunity to visit the Museum at some future time as well as simply to ensure its continued existence. The four versions presented three different levels of payment as well as an open-ended form of the question.

CHAPTER VI

ANALYSIS OF SURVEY RESULTS

This chapter presents the findings of the experimental tests for each of the six problem areas which have been outlined in the previous discussion. Key results are presented in tabular form and statistical tests of the significance of survey responses are included where appropriate. The questionnaires used in each comparative test are identified by their numbers, which refer to the complete listing of survey tests included as part of the Appendix. Each of the problem areas is reviewed in turn, while the discussion of Chapter VII will examine the relation between these concerns in more detail and investigate some of the broader implications of the research results.

DIFFERENCES IN PAYMENT AND COMPENSATION MEASURES OF VALUE

The empirical information which has been collected firmly supports the hypothesis that substantially more compensation will be demanded to relinquish a good or to forego its use than would usually be paid to retain or to obtain the same good. Ten of the fourteen comparisons of selling and payment alternatives which will be examined are significantly different at the 5 percent level of confidence on the basis of a Chi-Square test and in all cases measures of compensation demanded exceed individuals' willingness to pay for a good. The experimental evidence therefore strongly supports the contention that expressed preference valuations of non-market commodities and activities will generally vary with an individual's perception of his or her entitlement to or ownership of the good under consideration.

This section presents the information obtained in response to hypothetical questions. Earlier examples, discussed in Chapter IV, include contingent surveys which indicate that individuals will frequently require a significantly larger sum to forego the use of an environmental resource than they would pay to maintain current access rights. Additional experimental tests, which compare payment and compensation measures of value for actual transactions involving real exchanges of funds, will also be discussed in this chapter.

The test situations were designed to encourage participants to respond accurately, and the stated dollar amounts were sufficiently small so as to minimize the influence of income or wealth effects. In each case only one option--an opportunity to pay (for example, for environmental quality) or an opportunity to be compensated for the loss of a good--was presented to each individual. Discussions among participants were not allowed and no information was given concerning survey objectives which might have influenced responses to subsequent experiments.

Test 1 (Questionnaires 1a and 2a)

A first experiment compared the written responses of two groups of students to one of two hypothetical questions concerning the value of environmental quality. One question asked the participants' willingness to pay an annual tax of $25.00 "in order to prevent a decline in average air quality levels." The alternative question asked the participants' willingness to accept a decrease in annual taxes of $25.00 if as a result average air quality levels were to decline. The introductory information presented to respondents was identical, and both questions were non-negotiable in the sense of requiring simply a yes or no answer.

In the absence of significant income or wealth effects, and given a

random distribution of preferences throughout the sample population, the conventional expectation is that the expressed value of environmental quality should be consistent between the two measures. If individuals are willing to pay $25.00 or more to prevent a decline in air quality, they should refuse to accept less than this same amount of compensation in return for giving up present conditions. Similarly, the percentage of people who are willing to accept $25.00 in return for lower levels of air quality, and thereby indicate that its value to them does not exceed this sum, should be equal to the percentage which is unwilling to pay more than $25.00 to prevent a decline in air quality.

The results of the experiment do not conform to this expectation. While 73 percent of the participants (41 of 56) indicated their willingness to pay $25.00 or more to prevent a decline in air quality, forty-eight of fifty-two respondents (92 percent) refused to accept lower air quality levels in return for $25.00 in compensation. The fifteen respondents who refused to pay this amount expressed their unwillingness to give up $25.00 to prevent a decline in current air quality levels, while the four respondents who accepted the offer of $25.00 in compensation indicated their unwillingness to make this trade.

	Value > $25	Value < $25	Total	
Willing to pay $25	41 (yes)	15 (no)	56	
Willing to accept $25	48 (no)	4 (yes)	52	(Test 1)
Total	89	19	108	

$x^2 = 6.65$

The proportion of respondents who value present air quality conditions at more than $25.00 is significantly greater when measured on the basis

of their refusal to accept compensation than when measured on the basis of their willingness to pay. Using a Chi-Square test and a two-by-two contingency table with one Degree of Freedom, the difference is statistically significant at the 5 percent level. This suggests that the choice of evaluation procedures has a major impact on respondents' expressed values.

Tests 2, 3, and 4 (Questionnaires 1b and 2b, 3a and 3c, 3b and 3d)

The second test is identical to the first except that the order of the clauses used in the valuation question is reversed: rather than asking if participants would be willing to pay (accept) a stated sum to prevent (permit) declines in air quality, the question asks whether, in order to prevent a decline, respondents would either agree to pay a specified amount of money or accept a non-negotiable offer of compensation. Twenty-eight of the seventy-three persons responding to the payment option declined to pay $25.00, while only fourteen of the fifty-eight students who were offered compensation said they would accept.

	Value > $25	Value < $25	Total	
Willing to pay $25	45	28	73	
Willing to accept $25	44	14	58	(Test 2)
Total	89	42	131	

$x^2 = 3.01$

These results again contrast with the expectation of equal sample proportions, but the argument is now less strong. Sixty-two percent of participants were willing to pay the specified $25.00 sum compared to 76 percent who refused to accept $25.00 as compensation. However, the calculated x^2 of 3.01

is not significant at the 5 percent level.[1]

The third and fourth experiments are again similar to the first except for the incorporation of one sentence in the introductory description of survey objectives which informs participants that they have been selected as part of either a large or small sample of Vancouver area residents. It was anticipated that this addition, which emphasizes the responsibility costs accompanying a participant's decision, would increase the significance of the disparity between payment and compensation measures of value.

The results of the two tests confirm this expectation. In test 3, nineteen of thirty-seven respondents (58 percent) were willing to pay an annual tax of $25.00 to prevent a decline in average area air quality levels while 81 percent (26 of 32) refused to accept $25.00 in compensation.

	Value > $25	Value < $25	Total	
Willing to pay $25	19	14	33	
Willing to accept $25	26	6	32	(Test 3)
Total	45	20	65	

$x^2 = 4.17$

The results of test 4 show that 37 percent and 67 percent of respondents value air quality at $25.00 or more on the basis of payment and compensation measures. With respective x^2 values of 4.17 and 7.08, both significant at the 5 percent level, the experiments suggest that the value which participants place on air quality is lower when measured on the basis of their willingness to pay than when measured on the basis of their willingness to accept equal amounts of monetary compensation for its loss.

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[1]The critical value for the Chi-Square distribution with 1 D.F. is 3.84 at the 5 percent level and 2.71 at the 10 percent level.

	Value > $25	Value < $25	Total	
Willing to pay $25	11	19	30	
Willing to accept $25	36	18	54	(Test 4)
Total	47	37	84	

$x^2 = 7.08$

Test 5 (Questionnaires 4b and 2d)

The fifth test gave participants the closed-ended option of paying or receiving $200.00 to either prevent or allow a decline in average area air quality levels. Although the question remains hypothetical, it was anticipated that the substantially larger sum involved would elicit more exaggerated behavior on the part of survey respondents. If the pattern of the previous tests still holds, we would therefore expect to see a highly significant difference in the responses to payment and to compensation questions.

	Value > $200	Value < $200	Total	
Willing to pay $200	9	21	30	
Willing to accept $200	24	14	38	(Test 5)
Total	33	35	68	

$x^2 = 7.50$

This is indeed what is found, with only 30 percent of respondents (9 of 30) willing to pay $200 to prevent a decline in air quality levels and fully 63 percent of those questioned refusing to accept an identical sum as compensation. These results are significant at the 5 percent level. The test therefore presents strong evidence that the two measures of economic worth are not equivalent, and that the choice of measurement approach can influence the final estimated values.

Tests 6, 7, and 8 (Questionnaires 8b and 9b, 8c and 9c, 8d and 9d)

These three tests each compared one group of participants' willingness to pay with another's willingness to accept compensation for a series of ten everyday goods and experiences. The introductory information given to both groups was similar in tone and organization but, of course, differed according to whether it described a closed-ended option to purchase a ticket or to be compensated for its loss. Three different dollar amounts, ranging from $0.20 to $1.00, were employed, with test 6 presenting the lowest sums and test 8 the highest. Participants were instructed to indicate, by circling either yes or no, whether they would agree to pay or accept the stated amount.

Although disparities in selling and buying behavior were observed for all ten items, the most informative comparison (for reasons which will become clear later on) concerns the values placed on a lottery ticket which afforded the subject a one in thirty chance to win an electronic calculator. Although a respondent's preference or aversion for risks will obviously be reflected in his or her response, there seems to be no reason to expect that the influence of gambling or chance behavior will be other than symetrical between the two measurement options.

Interestingly, the difference in payment and compensation measures of value became more meaningful as the dollar amount employed in the experiments increased. The results of the highest value test demonstrate that only eight of thirty participants (27 percent) indicated their willingness to pay $1.00 to participate in the lottery, while 50 percent of those questioned (19 of 38) refused to sell their entry ticket when offered $1.00. However, this difference provides an x^2 of 3.81, which is not statistically significant at the 5 percent level.

Tests 6 and 7 present the results obtained when the amount of payment

or compensation was decreased to only \$0.20 or \$0.60. The insignificant difference shown in test 6 could reflect the fact that \$0.20 is a very small amount for people to pay or receive and that other considerations, such as an individual's desire to participate in the game or imagined peer-group pressures, are dominant. Substantial differences in participants' behavior begin to show up at the \$0.60 level of payment or compensation, with only 34 percent of respondents indicating that the ticket was worth \$0.60 if they had to pay for it compared to the 52 percent of those given a ticket who indicated that it was worth more than \$0.60. However, the x^2 value of 3.10 is again not statistically significant at a 5 percent level.

	Value > \$0.20	Value < \$0.20	Total	
Willing to pay \$0.20	32	15	47	
Willing to accept \$0.20	33	14	47	(Test 6)
Total	65	29	94	
				$x^2 = .03$

	Value > \$0.60	Value < \$0.60	Total	
Willing to pay \$0.60	16	31	47	
Willing to accept \$0.60	24	22	46	(Test 7)
Total	40	53	93	
				$x^2 = 3.10$

	Value > \$1.00	Value < \$1.00	Total	
Willing to pay \$1.00	8	22	30	
Willing to accept \$1.00	19	19	38	(Test 8)
Total	27	41	68	
				$x^2 = 3.81$

The finding that more significant results appear once higher values are employed probably reflects the fact that participants have begun to seriously evaluate the choice that must be made: at lower values, it simply isn't worth an individual's time to consider the proposed transaction. This interpretation is consistent with the results of earlier experiments, where the statistical significance of observed differences in the two measures of value was increased when larger amounts of payment or compensation (for example, $25.00 rather than $10.00) were tested. Yet this does not really provide an answer for the variation in the two measures, since for the same reason that it is less attractive to pay $1.00 than to pay $0.20 it has also become more attractive to accept $1.00 in compensation. Whether individuals contemplate the choice at hand seriously or flippantly tells us little about the new behavioral mechanisms which have come into play.

Considerations such as the previously discussed endowment effect (Thaler, 1980)--which suggests that individuals frequently underweight "opportunity costs" relative to actual (realized) costs, and therefore require a better offer to willingly give up (that is, place a higher value on) money or goods considered part of their endowment then assets which are not--may contribute to an explanation of the increasing disparity. For example, an argument could be made that only with sums of $1.00 or more (in this case) do monetary values become sufficient to be meaningfully included as part of an individual's perceived endowment. However, the explanation remains partial and additional experiments which seek to add to the reasons behind observed differences in buying and selling behavior will be described later in this chapter.

Test 9 (Questionnaires 8a and 9a)

This test presented individuals with the same set of ten everyday goods and experiences, but this time each participant was given a choice of five different payment levels and asked to indicate either the maximum amount of money which they would be willing to pay to obtain each good or the minimum amount of money which they would be willing to accept as compensation for its loss. This range of values was non-negotiable, so that the expression of higher or lower amounts than the stated endpoints was not permitted. Values expressed for a lottery ticket, with the prize of an electronic calculator, will again be reported.

If the method of evaluation made no difference, the mean value placed on the ticket should be the same regardless of whether participants' willingness to pay or compensation demanded is used as the basis of the evaluation. However, the results of this experiment add to the evidence that the selection of a measurement technique can have a substantial impact on the expressed value of the good or experience under consideration. Of the forty-nine people asked to pay for a ticket, only five (10 percent) said that it was worth more than $1.00 whereas thirteen of the forty-eight persons offered compensation (27 percent) indicated that it was worth at least $1.00 to them. The resulting x^2 of 4.59 is significant (with one Degree of Freedom) at the 5 percent level.

	Value > $1.00	Value < $1.00	Total	
Willing to pay $1.00	5	44	49	
Willing to accept $1.00	13	35	48	(Test 9)
Total	18	79	97	

$x^2 = 4.59$

Test 10 (Questionnaires 8g and 9g)

This test again presented participants with a list of ten activities or goods and instructions that each item should be assigned a value under either a willingness to pay or a willingness to sell evaluation framework. However, no dollar amounts were shown and no endpoints were specified; instead, respondents were asked to write in the dollar amount which best indicated the worth of each experience.

The results of this open-ended experiment provide very strong support that a marked difference in expressed values will emerge if compensation rather than payment prices are assigned. In response to the same lottery question which has been discussed previously, only two of thirty-seven respondents (5 percent) were willing to pay $1.00 or more in order to obtain a ticket. On the other hand, seventeen of thirty-six persons (47 percent) asked to state the minimum amount of monetary compensation that they would accept in return for giving up a ticket indicated that its value exceeded $1.00. The difference in these returns is striking, and the calculated x^2 of 16.44 is significant at the 5 percent level.

	Value > $1.00	Value < $1.00	Total	
Willing to pay $1.00	2	35	37	
Willing to accept $1.00	17	19	36	(Test 10)
Total	19	54	73	

$x^2 = 16.44$

Several reasons can be advanced to explain the observed disparity in the open-ended test. The lack of guidance in a hypothetical question of this sort may lead to a sense of unreality on the part of many respondents, but it is not clear why reactions to offers of compensation would be affected

differently than participants' willingness to purchase the lottery ticket. Gaming effects, however, might not prove to be symetrical: the willingness to pay question may invoke a respondent's specific reaction to the possibility of purchasing a calculator, which many students may already own and therefore value less highly, while the willingness to sell alternative may focus attention on the more attractive prospect of a low risk gamble. Furthermore, while endpoints are not specified only the higher end of the scale is truly open since low expressions of value are effectively bound by zero.

Whatever the reason, the results convincingly demonstrate that a substantially greater proportion of those holding the ticket would refuse to trade it for an offer of $1.00 than would agree to buy it at that price, while the relative magnitude of the disparity appears to be exaggerated by the selection of an open-ended measurement approach. This interpretation follows even more strongly from the results of two other open-ended experiments, which compare the maximum annual tax that respondents would be willing to pay to prevent a decline in air quality levels with the minimum tax decrease which would just compensate them for the decline.

While all twenty-one persons who were asked the payment question responded, only thirteen of the forty-six participants in the selling experiment (28 percent of the sample) chose, or were able, to give a specified monetary value. Furthermore, their mean level of compensation was nearly $2,000 per person compared to only $26.00 for the payment alternative. Twenty respondents (43 percent) refused to trade current levels of environmental quality for any amount of monetary compensation, while the remaining thirteen persons simply left the question blank. Clearly, the choice of evaluation method profoundly affected respondents' expressed values.

Tests 11 and 12 (Questionnaires 8e and 93, 8f and 9f)

These two tests investigate whether the introduction of bidding behavior will affect the magnitude of the disparity between participants' willingness to pay and their desire to accept compensation for the same series of ten familiar goods and activities. Respondents were given a starting price for each item and asked to indicate the value they placed on it by moving through a series of successive mental bids, as would be used in an auction. The starting price used in both the payment and the compensation questions is therefore viewed as a minimum value, and participants were asked to increase this initial value by either of two specified amounts (which varied with each question) until a maximum purchase price or a minimum selling price was reached.

The difference in bidding increments should not have proved significant in the present case, and the results of both tests verify the expectation--which after the previous ten experiments should no longer be surprising--that the relative number of participants valuing the lottery ticket at a specified amount will vary according to whether the measure of value is based on their willingness to purchase it or their willingness to accept an offer of compensation. In test 11, which employed a bidding increment of $0.20, 32 percent of respondents (10 of 31) were willing to pay $1.00 or more to participate in the lottery while only 41 percent (15 of 37) accepted an offer of $1.00 in compensation for giving up their ticket. The x^2 for this test was 5.04, which with one D.F. is significant at a 5 percent level.

With a bidding increment of $0.40, fourteen of thirty-five respondents (40 percent) indicated that participation in the lottery was worth at least $1.00 to them while twenty-eight of the forty-one persons (71 percent) refused an offer of $1.00 in trade for their ticket. The x^2 of 7.25 for test 12,

calculated from the resulting contingency table, is also significant at the 5 percent level.

	Value > $1.00	Value < $1.00	Total	
Willing to pay $1.00	10	21	31	
Willing to accept $1.00	22	15	37	(Test 11)
Total	32	36	68	
				$x^2 = 5.04$

	Value > $1.00	Value < $1.00	Total	
Willing to pay $1.00	14	21	35	
Willing to accept $1.00	29	12	41	(Test 12)
Total	43	33	76	
				$x^2 = 7.25$

Tests 13 and 14 (Questionnaires b.. and b., b.. and h.)

The final two tests comparing individuals' purchase and selling prices are drawn from the surveys which were conducted at the B.C. Provincial Museum. As described in some detail in the preceding chapter, these tests compare respondents' written or verbal responses to a series of questions designed to help determine the economic value of a visit to the Museum. Both the selling and payment alternatives present an introductory description of Museum services and survey objectives, and then go on to ask current visitors if they would be willing to accept an annual tax reduction of $10.00 in return for either a decline in the quality of Museum services (test 13) or closure of the Museum (test 14) or if they would make an equal annual payment to maintain the quality of the exhibits.

The results of both all-or-none frameworks strongly support the evi-

dence obtained in the University of British Columbia experiments that the two measures for estimating economic values are significantly different. Forty-eight percent of respondents (16 of 33) were unwilling to pay a tax of $10.00 to maintain the present quality of Museum services but only 10 percent of visitors (3 of 30) would agree to a decline in Museum quality in return for a $10.00 annual tax saving. With an x^2 of 10.88, these results are significant at a 5 percent level and argue that the two competing measures of economic value are not equivalent.

	Value > $10	Value < $10	Total	
Willing to pay $10	17	16	33	
Willing to accept $10	27	3	30	(Test 13)
Total	44	19	63	

$x^2 = 10.88$

Test 14 compares the same incremental tax payment to a second compensation question which posits the possible closure of Museum exhibits. It was expected that the harsher consequence of the compensation alternative would result in still fewer acceptances of the offered settlement, and this result is clearly shown in the accompanying table. While seventeen of the thirty-three respondents (52 percent) valued the Museum at $10 or more according to the payment measure, 96 percent of those interviewed (43 of 45 persons) declined to accept the offer of an equal amount as compensation. This results in an x^2 of 20.90, which with one Degree of Freedom is again significant at the 5 percent level.

	Value > $10	Value < $10	Total	
Willing to pay $10	17	16	33	
Willing to accept $10	43	2	45	(Test 14)
Total	60	18	78	

$x^2 = 20.90$

COMPARISON OF ALTERNATIVE HYPOTHETICAL MEASURES

This section reviews the empirical results which have been obtained from a comparison of alternative hypothetical measures of economic value based on an individual's willingness to pay for a good and his or her willingness to accept compensation in return for its loss. As discussed in Chapters II and III, three major forms of the evaluation question have been employed in previous studies of non-market goods: a closed-ended or all-or-none measure, an open-ended technique, and any of a variety of bidding game or auction methods. Although some discussion can be found in the literature regarding the ability of each of these approaches to accurately depict respondents' true economic values for a variety of non-market goods (for example, Stoll et al., 1982 or Randall and Brookshire, 1978), no information is available regarding the results of a direct comparison of the three measures.

This section reports on a series of very simple experiments which have been designed to achieve this objective. The framework and organization of the surveys have already been encountered in the previous section: each respondent is confronted with a list of ten familiar goods or experiences and asked to estimate their value following a short introductory description of the rules under which payment or compensation would be made. The results of question number 4, which involved the purchase or sale of a lottery ticket, will again be analyzed; the existence of the other nine questions therefore

serves to familiarize the respondent with the evaluation procedure and to mask the question of principal interest. All comparisons are again between subjects.

It was hoped that an analysis of test results would contribute additional information on two important issues. First, if the values held by participants were clearly articulated and well understood, then a relatively minor change in measurement procedures--for example, from a closed-ended to a bidding game approach--should have little effect on the average preferences expressed by the sample population. If it was instead discovered that preferences were substantially altered by the change in question form, not only the subject's subjective sense of his or her own values but also the neutrality of the survey instrument would be cast into doubt. This second point runs counter to the implied assumption of any study which has considered only one evaluation approach and maintains that the resulting estimates provide an accurate reflection of participant's true values.

The results which have been obtained demonstrate a substantial difference in the three expressed preference measures, and provide preliminary evidence that indicated values will vary with the type of evaluation format which is selected. In addition, the results suggest that this variation is not random but is instead surprisingly systematic. In particular, the estimates which were obtained using a bidding game approach were consistently higher than those expressed using either a closed-ended or open-ended technique; this difference is maintained in both the payment and the compensation questions.

The complete set of surveys, as shown in the Appendix (Questionnaires 8a to 8g, 9a to 9g), employs two different bidding game measures (using $0.20 and $0.40 bid increments) and two different open-ended measures (one presenting a range of values and another where respondents fill in their own entry)

along with one closed-ended approach. These results are summarized in Table 1, which shows the percentage of respondents either willing to pay or willing to accept compensation as the monetary sum involved is allowed to vary. However, it does not seem worthwhile to compare the results for each alternative at each payment level. Instead, six examples illustrate the variation which has been observed.

Tests 16 and 17 (Questionnaires 8f and 8c, 9f and 9c)

These two tests both compare a bidding game with a closed-ended question framework. For the payment alternative (test 16), the bidding game starts at $0.20 and increases by $0.40 intervals; responses to this question are compared to those for an all-or-none payment level of $0.60. For the selling alternative (test 17), the bidding game again starts at $0.20 and increases by $0.40 intervals, with the test comparison made to a non-negotiable offer of $0.60 in compensation.

In both experiments a difference was observed in responses to the two evaluation approaches, but in neither case was it statistically significant at the 5 percent level. As demonstrated in test 16, nineteen of thirty-five participants in the willingness to pay bidding game (54 percent) valued the ticket at more than $0.60 while only sixteen of forty-six persons (35 percent) were willing to pay an equal amount on the basis of their responses to the closed-ended question. Respondents also demanded a higher average level of compensation under a bidding game approach. While twenty-two of forty-six participants (48 percent) were willing to accept a non-negotiable offer of $0.60 in compensation, only twelve of forty-one persons (30 percent) engaged in the bidding game measure of value would agree to an equivalent offer.

TABLE 1

PERCENTAGE OF RESPONDENTS INDICATING DESIRE TO PARTICIPATE IN HYPOTHETICAL LOTTERIES

	Bidding Game - 20¢ %	Bidding Game - 40¢ %	Closed-Ended %	Closed Range %	Open-Ended %
Willing to pay $0.60	52	54	35	29	27
Willing to pay $1.00	32	40	26	10	5
Willing to accept $0.20	19	12	30	27	25
Willing to accept $0.60	32	29	48	63	53

	Value > $0.60	Value < $0.60	Total	
Willing to pay $0.60, bidding game	19	16	35	
Willing to pay $0.60, closed-ended	16	30	46	(Test 16)
Total	35	46	81	
				$x^2 = 3.12$

	Value > $0.60	Value < $0.60	Total	
Willing to pay $0.60, bidding game	29	12	41	
Willing to pay $0.60 closed-ended	24	22	46	(Test 17)
Total	53	34	87	
				$x^2 = 3.10$

In both cases, it seems likely that participants were influenced by the gaming aspect of a bidding opportunity. Whereas a closed-ended evaluation is direct and very to the point, any iterative bidding procedure introduces an additional element of gamesmanship which could prove to be largely independent of respondents' values associated with the particular good under consideration. For example, an individual's expressed value may simply reflect his or her desire to "play the game"--engage in consecutive bids--a certain number of times, or it may reflect their perception of a hidden agenda on the part of the interviewer by which a formula such as "initial value plus two iterations" would yield a "correct" response. Some evidence for this interpretation is gained from Table 1, which shows that the four ticket values obtained with a $0.40 bid interval are all slightly higher than those derived using a $0.20 increment.

Tests 18 and 19 (Questionnaires 8e and 8g, 9e and 9g)

These tests compare bidding games using a $0.20 increment with individuals' responses to an open-ended value question. In both cases the variation in the two approaches is again meaningful and in the same direction as in the preceding tests: respondents are willing to pay substantially less for a ticket under an open-ended evaluation framework and also tend to demand significantly less compensation in return for its loss.

This finding is surprising, since the open-ended format was expected to encourage the highest expressions of value for both the payment and the selling alternatives. Part of the explanation may be found in the contextual differences between this test, which asked participants to value a chance to win a rather mundane good, and earlier tests concerning the value of declines in air quality. A lottery for a calculator is familiar and involves an exchange between two readily substitutable commodities, with the result that participants can easily bound their subjective estimates of its economic value. However, the trade-off between money and environmental quality is unusual and (for many people) highly controversial. As a result, it may be much more difficult to set limits on the real costs of the exchange because they are psychological as well as economic, an argument to which we will return in the final section of this chapter.

The results of the payment alternative are shown below. Whereas 32 percent of the participants (10 of 31) valued the ticket as worth at least $1.00 under a bidding regime, only 5 percent of the respondents (2 of 37) agreed to pay $1.00 or more when the open-ended question format was employed. With an x^2 of 8.26, the difference in these two response patterns is significant at the 5 percent level.

	Value > $1.00	Value < $1.00	Total	
Willing to pay $1.00, bidding game	10	21	31	
Willing to pay $1.00, open-ended	2	35	37	(Test 18)
Total	12	56	68	
				$x^2 = 8.26$

The results of the two compensation questions provide additional evidence that in familiar and readily commensurate situations the bidding game form of the evaluation question will tend to encourage higher responses than an open-ended alternative. In this experiment, twenty-five of thirty-seven respondents (68 percent) refused to accept an offer of $0.60 as compensation for their ticket when tested under a bidding game framework, while only seventeen of thirty-six participants (47 percent) refused an equivalent settlement when an open-ended test was used. However, this difference is not statistically significant at the 5 percent level.

	Value > $0.60	Value < $0.60	Total	
Willing to accept $0.60, bidding game	25	12	37	
Willing to accept $0.60, open-ended	17	19	36	(Test 19)
Total	42	31	73	
				$x^2 = 3.05$

Tests 20 and 21 (Questionnaires 8d and 8a, 9c and 9a)

These tests compare the closed-ended and closed-range valuation approaches, the first of which asks respondents if they would agree to pay or receive a single specified sum of money and the second which presents a range of

five different amounts between $0.20 and $1.00. There was no clear a priori expectation of difference in the two formats, since the decision to be made in both cases is essentially similar.

Surprisingly, a comparison of the willingness to pay form of the questions demonstrated a variation in the two approaches. While eight of thirty respondents (27 percent) to the all-or-none question agreed to pay at least $1.00 for a lottery ticket, only 10 percent (5 of 49) of those given a choice of values felt that the opportunity was worth as much. However, the x^2 value for the disparity of 3.76 is not statistically significant at the 5 percent level. One explanation for the variation is that participants in the closed-range experiment might have been influenced to state lower values by the fact that $1.00 was an endpoint of the scale and the midpoint of the five possible values was only $0.60. Yet the evidence for this interpretation is weak: as shown in Table 1, the variation between closed-ended and closed-range payment questions was smaller at a $0.60 level but the difference in the compensation alternatives was larger at the $0.60 midpoint of the range than at $0.20.

	Value > $1.00	Value < $1.00	Total	
Willing to pay $1.00, closed-ended	8	22	30	
Willing to pay $1.00, closed-range	5	44	49	(Test 20)
Total	13	66	79	

$x^2 = 3.76$

The willingness to sell forms of the two questions also produced different average values, but in this case the results are less reliable. While just over one-half of those participating in the closed-ended experiment (24 of 46, or 52 percent) said that the ticket was worth at least $0.60, thirty of

the forty-eight persons (72 percent of the sample) given a closed-range questionnaire indicated that the ticket was worth less than $0.60 to them. With an x^2 of 1.99, the difference is not significant at the 5 percent level.

	Value > $0.60	Value < $0.60	Total	
Willing to accept $0.60, closed-ended	24	22	46	
Willing to accept $0.60, closed-range	18	30	48	(Test 21)
Total	42	52	94	

$x^2 = 1.99$

COMPARISONS OF HYPOTHETICAL AND ACTUAL RESPONSES

In the first section of this chapter I have presented the results of a number of experiments which demonstrate that people will generally require more compensation to willingly give up a good considered to be part of their entitlement than they would pay to purchase or to maintain it. A large number of other hypothetical surveys, some of which have been discussed in the preceding chapters, have also reached a similar conclusion. However, the fact that most studies have employed questions based on hypothetical scenarios has served as a major source of criticism and provided a convenient avenue by which conventional theory--which maintains that the two approaches should yield equivalent measures of value--could escape a confrontation with conflicting empirical evidence.

In order to test the robustness of variations in payment and compensation measures of value, two modest experiments have been devised which directly compare the results of hypothetical and actual transactions. The basic form of these experiments closely follows earlier tests developed by Knetsch and Sinden (1982). Both common sense logistics and budgetary constraints suggested

that a lottery would provide a convenient asset for which prices could easily be varied and income or wealth effects would clearly remain negligible. So long as all four test situations--hypothetical and actual, purchase and compensation--involve the same opportunity, participants' behavior toward gambling should also be symetric between the choices and therefore preserve the more general applicability of the results.

The first series of hypothetical experiments, which offer students the choice of purchasing or trading a lottery ticket which will give them a one in thirty chance of winning an electronic calculator, has already been discussed; results from both the closed-ended and bidding game experiments will be reviewed. A second set of questionnaires also asked participants to value ten goods or activities but in this case the lottery provided a one in forty chance to win a bottle of imported champagne. A range of values between $0.20 and $1.00 was provided, and respondents were asked to circle the value which best represented either their maximum willingness to pay for a ticket or the minimum price at which they would agree to sell a ticket.

Participants in the actual experiments were randomly selected (depending on whether their ticket number was even or odd) to be in one of two groups. Each student in the first set was given a ticket and told that they had the option of either paying to keep it and participating in the lottery or refusing to pay and thereby losing the chance to take part. Students in the second group, who could participate in the lottery without paying, were offered money if they would give up their ticket and thereby lose the chance to be in the lottery. Participants were interviewed either individually or in small groups, and were not informed that comparisons of payment and compensation or actual and hypothetical approaches were planned. The cash transactions in the calculator raffle were made at three levels of payment--$0.20,

$0.60 and $1.00--under both a bidding game and a closed-ended question format; open-ended tests were not attempted for obvious budgetary reasons. Actual payments in the champagne experiment were all at a non-negotiable level of $0.50.

The results of these experiments add to the evidence that disparities in responses to buying and selling measures of value are indicative of significant differences in preferences and not merely the result of contrived hypothetical test situations. This evidence takes two forms. First, responses to the actual experiments demonstrate that the value placed on the ticket varies substantially according to whether participants are asked to pay money in order to purchase it or to accept money in return for giving it up. Secondly, the actual behavior of participants in tests involving a cash transaction is surprisingly similar to the preferences which have been indicated by participants in the hypothetical experiments. A summary of survey responses is presented in Table 2, which shows the percentage of respondents indicating their desire to participate in either the hypothetical or the real lotteries under both evaluation measures. These results are similar to those reported by Knetsch and Sinden (1982) and strongly suggest that responses to hypothetical questions can at least in some cases provide reasonably close approximations of respondents' actual behavior.

Tests 23, 24 and 25
(Questionnaires 8c and 9c)

These experiments compare the results of hypothetical and actual test scenarios which were conducted using a closed-ended question format. The selected level of payment was $0.60, with one group of participants asked if they would agree to pay this sum as the entrance price to a lottery and a second group asked if they would accept an equal amount as compensation for

TABLE 2

PERCENTAGE OF RESPONDENTS INDICATING DESIRE
TO PARTICIPATE IN ACTUAL LOTTERIES

Lottery Prize	Level of Payment	Question Format	Willingness to Pay		Willingness to Accept	
			Hypothetical %	Actual %	Hypothetical %	Actual %
Calculator	$0.20	Bidding Game			12	9
		Closed-Ended	68	68	30	23
	$0.60	Bidding Game	54	56	29	26
		Closed-Ended	35	27	48	42
	$1.00	Bidding Game	40	31		
		Closed-Ended	26	21	50	53
Champagne	$0.50	Closed-Ended	27	29	39	44

the loss of their ticket. In both cases the prize was a calculator of unspecified monetary value; participants were informed that the prize was on hand and that a winner would be chosen within a few minutes (as soon as all thirty tickets had been distributed).

The responses in the actual raffle closely replicate the results of the hypothetical experiment. Participants' willingness to pay for a lottery ticket was again compared with their willingness to accept compensation for its loss. If the two bases for evaluation are equivalent, as suggested by conventional economic theory, then the same proportion of individuals should decide to pay \$0.60 to acquire a ticket as would agree to give it up for an equal cash settlement. However, only nine of the thirty-three persons tested (27 percent) actually made the \$0.60 payment required to take part in the lottery while eighteen of thirty-one persons (58 percent) demonstrated that a ticket was worth more than this by their refusal to trade it for \$0.60 in cash. The x^2 for this difference is 6.16, which is significant at the 5 percent level and provides strong supporting evidence that the observed disparity in responses to the two measures is reliable.

	Value > \$0.60	Value < \$0.60	Total	
Willing to pay \$0.60	9	24	33	
Willing to accept \$0.60	18	13	31	(Test 23)
Total	27	37	64	

$x^2 = 6.16$

The fact that purchase and selling prices are significantly different for both the actual and hypothetical experiments does not necessarily imply that participants' responses to actual and hypothetical situations are similar. Tests 24 and 25 therefore compared the hypothetical and actual responses which

have been obtained to the payment and selling evaluation alternatives.

	Value > $0.60	Value < $0.60	Total	
Willing to pay, hypothetical	16	30	46	
Willing to pay, actual	9	24	33	(Test 24)
Total	25	54	79	
				$x^2 = .47$

	Value > $0.60	Value < $0.60	Total	
Willing to accept, hypothetical	24	22	46	
Willing to accept, actual	18	13	31	(Test 25)
Total	42	35	77	
				$x^2 = .26$

With x^2 values in each case of substantially less than one, the Chi-Square tests confirm the visual expectation that there is no statistical difference in values expressed by those participating in the hypothetical and the actual experiments.

Tests 26, 27 and 28
(Questionnaires 8f and 9f)

This set of experiments compare individuals' responses to hypothetical and actual test situations in which a bidding game was used to estimate values. Both the payment and the compensation tests employed a starting bid of $0.20 and the results show the proportion of students willing to purchase a ticket or accept compensation for its loss at a payment level of $0.60.

Responses to the payment and selling measurement alternatives are presented below. Forty-four percent (21 of 48) of those participating in the willingness to pay experiment valued the lottery ticket at less than $0.60,

whereas only 26 percent (14 of 54) of those tested were willing to accept an equivalent sum in compensation for its loss. With an x^2 of 3.54, this difference is not statistically significant at the 5 percent level.

	Value > $0.60	Value < $0.60	Total	
Willing to pay $0.60	27	21	48	
Willing to accept $0.60	40	14	54	(Test 26)
Total	67	35	102	

$x^2 = 3.54$

Tests 27 and 28 investigate whether it is significant that participants made or accepted actual cash payments in order to buy or sell a real lottery ticket or simply indicated their preferences in reference to a hypothetical exchange. Test 27, which compares participants' hypothetical and actual payments for a ticket, and Test 28, which compares their willingness to accept hypothetical and real cash settlements in exchange for the opportunity to participate in the lottery, suggest that it is not. Instead, the insignificant x^2 values obtained in the two tests support the acceptance of the null hypothesis that no difference exists in the responses to real and to hypothetical question formats.

	Value > $0.60	Value < $0.60	Total	
Willing to pay, hypothetical	19	16	35	
Willing to pay, actual	27	21	48	(Test 27)
Total	46	37	83	

$x^2 = .03$

	Value > $0.60	Value < $0.60	Total	
Willing to accept, hypothetical	29	12	41	
Willing to accept, actual	40	14	54	(Test 28)
Total	69	26	95	

$x^2 = .14$

Tests 29, 30 and 31
(Questionnaires 10a and 10b)

These three tests compare students' reactions to a lottery in which the prize was a bottle of imported champagne. As in the experiments which used a calculator, participants were not given any further information regarding the type or value of the champagne but they were told that the prize would be awarded momentarily. Although the expected value of a ticket was in this case slightly lower, the difference in the experimental situations was small and there was no reason to anticipate major deviations from the earlier raffle results.

The comparison of the value placed on a ticket by students required to pay for it and others offered compensation if they would give it up once again demonstrates that an expectation of equivalence is not warranted. Whereas nineteen of thirty-four participants (56 percent of those interviewed) were unwilling to accept a cash offer of $0.50 in exchange for their ticket, only nine of thirty-one persons (29 percent) chose to pay this same amount in order to obtain a ticket. The difference in responses to the two evaluation measures shows an x^2 of 4.86, which with one Degree of Freedom is significant at the 5 percent level.

	Value > $0.50	Value < $0.50	Total	
Willing to pay $0.50	9	22	31	
Willing to accept $0.50	19	15	34	(Test 29)
Total	28	37	65	

$x^2 = 4.86$

Actual responses to both the payment and compensation alternatives were very similar to the answers which had previously been obtained to the companion hypothetical questions. The values demonstrated by participants' actual and hypothetical willingness to pay were nearly identical, and the variation in responses to the compensation offer was statistically insignificant. With a high degree of confidence, these results argue that hypothetical scenarios can provide an extremely close estimate of individuals' actual expressed values and provide evidence for a presumption of trust in the results of carefully designed hypothetical surveys.

	Value > $0.50	Value < $0.50	Total	
Willing to pay, hypothetical	9	24	33	
Willing to pay, actual	9	22	31	(Test 30)
Total	18	46	64	

$x^2 = .03$

	Value > $0.50	Value < $0.50	Total	
Willing to accept, hypothetical	17	11	28	
Willing to accept, actual	19	15	34	(Test 31)
Total	36	26	62	

$x^2 = .12$

INFLUENCE OF FRAMING EFFECTS

Decision problems can be defined in terms of the acts or options between which a choice must be made, the set of possible outcomes or consequences that might arise, and the contingencies or conditional probabilities which relate acts and outcomes. The decision-maker's conception of the options, outcomes and probabilities associated with a particular choice constitutes his or her decision frame. The particular structure or frame which is employed in the evaluation or any decision is in part determined by social norms and personal characteristics of the decision-maker and in part controlled by the particular way in which the problem is formulated.

Utility theory, which has provided the basis for most descriptive and normative theories of decision making, has little to say about the relation of particular decision frames to preferences. In fact, a number of different researchers have noted that changes in presentation which are irrelevant from the standpoint of utility theory can result in dramatic alterations in individuals' expressed values (Slovic, et al., forthcoming). Since most questions can be framed in more than one way, it follows that subtle changes in the way in which trade-offs are phrased may consciously or unintentionally distort survey measures of peoples' values. It therefore becomes important to better understand both the influence of particular problem descriptions in subsequent decisions and the mechanisms by which people might adapt particular decision frames.

The section reviews a series of experiments which investigate the influence of alternative decision structures on expressed preference measures of environmental quality. The interpretation of test results relies heavily on the analysis of decision frames which is provided by Kahneman and Tversky's prospect theory (Kahneman and Tversky, 1979; Tversky and Kahneman, 1981).

This approach, discussed in Chapter IV, provides the basis for an explanation of a number of shifts in preferences that are not predicted by utility theory. Most importantly, prospect theory stresses the vulnerability of peoples' values and feelings to different elicitation methods, and emphasizes the difficulties involved in any attempt to accurately translate individuals' subjective feelings into commensurate expressions of value.

Three versions of a payment question and two versions of a compensation question have been tested. All respondents received the same introduction to study objectives and a short description of potential trade-offs between increased industrial activity and the quality of the local environment. Participants in the basic payment experiment were next asked if they would agree to pay an annual "environmental quality tax of $10.00 in order to prevent a decline in average area air quality levels." If they responded affirmatively, they were asked whether they would be willing to pay $25.00; if they responded negatively, they were asked whether they would be willing to pay an annual tax of $5.00. Participants in the basic compensation experiment were asked if they would accept a decrease in annual taxes if as a result area air quality levels would decline; payment offers of $10.00, followed by $5.00 or $25.00, were again employed.

Tests 32 and 33 (Questionnaires 1a and 1b, 2a and 2b)

This test compares the basic willingness to pay format with a second version which asks the same question but reverses the order of the environmental quality and payment clauses. In both cases, the activity itself (assigning monetary payments to environmental quality) was unfamiliar and subjects were able to look at and repeatedly refer to their personal written copy of the question.

The two evaluation procedures were expected to be equivalent, particularly since at the $25.00 level of payment participants were one step removed from the difference in decision frames. However, forty-one of the fifty-six participants (or 73 percent of those sampled) were willing to pay at least $25.00 to prevent a decline in air quality levels when the tax clause preceded the description of the environmental change, while only forty-five of seventy-three respondents (or 62 percent) were willing to pay $25.00 when the order of the clauses was reversed. With an x^2 of 1.94, this difference is not statistically significant at the 5 percent level, but even so it is troubling that such a minor and transparent alteration could result in different average responses.

	Value > $25	Value < $25	Total	
Willing to pay $25, basic	41	15	56	
Willing to pay $25, reversed	45	28	73	(Test 32)
Total	86	43	129	

$x^2 = 1.94$

The same manipulation of the compensation question was also tested, and the results in this case present a much stronger argument. Only four of the fifty-two persons (or 8 percent) answering the basic compensation question (with a tax clause first) were willing to accept $25.00 in return for a decline in air quality, but fourteen of the fifty-eight respondents (24 percent) to the reversed format accepted an identical offer. The x^2 for these results, based on a 2x2 contingency table with one Degree of Freedom, is 5.40, which is significant at the 5 percent level.

	Value > $25	Value < $25	Total	
Willing to accept $25, basic	48	4	52	
Willing to accept $25, reversed	44	14	58	(Test 33)
Total	92	18	110	

$x^2 = 5.40$

One possible explanation of the difference is that these responses might reflect a variant of anchoring and recency biases in which the last information which is presented is weighted most heavily in an individual's evaluation. According to this interpretation, respondents who are left thinking about the emotionally-charged issue of environmental quality (as in the basic questions) will on average demonstrate a higher value than will those participants who (as in both reversals) are left considering relatively minor changes in their tax bill. Participants in the payment alternative would therefore have matched their response with either an obligation to pay (in the reversed question) or an opportunity to enhance environmental quality; since the latter is more attractive, expressions of willingness to pay are higher using the basic question. For participants in the compensation alternative, the most recent information would have been either the offer of a tax saving (in the reversed format) or the prospect of a decline in environmental quality: given the relatively small amount of the bribe and the responsibility associated with permitting environmental degradation, fewer participants agreed to accept compensation under the basic question structure.

Test 34 (Questionnaires 1a and 1c)

This test compares the basic willingness to pay question with a third version which asked individuals if they were "willing to pay an annual tax of

$10.00 in order to maintain present area air quality levels" (emphasis added). Both variants asked subjects to weigh competing benefits and costs by comparing a hypothetical monetary payment and a potential change in environmental quality. If potential outcomes are evaluated in terms of final asset states, as suggested by expected utility theory, there would be no reason to suspect a systematic difference in these formally equivalent versions of the payment question.

The alternative model of prospect theory (Kahneman and Tversky, 1979) indicates that expressed values should be higher for the first question than for the third due to the different shape of the value function for gains and for losses. THe opportunity to "prevent a decline" suggests that future air quality levels will be lower unless some action--in this case, a tax payment--is taken today. The framing of the first version therefore encourages respondents to assume a fixed reference point associated with present high levels of air quality. In contrast, the framing of the third question encourages respondents to adopt an adjusted reference point associated with future lower levels of air quality and to view the maintenance of present conditions as a relative gain. Since the value function proposed by prospect theory is steeper for losses than for gains, we would anticipate that an individual would exhibit a greater willingness to pay in order to avoid a loss than to maintain the present state of air quality.

Results of this trial support the interpretation suggested by prospect theory and provide additional evidence that what have formally been considered to be irrelevant variations in the framing of the payment question can lead to significant differences in subjects' expressed valuations. As demonstrated by Test 34, 46 percent of respondents (27 of 59) refused to pay a tax of $25.00 in order to maintain present air quality levels while only 27 percent (15 of

56) refused to pay the same amount in order to prevent their decline. The Chi-Square test yields an x^2 of 4.54, which with one Degree of Freedom demonstrates that the difference in the two evaluation approaches is significant at the 5 percent level.

	Value > $25	Value < $25	Total	
Willing to pay $25, prevent	41	15	56	
Willing to pay $25, maintain	32	27	59	(Test 34)
Total	73	42	115	

$x^2 = 4.54$

An additional factor (considered in more detail in the final section) may also be operative in that the first question appeals to the self-image of the respondent and introduces an implied sense of responsibility costs. If no action is taken and air quality levels do in fact decline, an individual who answers negatively might well feel some measure of personal blame for having passed up an explicit opportunity to intervene. His or her choice is unambiguously clear: either pay the tax or face the consequences of lower air quality levels. In the third question the effect of refusal is not explicitly stated, and the question does not present a clear causal relationship between a failure to maintain present air quality standards and the lowering of future levels. As a result, there is no clear call to action and hence responsibility costs associated with a negative response are substantially lowered.

The presence of a weak certainty effect, by which outcomes perceived to be probable are underweighted in comparison with certain outcomes (Kahneman and Tversky, 1979), may serve to reemphasize this point. Since the first question suggests that payment is required to prevent a certain decline in air

quality levels and the third question only implies that a decline might occur, a certainty effect may increase subjects' relative willingness to pay in the first version of the question.

INFLUENCE OF ANCHORING BIASES

One of the most intuitively plausible cognitive biases is concerned with the finding that adjustments from an initial opinion or value tend to be both imprecise and insufficient. The concept emphasizes the common-sense dictum that first impressions which are formed of a person, idea or value are extremely important and frequently prove surprisingly resistant to subsequent and even conflicting information or alternate perceptions.

There exists a notable lack of consensus among survey researchers regarding the significance of anchoring effects or the types of initiatives which could be undertaken to minimize their influence. As emphasized in the discussion of Chapter IV, this disagreement is in part related to the different contexts in which surveys of non-market values have been undertaken. To the extent that preferences are well-formed and clearly bounded, anchoring effects--or, as they are more informally known, starting point biases--should exert a minimal influence on an individual's expressed values. For example, survey measures of routine expenditures or well understood behavior should be relatively free of anchoring bias. On the other hand, if individuals have not given much thought to an issue or are trying to evaluate a good for the first time, their susceptibility to the magnetism of an initial value or perception is likely to increase substantially.

This section presents the results of several experiments which have been conducted to test the influence of anchoring biases. Two different situations were employed. In the first, participants were asked to respond

affirmatively or negatively to a proposed trade-off between air quality levels and a specified monetary payment or offer of compensation. In these experiments, which were primarily administered to university-level students, both goods under consideration are well understood but the required exchange--weighing environmental quality against discrete amounts of money--is likely to be unfamiliar. In the second situation, participants were asked if they would agree to pay a designated sum of money in order to visit or to help maintain the Provincial Museum in Victoria. Both of the payment vehicles--either an addition to annual taxes or an entrance fee--are familiar, and the trade-off itself, which posits the need to pay money to help operate a Museum, is also readily comprehensible. If starting point biases are to be found, their influence would therefore be least surprising in the questions concerned with environmental quality.

The results of the tests provide strong evidence for the existence of pronounced anchoring biases, and this conclusion holds for both sets of experiments. In total, nine of the eleven tests which were conducted showed a statistically significant influence of anchoring effects at the 5 percent level.

Unfortunately, it is not easy to move from a demonstration of the problem to the development of a general strategy for improving survey design. The empirical evidence shows that when the same question is asked using two different initial values the results are likely to be substantially different, but no information is thereby gained regarding which of the two questions provides a more accurate estimate of an individual's true value. At the least, it appears that survey approaches to the valuation of non-market goods should in most cases employ a range of values rather than a single "most reasonable" estimate which may only influence participants to confirm the

prejudices of the investigator. At the most, it would be advantageous to also phrase the same evaluation question in a number of different ways and to employ an interactive debriefing or debiasing procedure whereby respondents could be helped to gain an improved perspective on and understanding of their answers. These concerns will be discussed more closely as part of Chapter VII.

Test 35 (Questionnaires a. and a..)

This test compares two versions of a question which asks participants to estimate the economic value of the B.C. Provincial Museum. Following a short description of Museum services and survey objectives and several introductory demographic questions, respondents are asked if they would be willing to pay a specified entrance fee in order to visit the Museum. In one case, participants who are willing to pay a $3.00 entrance fee are asked if they would pay $5.00, while those who refuse are asked if they would pay $1.00. In the other case participants are first asked if they would pay $4.00; those responding affirmatively are then asked to pay $5.00, while those who refuse are asked if they would pay $3.00.

The second trial employs a higher initial value, and if an anchoring bias is evident respondents should be encouraged to pay a higher admission fee than in the first case. In addition, the higher starting amount used in the second test decreases the difference between the initial and subsequent values. It was felt that more people might be encouraged to pay $5.00, and fewer refuse to pay $3.00, following an initial reference point of $4.00 rather than $3.00.

This is exactly what is found, and the level of variation in answers to the two approaches is surprisingly large. While only 31 percent of respondents (49 of 158) who were asked the first question were willing to pay an

entrance fee of $5.00, 47 percent (23 of 49) of all those who were first asked if they would pay $4.00 agreed to pay $5.00. The x^2 for this difference is 4.25, which with one Degree of Freedom is significant at the 5 percent level.

	Value > $5	Value < $5	Total	
Willing to pay, initial value of $3.00	49	109	158	
Willing to pay, initial value of $4.00	23	26	49	(Test 35)
Total	72	135	207	

$x^2 = 4.25$

Tests 36, 37 and 38
Questionnaires b., b.., and b...)

The tests which are discussed in this section compare the joint effects of different starting points and different bid increments on participants' expressed values. The three questionnaires are similar to those just discussed but in this case on-site visitors were asked their willingness to make an increased tax payment in order to ensure "that the present quality of Museum exhibits is maintained." Three different levels of payment were tested, with a basic question again employing sums of $3.00, $5.00, and $1.00 and two variants presenting payment levels of $5.00, $10.00 and $3.00 and $10.00, $20.00 and $5.00.

Tests for the significance of anchoring effects were undertaken at the $5.00 payment level, which is common to all three trials but varies in a relative sense according to the context which is provided by the accompanying sums. In the first case, a $5.00 payment is the largest amount under consideration and is likely to be viewed in relation to the initial value of $3.00. In the second test $5.00 represents the starting sum and might well be valued at a relatively lower level when viewed either in isolation (as the first value

considered) or in reference to the subsequent option of a $10.00 payment. In the third instance the $5.00 payment choice comes last and may be seen as a last chance by those holding a positive value but who were unwilling to pay the higher amounts (that is, $10.00 or $20.00). This interpretation suggests that more people should be willing to pay an annual tax of $5.00 to maintain the quality of Museum exhibits in the second and third versions than in the first, and also that expressed values might be higher for the final test, when a $10.00 sum is the starting payment, than when the initial amount is $5.00.

	Value > $5	Value < $5	Total	
Willing to pay, initial value of $3.00	78	27	105	
Willing to pay, initial value of $5.00	30	3	33	(Test 36)
Total	108	30	138	

$x^2 = 4.12$

The confirmation of this hypothesis is presented in tests 36, 37 and 38. Whereas twenty-seven of the 105 participants (26 percent) refused to make a $5.00 payment following an initial value of $3.00, only three out of thirty-three respondents (9 percent) refused to pay an equal amount when the $5.00 payment option was presented first and followed by a $10.00 choice. Similarly, only two out of a total of thirty-three subjects (6 percent) refused to make a $5.00 payment after first being presented with the opportunity to pay either $10.00 or $20.00. The x^2 for both comparisons indicates a statistically significant degree of difference, and argues in favor of the presence of a definite anchoring bias. For test 36, which compares the first and second versions of this question, the x^2 is 4.12; for test 37, which compares the first and third experiments, the x^2 is 5.77: both are significant at the 5 percent

level.

	Value > $5	Value < $5	Total	
Willing to pay, initial value of $3.00	78	27	105	
Willing to pay, initial value of $10.00	31	2	33	(Test 37)
Total	109	29	138	

$x^2 = 5.77$

Test 38 compares the responses given to the second and third willingness to pay variants, which employ respective starting values of $5.00 and $10.00. The impact of an anchoring bias is again substantial: while nearly half (16 of 33, or 48 percent) of the participants in the first experiment refused to make a $10.00 annual tax payment, only five of thirty-three respondents (15 percent) in the second test were unwilling to pay $10.00 to maintain the quality of Museum exhibits. The x^2 for this variation is 8.45, which with one Degree of Freedom is significant at the 5 percent level, and argues persuasively that the difference in the two approaches--which were identical in all aspects except the specified levels of payment--is reliably altering the expressed preferences of survey participants.

	Value > $10	Value < $10	Total	
Willing to pay, initial value of $5.00	17	16	33	
Willing to pay, initial value of $10.00	28	5	33	(Test 38)
Total	45	21	66	

$x^2 = 8.45$

Tests 39, 40 and 41
(Questionnaires j., j.., j...)

This set of questions was designed to estimate the value of the Museum to provincial residents who were not at present visiting, and who might never visit, the Museum exhibits in person. Brief descriptions of the Museum and survey objectives were presented to respondents, who were then asked to state their willingness to make an incremental tax payment "to ensure that the Museum exhibits remain open to visitors and preserve(s) your opportunity to visit the Museum at some future time." Responses to three versions of the question, specifying hypothetical tax payments of between $1.00 and $20.00 and starting points of $3.00, $5.00 and $10.00, were obtained in each of four British Columbian cities: Victoria, Vancouver, Chilliwack and Nelson.

The payment levels employed in these three tests of non-users were identical to those presented in the preceding three trials (tests 36, 37 and 38), and in this case the influence of a starting point bias is found to be even stronger. Whereas 34 percent (67 out of 200) of the individuals participating in the basic test (which presented respective payment levels of $3.00, $5.00 and $1.00) were not willing to pay $5.00, only 17 percent (26 of 152) and 16 percent (17 of 103) of respondents in the second and third versions of the experiment refused to make a $5.00 payment. Tests 39 and 40 present these results and demonstrate the substantial differences in participants' expressed values. The x^2 statistic for the 2x2 contingency table derived from test 39 is 12.01, while the x^2 for test 40 is 9.87; both values are significant at the 5 percent level.

The evidence is equally clear that the difference in individuals' average expressed values between starting points of $5.00 and $10.00 is also significant. Sixty-nine of 152 respondents (45 percent of those sampled) were

willing to pay $10.00 when a $5.00 payment option was given first compared to sixty-seven of 103 participants (65 percent) who were willing to pay $10.00 when it was presented as the starting value. The x^2 for this variation is 9.58, which is again significant at the 5 percent level and provides additional evidence of the important influence of starting points on individuals' expressed values.

	Value > $5	Value < $5	Total	
Willing to pay, initial value of $3.00	133	67	200	
Willing to pay, initial value of $5.00	126	26	152	(Test 39)
Total	259	93	352	

$x^2 = 12.01$

	Value > $5	Value < $5	Total	
Willing to pay, initial value of $3.00	133	67	200	
Willing to pay, initial value of $10	86	17	103	(Test 40)
Total	219	84	303	

$x^2 = 9.87$

	Value > $10	Value < $10	Total	
Willing to pay, initial value of $5.00	69	83	152	
Willing to pay, initial value of $10	67	36	103	(Test 41)
Total	136	119	255	

$x^2 = 9.58$

Tests 42 and 43 (Questionnaires 1a and 4b; 4c and 4d)

These two tests both examine the influence of anchoring biases in the context of responses given to the University of British Columbia surveys of individuals' expressed willingness to pay in order to prevent a decline in average air quality levels. The introductory descriptions of survey objectives and the reminder that environmental protection is not costless were identical in all four questionnaires, as was the form of the subsequent valuation questions. The only difference in the four versions was in the specified levels of payment open to each respondent.

Test 42 compares the responses which were given to a questionnaire proposing an initial payment of $10.00 with the values expressed by participants in reference to a questionnaire which employed a starting value of $100.00. Test results are shown for a $25.00 level of payment. In the first case, where $25.00 represents the maximum payment choice and follows a starting value of $10.00, forty-one of fifty-six respondents (73 percent) were willing to pay at least $25.00 to prevent a possible decline in air quality within the area. When $25.00 appeared as the final payment option, following an initial value of $100.00 and a maximum choice of $200.00, twenty-eight of the thirty persons completing the questionnaire (93 percent) stated their willingness to pay this amount. A Chi-Square test of these results yields an x^2 of 4.92, which with one Degree of Freedom is significant at the 5 percent level.

This result is similar to that of previous tests, where the context within which a particular sum was presented to respondents appears to make it seem relatively higher or lower. What is surprising is not so much that $5.00 looks big when compared to $3.00 and small when compared to $20.00 but that the value which individuals place on the goods under consideration is

apparently so malleable, so easily swayed by a change in the point of reference.

	Value > $25	Value < $25	Total	
Willing to pay, initial value of $10	41	15	56	
Willing to pay, initial value of $100	28	2	30	(Test 42)
Total	69	17	86	

$x^2 = 4.92$

Test 43 compares the results of two additional experiments which were conducted using starting points of $100.00 and $10.00. In the first trial, those respondents who were willing to pay $100.00 were asked if they would pay $200.00, while those who refused were presented with an opportunity to pay a $50.00 annual tax. In the second version, participants who agreed to pay $10.00 were asked if they would pay $50.00, while those refusing were given the option of paying $5.00.

The test results, conducted at the shared payment level of $50.00, add to the evidence in support of a substantial anchoring bias. When the $50.00 payment level was presented last, following previous amounts of two and four times as much, twenty-four of thirty-two participants (75 percent of those sampled) agreed to pay this amount in order to prevent a possible decline in air quality levels. However, when $50.00 represented the maximum payment option only nine of twenty-seven respondents (33 percent) were willing to pay this amount. With an x^2 value of 10.31, the difference in results proves to be statistically significant at the 5 percent level.

	Value > $50	Value < $50	Total	
Willing to pay, initial value of $100	24	8	32	
Willing to pay, initial value of $10	9	18	27	(Test 43)
Total	33	26	59	

$x^2 = 10.31$

Test 44 (Questionnaires 2a and 2d)

This test provides an estimate of respondents' willingness to accept compensation in return for permitting lower average levels of air quality. Two different payment options were again presented. The first employed an initial value of $10.00; if it was acceptable participants were asked if they would settle for a $5.00 payment, while if it was considered to be insufficient participants were offered $25.00. The second version started with an offer of $100.00 in compensation and then either increased it to $200.00 or decreased it to $25.00. A $25.00 payment is thus viewed as either the minimum or the maximum sum offered to respondents in trade for the lower level of air quality.

In this case the difference in results at $25.00 is not significant. The reason is immediately clear from the responses shown in test 44: such a high proportion of participants (92 percent of those sampled) were unwilling to accept a $25.00 payment even with a starting offer of $10.00 that any variation in responses due to the presence of an anchoring bias is rendered invisible. As a result, the 95 percent of respondents (36 of 38) who refused to accept $25.00 in compensation after first being offered $100.00 is not significantly different from the percentage which refused following an offer of $10.00: whether the $25.00 payment appears relatively larger or smaller is apparently unimportant, because either way it is viewed as insufficient

compensation.

	Value > $25	Value < $25	Total	
Willing to accept, initial value of $10	48	4	52	
Willing to accept, initial value of $100	36	2	38	(Test 44)
Total	84	6	90	
				$x^2 = .18$

Tests 45 and 46 (Questionnaires c. and c..., e. and e..)

These two tests evaluate the possible importance of an anchoring effect when it is conveyed through a frame of reference which is ostensibly provided to assist the participant in bounding the value placed on the good or activity under consideration. The approach has been employed in a number of studies (for example, Meyer, 1974) which seek to estimate the value of non-market goods, and it is frequently proposed as a way to render an unfamiliar and relatively complex process--placing a monetary value on an unpriced good--less formidable.

Each of the tests, which estimate the economic value of the Provincial Museum, compare two reference scales which differ in the mean value presented to respondents. In the first experiment, individuals were provided with a list showing the approximate adult entrance prices which must be paid to visit six other roughly comparable exhibits in North America. They were then asked, in light of these referent prices, whether they would be willing to pay an admission fee of $3.00 to visit the Provincial Museum. Those responding affirmatively were asked if they would also agree to pay a $5.00 entrance fee, while those who refused were asked if they would instead pay $1.00. Four of the six prices included for reference, with a mean value of approximately

$3.75, were shown in the same order on both versions, while the remaining two values were placed at either the high (mean value of about $9.00) or low (mean value of $2.00) endpoints of the resulting scale.

Even when the levels of payment presented to participants are identical and the valuation process (paying a visit to a Museum) is readily comprehensible, responses to the two questions proved to be significantly different. When the lower prices were included in the reference scale only eleven of the forty-seven persons questioned (23 percent) were willing to pay a $5.00 entrance fee to visit the Museum, while seventy-six of 161 individuals (47 percent) responding to the higher scale agreed to pay a $5.00 admission price. The x^2 for this difference is 8.55, which means that the results are significant at the 5 percent level.

	Value > $5	Value < $5	Total	
Willing to pay, high reference scale	76	85	161	
Willing to pay, low reference scale	11	36	47	(Test 45)
Total	87	121	208	

$x^2 = 8.55$

The second experiment employed the same two reference scales but this time asked visitors to state the maximum fee that they would be willing to pay in order to visit the Provincial Museum. The difference in the two sets of responses is again substantial. Whereas only thirteen of fifty-five respondents (24 percent) were willing to pay a $5.00 admission fee when the lower scale was employed, nearly half of those questioned (33 of 68 persons, or 49 percent) agreed to pay this price when the frame of reference which was provided showed a higher average value. The x^2 of 8.11 for this difference is

again significant at the 5 percent level, and provides additional evidence that the impact of a particular reference scale on respondents' expressed values can be substantial. Although the concept of providing some sort of analogous framework as an aid in the measurement of non-market values is appealing, these results suggest that it may prove impossible to do so without simultaneously biasing participants' responses.

	Value > $5	Value < $5	Total	
Willing to pay, high reference scale	33	35	68	
Willing to pay, low reference scale	13	52	65	(Test 46)
Total	46	87	133	

$x^2 = 8.11$

Test 47 (Questionnaires 1e and 1f)

The final test in this section again looks at the effect of anchoring biases in the context of alternative frames of reference. Participants were asked if they would pay an annual tax in order to prevent a decline in air quality levels, and were provided with a short list of six items which showed the average annual monetary payments made by British Columbian residents for a number of goods and services. These expenditures were arranged in two columns of three entries each: one column, with a mean value of about $86, was utilized in both versions, while the second column presented three items with a mean value of either $26.00 or $215.00. The specified levels of payment and the sequencing of payment options were the same in both questionnaires.

The influence of the frame on participants' expressed values was again substantial, although the effect of anchoring biases is not as strong as in the preceding examples. Twenty-three of the thirty-four persons (68 percent)

who received the higher set of reference expenditures were willing to pay at least $25.00 in order to prevent a decline in air quality, while only twenty-two of the forty-five participants (49 percent) in the experiment which employed lower reference values were willing to pay as much. This difference in expressed values yields an x^2 statistic of 2.73, which is not significant at the 5 percent level. It is interesting to note that these results are therefore less persuasive than those presented for either of the reference tests conducted at the Provincial Museum: both the greater magnitude of the monetary differences in the alternative frames and the less familiar nature of the exchange under consideration suggested that the evidence of anchoring biases might instead have been stronger in this comparison.

	Value > $25	Value < $25	Total	
Willing to pay, high reference scale	23	11	34	
Willing to pay, low reference scale	22	23	45	(Test 47)
Total	45	34	79	

$x^2 = 2.73$

INFLUENCE OF PROCESS VARIABLES

This section discusses the role played by a number of process variables, notably responsibility costs and regret, in the valuation of non-market goods. Emphasis is therefore placed on the psychic costs and benefits of an action rather than the actual good which is acquired or the specific activity in which one is engaged. These considerations are omitted from most models of decision-making and certainly fail to appear in most descriptions of economic behavior, which instead focus on consumption possibilities which arise in relation to tangible goods. Process or manner variables instead

stress that the particular way in which an action is presented or performed--the "how" of a choice rather than simply the "what"--may exert a significant influence on an individual's expressed preferences and observed behavior.

A sense of these concerns is conveyed by the term "transactions costs," which appears frequently in both legal and economic discussions of such topics as the appropriateness of alternative liability rules or resource allocation frameworks. Yet in most cases transactions costs remain vague and general, referring to financial costs of unknown magnitude which are associated with getting large numbers of people together or excluding free riders who neglect or refuse to pay for some good. The term "psychic costs" has also been employed at times to refer to such anti-rationalist phenomenon as the widely observed relevance of historical, or sunk, costs. However, neither transaction nor psychic costs successfully convey the richness and significance of behavioral concerns which are associated with the way in which a consumption decision is undertaken or avoided: just as I may donate to charities for altruistic reasons so I may be hoping to decrease my taxes, inflate my ego or relieve a sense of acute embarrassment related to my relative position of wealth.

The discussion of Chapter IV has stressed that whereas utility theory evaluates end states or final asset positions, prospect theory emphasizes that outcomes may more commonly be expressed as positive or negative deviations from a neutral reference point. This provides a conceptual basis for the evaluation of process considerations such as regret or responsibility through impacts on the reference outcome. For example, I may initially have been very happy to receive a B on an examination which I feared I might have failed; however, after hearing that my friend and study partner received an A, my joy may turn to consternation and a sense of disappointment in my performance.

My reference position therefore includes elements of both gain and loss, and the utility of the end state--my dissatisfaction at receiving a mark which exceeds my initial expectation--can only be understood in terms of the changing definition of my reference outcome.

Routine and easily comprehended purchases--buying a loaf of bread or a bus ticket--would not normally involve an individual in the subjective weighing of process considerations. As decisions become less familiar and more complex, however, the significance of process variables will generally increase. Even if the impetus for the behavior is the same, there is a significant difference between the person who debates whether to save string or paper bags in case they are someday needed and the society which debates whether to preserve wilderness areas or threatened species of plants. Decisions involving a potential loss of life, degradation of health or change in environmental quality form part of a large group of choices which individuals may be asked to make in the context of the valuation or distribution of a wide range of non-market goods. In such cases, the particular way in which a question is phrased or a choice is presented to an individual may give rise to costs or benefits which have little or nothing to do with the specific trade-off which is ostensibly under consideration.

In fact, most actions or choices involve an invisible cost in that what is done may in hindsight prove to be less than perfectly correct. Thus the person who sells his or her house just before a price increase feels worse than someone else who, due to lack of money or initiative, simply lets the chance pass by: the lost opportunity for financial gain is more easily imagined by the first individual since he or she actively chose a change in circumstances. This characteristic encourages the maintenance of the status quo and enhances the possibility for regret or disappointment which in turn

increases the costs associated with giving up rights to a resource or an experience. Yet it is also this aspect of many manner variables which encourages politicians, advertisers or interviewers to stress that indecision or inactivity also constitutes a choice. As a result, any child who goes hungry or any species which is endangered may be perceived as my personal responsibility and my fault.

There exists a large gap, however, between casual descriptions of possible process effects and the rigorous analysis or prediction of their occurrence. Little experimental evidence exists at present to assist in the clarification of process influences. In this section I therefore present the results of two series of experiments designed to test for the presence of responsibility costs and regret. A first set of experiments compares the responses of two groups of participants who were informed either that they had been randomly selected as part of a student research project or that they had been chosen as part of a small sample group, with their responses perhaps providing an input to the formation of governmental policies. If responsibility costs are significant, respondents in the latter test should be encouraged to place a higher value on environmental quality. A second group of experiments compares the relative aversiveness of a number of different unpleasant events about which the subject is made to feel that he or she either bears no responsibility or may be partly to blame. In both cases, process considerations are shown to significantly influence respondents' expressed values.

Tests 48 and 49 (Questionnaires 3a and 3b; 3c and 3d)

These two tests evaluate participants' willingness to pay in order to prevent, or their willingness to accept compensation in return for permitting,

a hypothetical decline in average air quality levels within the Vancouver area. The tests were conducted on student populations at the University of British Columbia and are identical in terms of descriptive information, question formats and payment levels except for the inclusion of an introductory sentence which alters the responsibility cost accompanying a participant's expression of value. In one case, the respondent is informed that he or she has been selected as part of a small sample of Vancouver area residents and that the responses which are given could "serve as an input to the formation of Government policies." In the low responsibility version, respondents are instead informed that they have been randomly selected as part of a large sample and that their answers will "serve as an input to a University of British Columbia student research project." Following the previous discussion, it is expected that the sense of higher responsibility costs which is conveyed in the first version will encourage respondents to inflate the value which they place on the maintenance of high levels of air quality.

The results of the empirical tests tend to support this hypothesis, although neither is statistically significant at the 5 percent level. Responses to the willingness to pay experiment, shown in test 48, are most persuasive. While nineteen of thirty-three participants (58 percent) in the high responsibility version were willing to pay at least $25.00 to prevent a decline in air quality levels, only eleven of the thirty people questioned in the low responsibility test (37 percent) agreed to pay this amount.

	Value > $25	Value < $25	Total	
Willing to pay, high responsibility	19	14	33	
Willing to pay, low responsibility	11	19	30	(Test 48)
Total	30	33	63	$x^2 = 2.78$

The results of the compensation experiment are less strong but nevertheless provide additional evidence that the perception of responsibility costs may influence an individual's expression of value. While one-third (33 percent, or 18 of 54) of those questioned in the low responsibility sample valued the potential decline in air quality levels at less than $25.00, only 19 percent (6 of 32) of the participants in the high responsibility experiment were unwilling to pay $25.00. The x^2 for this difference is 2.08, which is not significant at the 5 percent level.

	Value > $25	Value < $25	Total	
Willing to accept, high responsibility	26	6	32	
Willing to accept, low responsibility	36	18	54	(Test 49)
Total	62	24	86	

$x^2 = 2.08$

Tests 50, 51, 52 and 53 (Questionnaires 5a and 5b; 6a and 6b; 7a, 7b and 7c)

Whereas the previous tests evaluate the influence of responsibility costs on participants' evaluation of a non-market resource, this group of four experiments seeks to isolate the influence of regret. The focus in the present set of experiments is on participants' sense of self-blame for not having taken an action at some time in the past when an opportunity was available, whereas the emphasis in the preceding tests was on the avoidance of potential future costs. Regret is therefore linked with a lack of inevitability, and in general will increase with the extent to which it is believed that a situation could have been changed if different actions had been undertaken.

All three tests employ an aversiveness scale which was originally employed by Kahneman and Tversky (1979), although many of the events which participants are asked to evaluate as well as the particular context within which responsibility costs are assessed were developed for the purposes of this study. Each experiment asks respondents to state the aversiveness of ten different unpleasant events by recording the strength of their wish that each not happen to them on an open-ended scale of 0 to 20. A reference event ("Having a stomach flu for a week, with nausea and fever") is provided to serve as an anchor and assigned a score of 10. In each case one of the events (always listed as the ninth item) was varied in order to test the influence of additional costs associated with the presence of regret.

Test 50 compares participants' responses to two questions. The first described a situation in which the respondent read that environmental quality had declined in Vancouver to the point that average air quality levels were the worst of any major Canadian city. Each participant then indicated the relative aversiveness of this hypothetical event. A second version posed the same situation but added that the respondent could have voted for the creation of an "environmental quality" tax in last year's elections but neglected to fill in a ballot that day because they were pressed for time. Whereas the mean value recorded in the first experiment was 10.7, the mean in the second test was 13.9. On the basis of a two-tailed t-test and a test statistic of 2.70, we are permitted to confidently reject the null hypothesis that there is no difference in the two versions at a .05 level of significance.

Presence of Regret	Yes	No	
Number of respondents	44	43	
Mean value	10.7	13.9	(Test 50)
Standard deviation	5.19	5.42	t = 2.70

Test 51 employs a similar format and provides additional evidence for the significance of regret in individuals' evaluation of non-market resources. A first question suggests that the development of new mines and townsites in northern British Columbia "is threatening the continued survival of several rare species of large mammals." The test again investigates whether the relative aversiveness of this situation can be affected by the manipulation of respondents' sense of regret resulting from their failure to register their views on the subject in a recent election. If so, their expressed willingness to pay would not only include values associated with preservation of the animals but also any additional costs associated with their desire to avoid a sense of regret.

The results of this experiment again emphasize the surprising strength of process concerns. Whereas the mean value given for the high regret questionnaire was 12.4, the mean of the alternative version was only 8.8. With a t-statistic of 2.29, the null hypothesis--that there is no difference in the two versions--can again be rejected at a .05 level of significance.

Presence of Regret	Yes	No	
Number of respondents	34	25	
Mean value	12.4	8.8	(Test 51)
Standard deviation	5.60	5.96	t = 2.29

Tests 52 and 53 compare the results of participants' responses to a question concerning their hypothetical failure to contribute blood just prior to a local air crash. Although respondents' desire to avoid regret is very strong in this case--the t-statistic for the difference in sample means (test 52) is 3.32, indicating that the null hypothesis can be rejected at a .05 level of significance--the more interesting comparison is between two

versions of the test which relate a participant's avowed refusal to either an in-person or telephone request for a contribution of blood from a Hospital volunteer. It was expected that the face-to-face confrontation would increase the perceived aversiveness of the refusal, and this is exactly what is found. However, the difference in the means of the experiments--12.1 for the telephone request compared to 13.7 for the personal appeal--provides a test statistic 1.37, which is not statistically significant at a .05 level.

Presence of Regret	Yes	No	
Number of respondents	39	38	
Mean value	13.7	9.5	(Test 52)
Standard deviation	5.13	5.82	t = 3.32

Presence of Regret	Yes	No	
Number of respondents	39	37	
Mean value	13.7	12.1	(Test 53)
Standard deviation	5.13	5.00	t = 1.37

CHAPTER VII

SURVEY IMPLICATIONS AND FUTURE RESEARCH PRIORITIES

The preceding chapter has presented empirical evidence regarding six closely related concerns which often arise when attempting to measure the value of goods which are not traded in conventional markets. These topics range from fairly specific and relatively well-defined phenomena such as anchoring effects to more general and poorly delineated phenomena such as the influence of process variables. However, a danger exists that rather than clarifying the dimensions of suggested evaluation measures or assisting in their implementation, the discussion will instead leave the reader with a sense of premonitory fatigue in the face of an unmanageable number of interdependent considerations.

This chapter therefore attempts to define a number of the major research concerns and also investigates some of the broader implications of the experimental evidence. Definitive statements will rarely be forthcoming, which testifies to both the contentiousness and the complexity of the issues at hand. Emphasis is instead placed on the contribution which this study has made to an improved understanding of each area of concern and on how lessons gained in the course of this work can help point the way to further research opportunities.

Two principal questions will be addressed. The first is concerned with the observed disparity between measures of value based on an individual's willingness to pay for a good and measures which reflect a person's willingness to accept compensation in return for the loss of a good. A second

section explores the case for using hypothetical questions, and characterizes a number of circumstances in which contingent valuation approaches are likely to be necessary. Some of the major concerns which arise when asking hypothetical questions are then discussed. Taken as a whole, these two sections seek to clarify what is and what is not known about a number of the key concerns which arise in measuring the value of non-market goods. It is hoped that the analysis will encourage a closer examination of the behavioral assumptions and decision criteria which lie behind individuals' expressed preferences for non-market goods.

DISPARITIES IN PAYMENT AND COMPENSATION MEASURES OF VALUE

Chapter II reviews the theoretical arguments for the anticipated equivalence of willingness to pay and compensation demanded measures of value (or, in the case of non-market goods, equivalent and compensating variation measures of consumer's surplus). So long as income effects are small and the proposed change in the price or quantity of the item is insignificant relative to an individual's total real wealth, then differences in the two approaches are expected to be negligible. Chapter II also reviews a number of contrasting studies which provide empirical evidence that a disparity in payment and compensation measures is not only frequently encountered but that it is often of substantial magnitude.

In some of these studies researchers had anticipated that a difference might be observed, and their experimental results confirmed a view that beforehand seemed plausible. For this group, the empirical responses are felt to be basically correct and the conventional theory either wrong or, at best, incomplete. Other individuals appear to have been disturbed by the magnitude of variation between expressed payment and compensation values which

was indicated by their results. This group of researchers have maintained that the theory is basically correct and the error instead lies with some intransigent aspect of experimental procedures or survey design.

Neither group, however, has been able to develop a theoretical framework which satisfactorily interprets their results. While several explanations for the disparity have been advanced--for example, the endowment effect proposed by Thaler (1980) or subtle influences of income and wealth effects--they remain partial, and if faith in the empirical evidence is justified a more complete rationale for observed differences in the measures is required. Similarly, a number of thoughtful arguments for the equivalence of payment and compensation approaches have been made--for example, the discussions of Willig (1976) or Bishop and Heberlein (1979)--but they tend to treat situations of limited relevance (such as where price changes are small) and ignore some important considerations.

The tests which have been conducted as part of this study firmly support the hypothesis that substantially more compensation will be demanded in exchange for a good which is considered to be already in one's possession than would usually be paid to retain or to obtain the same good. The evidence demonstrates that the two measures of value do not yield equivalent responses, and the strength of statistical tests of the difference presents a convincing argument that the disparity is both pervasive and substantial. Two questions must therefore be addressed. First, why the disparity: what differences in the two measures create the consistent variation in response? Second, what are the implications: can the empirical results tell us anything about the conditions under which one measure will provide a more accurate guide to potential changes in welfare?

Reasons for the Disparity

Some information on the first question can be derived from a closer look at responses to the experiments conducted as part of this and previous studies. Although the evidence is suggestive rather than conclusive, four closely related factors appear to exert a particularly significant influence on both the frequency and the magnitude of the disparity. These are the size of the good or payment levels under consideration, the availability of substitutes, the perceived legitimacy of the transaction, and the presence of responsibility costs, regret or other process considerations. Each will be considered in turn.

Size. Chapter VI reported the results of three closed-ended experiments which assessed the value placed on a lottery ticket giving the participants a one in thirty chance to win a calculator. The tests employed three different dollar amounts, ranging from $0.20 to $1.00, with the expected value of the exchange approximately equal to the $0.60 midpoint of this range. Unfortunately, the experiments were not designed to collect information on the absolute size of the disparity between payment and compensation measures of value. However, participants' responses consistently demonstrated that differences between the two approaches became more reliable in direct proportion to the dollar amount employed in the experiments.

Similar results were obtained in tests of students' willingness to pay or accept compensation for proposed changes in regional air quality. The questionnaires provided information at three different payment levels--since participants were presented with an initial value and then, depending on their response, moved on to either a higher or lower amount--and the observed differences in payment and compensation approaches were statistically significant only when larger amounts were paid or received. In most cases, no

differences were observed at $5.00 or $10.00 payment levels while differences in the approaches when $25.00 was to be paid or received were statistically significant at the five percent level. Comparable responses were also obtained in tests at the Provincial Museum using lower dollar amounts but a parallel question format.

In each of these cases the good or experience under consideration remained the same and the magnitude of the proposed payment varied. It is expected that a similar relation would be observed if the value of the good in question were to vary and the level of payment instead remained the same. Following earlier discussions, it may well be that size affects the disparity in part through an endowment effect, with more highly valued goods generally forming a more significant part of a person's overall asset position. This hypothesis should be relatively easy to test, perhaps using lottery exchanges to determine the size of the disparity in relation to comparable bundles of goods which can unambiguously be ranked in terms of increasing value.

Legitimacy. Differences in willingness to pay and compensation demanded measures of value have now been examined in a wide variety of contexts. Tests which have been carried out in the course of this study, for example, compare prices when purchasing and relinquishing lottery tickets for a calculator, changes in environmental quality, theatre seats, umbrellas, positions in a queue, entrance to a Museum, and a variety of foods. Some of the earlier experiments by other researchers investigate the value of recreational hunting and fishing opportunities, a lunch, the local postal service, a television program, parklands, and admission to a library. An equally wide range of empirical results have been obtained: in some cases the responses of both groups are similar and differences in payment and compensation measures of value are small, while in other situations both the magnitude of the disparity--

as much as ten-fold and more--and the proportion of respondents who refuse to participate in the compensation test are dramatically large.

A review of these varied responses suggests that the legitimacy of the transaction, in the sense of the normalcy or familiarity of the exchange, constitutes a significant concern. People appear to be quite comfortable when paying for, and sometimes also when relinquishing, theatre seats or lunches; they become much less comfortable when what they are being asked to purchase, and even more so to give up, influences their health or the quality of the environment. Some of this unease has to do with considerations of size or responsibility, which are discussed elsewhere in this section. But at least in certain cases much of it may also derive from the fact that transactions of this nature may be unfamiliar and are not considered to be a regular, normal or even ethical thing to do.

Evidence in support of this hypothesis has been obtained from a number of the experiments conducted as part of this study. For example, many of the individuals who were asked to state the minimum tax decrease which would just compensate them for a decline in local air quality levels either refused to participate in the survey or required a very high level of compensation. As reported in Chapter VI, only thirteen of the forty-six individuals who were asked the open-ended version of the question reported a specific monetary value, and their mean level of compensation demanded was nearly $2,000.00 per person. Twenty respondents (43 percent of those questioned) explicitly refused to accept any amount of monetary compensation in exchange for decreased levels of environmental quality, while the remaining thirteen participants simply left the question blank. Similar results were obtained in the surveys conducted at the Provincial Museum. For example, seventeen of twenty-one persons (81 percent) stated that they were unwilling to accept any level

of tax relief in trade for the possible closure of the Museum, and several individuals were plainly offended by the nature of the suggested exchange.

These results are not unexpected. For example, both Randall et al. (1974) and Rowe et al. (1980) reported that approximately 50 percent of those interviewed refused to cooperate when asked to state the minimum level of compensation that they would accept in return for declines in air quality. However, most earlier studies viewed the high rates of non-response as providing a rationale for using payment questions as a measure of value. The question of the legitimacy of the proposed exchange, and the possibility that this general type of evaluation question should not be asked in some circumstances, was conveniently ignored.

The results of this study suggest that in only a few cases would the legitimacy of an exchange be symmetric with respect to the two types of transaction. For example, both buying and selling books or a car might constitute familiar exchanges in which most people have engaged at one time or another. Similarly, the possibility of purchasing or selling tickets to a raffle, concert or sports event is easily understood, although in these cases the selling alternative may be viewed differently due to the semi-illegitimate role played by scalpers and others who engage in re-selling for a profit.

In most situations, however, the two alternatives will not be viewed as equally legitimate proposals. In some cases this has to do with the nature of the good under consideration. For example, buying and selling are generally not equivalent in the context of valuing environmental quality or human health, since the act of paying for these services (through taxes, medical plan contributions, safety equipment and the like) is usual but the act of relinquishing them is not. Similarly, paying an entrance fee to visit a Park or a Museum which is currently free is consistent with established standards

of behavior, whereas the possibility of receiving compensation for their loss is a novel and frequently baffling notion to people who may never have considered these goods to be theirs in the first place. The nature of the good--children, a place of worship, freedom--may also be such that, once compensation has been established as the proper measure of value, setting any particular dollar amount in exchange for its loss is seen as unnatural or immoral: the basis of the exchange itself is considered to be illegitimate.

In other cases it is likely that a lack of legitimacy derives from the conditions under which an exchange takes place. For example, even though I am aware that some familiar good--a sandwich or a pair of shoes--is commonly bought and sold, selling a sandwich I've brought for lunch or selling a pair of shoes which I'm wearing at the time are likely to be considered illegitimate transactions in the sense of being outside established social norms. They may constitute normal activities for other people who do them as a vocation, but I am not normally in the business of accepting monetary payments in exchange for my lunch or my clothing.

In many cases an inappropriate or even perverse measure of relative values might be obtained. For example, I may be willing to pay $x for some ordinary item--a shirt--and agree to sell it for either the same price (if a perfect substitute were readily available) or a substantially higher amount (if substitutes were unavailable or if this particular shirt were especially meaningful). However, I may also refuse to sell it at any price--because selling my shirts is not something I do--but readily give it away for free for humanitarian or charitable reasons. In such cases, the fundamental illegitimacy of the transaction means that a measure of the worth of a good based on the compensation I demand for its loss could indicate either an infinite or no value.

These examples demonstrate that further research is required in order to differentiate between a number of circumstances which could give rise to the perception that an exchange is not legitimate. If it is due to the context within which a transaction is presented, a change in wording or a shift in the experimental setting may solve the problem. If a lack of legitimacy is due to the novelty of a proposed transaction, then the inclusion of additional information, retesting at a later time or the description of other similar situations may prove helpful. If a lack of legitimacy arises because of the nature of the good under consideration, then an understanding of its relevant characteristics should allow the inappropriateness of a compensation measure to be predicted in advance. Some implications of these questions will be considered in more detail as part of the second section of this chapter.

Substitutes. A third factor has to do with the perceived or actual availability of substitutes for the good or experience under consideration. Three different types of goods were used in the experimental tests of payment and compensation measures of value reported in the first section of Chapter VI: changes in air quality levels, the Provincial Museum, and a lottery ticket for an electronic calculator. While tickets for a large number of other lotteries can be readily purchased and one low priced calculator is much like any other, many visitors would consider the Provincial Museum to be a unique attraction and therefore without substitutes. The proposed change in air quality would probably be viewed as intermediate in terms of uniqueness, not because there are substitutes for air but because incremental moves between levels of air quality would be difficult to distinguish.

If the availability of good substitutes reduces the magnitude of the disparity between willingness to pay and compensation demanded measures of value, then differences between the two versions of the lottery experiments

should less frequently be significant than when the other goods were tested. This is consistent with the results which were obtained: only two of the seven lottery tests were statistically significant at the five percent level as compared to five of the six comparisons of air quality measures and both of the Museum experiments.

Following this line of thought, both payment and compensation measures of value for an easily recognizable good with perfect substitutes--for example, a $5.00 bill--should be equal. A person's willingness to pay and compensation demanded for goods which are perceived to be unique, however, should differ significantly: the amount that I would pay to keep my citizenship, my health or my children is far less than the amount I would demand as compensation were I threatened with their loss. These are extreme examples, but the results of other experiments suggest that the question of substitutes may frequently prove to be important. In discussing the results of an experiment in which participants were asked to buy or sell alternative lunch offerings, for example, Knetsch (1981) suggested that the observed divergence in the measures was probably minimized by the ready availability of a wide range of substitute lunch offerings.

This hypothesis could be tested to see if similar situations in which substitutes were less available would yield differences in payment and compensation measures of value exceeding Knetsch's observed disparity of approximately 30 percent. Experiments could also be designed to test differences in the expressed value of recreational hunting or fishing opportunities, with questions regarding proposed changes in specific local areas or affecting single species expected to show a smaller disparity than changes which would effect a larger region or several species.

Process considerations. Experimental evidence concerning the influence of process considerations has been presented in the preceding chapter, which looked at the role of responsibility and regret in the valuation of non-market goods. The discussion stressed that process considerations constitute true costs, since an individual's sense of regret or guilt associated with the degradation of a wilderness environment or a preventable loss of life represents a real component of value, but that they are considerations which are particularly susceptible to changes in context and are therefore easily biased or open to manipulation. In particular, the argument was presented that the more easily a preferred alternative can be imagined, the greater is the potential for future regret. Doing something is therefore more likely to involve psychic costs than doing nothing, because alternatives to taking action are more easily imagined.

Process considerations may prove to be extremely important in explaining the variation in measures of an individual's willingness to pay for a non-market good and a person's willingness to accept compensation in return for its loss. As stressed by the endowment effect, the decision to purchase a good which is not currently owned is different from the decision to sell a good considered to be part of one's entitlement. Process considerations help to explain why this is so, since if I choose to accept an offer of compensation and subsequently decide that I was wrong or am criticized by others for my action, it is likely that I will then blame myself or feel embarrassed. If I anticipate the possibility that these considerations may arise, I will make them a part of my current evaluation of costs and either increase the price at which I will agree to sell or refuse to participate in the exchange. This type of reaction appeared in both the environmental quality and the Museum surveys, in which a majority of respondents to several of the compensa-

tion questions either demanded extremely high settlements or simply refused to give up current rights of use.

In the same sense, I may rationally care very little about environmental quality and be unwilling to make even a small payment to maintain present standards but still refuse to accept a substantially higher sum offered as compensation for a decline in current levels. Although the surveys conducted as part of this study only asked individuals one or the other of these alternatives, the average responses that were obtained demonstrate that this position is characteristic of most participants. In the first case, I can avoid an emotional or psychological attachment to the eventual consequences by referring to a large number of constraints (income, time, knowledge of the impacts, etc.): it is someone else's problem and I choose not to become involved. In the compensation alternative, however, I cannot escape complicity since by accepting the terms of the trade I have in effect given my permission for the change. The higher amount of compensation is therefore demanded to help quiet my fear that some part of the consequences has thereby become my responsibility. As a result, any question which is worded so as to emphasize the possibility of future regret or blame--whether on the part of society at large or by a specified group--could result in significantly inflated estimates of value.

One of the major difficulties that arises in discussing process considerations is that the set of possible variables appears to be both large and poorly defined--succinct, universally accepted definitions for a bounded set of considerations such as regret, responsibility or guilt simply do not exist. As a result, the assignment or prediction of relevant process concerns remains highly subjective. Nevertheless, several preliminary hypotheses can be advanced on the basis of study results regarding the anticipated role of process

considerations; further research is required in order to clarify the relative significance of each concern and the susceptibility of individuals' expressions of value to intentional manipulations of the survey question.

1. The more clearly that a respondent is identified, the greater is his or her incentive for stating an inflated value. For example, asking survey participants to provide their name or conducting household and other surveys in which the identity of participants can be noted will tend to result in higher average expressed preferences.

2. The more importance that is placed on a person's answers, the larger his or her declared values will tend to be. For example, stating that the study population has been carefully selected, that the sample size is small or that the magnitude of responses will prove important to a particular public agency could increase a participant's sense of responsibility or the perceived potential for future blame.

3. High declarations of value are also probable whenever the potentially injured parties are clearly identified. For example, evaluations of a wilderness environment that emphasize the rights of future generations or a sense of stewardship with respect to one's grandchildren will bring to mind an easily imagined source of future blame and criticism.

4. Discussions which emphasize the uniqueness and magnitude of future costs or the uncertainty of anticipated changes will tend to encourage higher expressions of value associated with the maintenance of present conditions. In particular, descriptions of possible irreversible alterations in an environment or the depiction of low probability adverse potential impacts of an unknown may result in exaggerated statements of value.

5. Increased expressions of value are also likely whenever the action required of a respondent is demonstrated to be small. Such introduc-

tory clauses as "For only a few minutes of your time..." or "For only a few dollars more each month...," for example, appear to de-emphasize the financial or psychic costs associated with an action and focus attention on the benefits of its outcome.

Implications of the Disparity

Most studies have recognized the existence of both payment and compensation measures of value but have only presented empirical estimates of individuals' willingness to pay for a good because of the presumed difficulty of obtaining sufficiently accurate expressions of the compensation required for its loss. The recognition that a disparity will generally exist between the two methods implies that the choice of evaluation procedure could prove to be significant when assessing the value of a non-market good. In the context of a benefit-cost analysis of a major resource development, for example, the selection of an evaluation approach could dramatically affect the magnitude of estimated resource losses. In the context of a publicly provided service, the choice of an evaluation measure could determine whether the current level of government expenditure should be maintained or even whether a program should continue. If differences in payment and compensation measures prove to be both consistent and large--as indicated by the empirical evidence obtained in the course of this study--then not only the procedures used in estimating gains and losses or assigning legal entitlements but also the behavioral assumptions used in much of welfare economics will be open to fundamental re-examination.

However, the evidence for the disparity fails to address the question of which approach might provide the most accurate measure of changes in a person's welfare. The Pareto criteria has generally been interpreted as asserting that if an individual is expected to benefit from a change, then a

measure of his or her willingness to pay for the improvement should be employed. If losses are involved, then a measure of the individual's compensation demanded is appropriate. These recommendations conform to the established theory and their implementation would seem to only require a more widespread acceptance of the justification for employing measures of compensation demanded in cases where the status of entitlements is not explicit.

Problems arise when differences in the two approaches are observed to be large--when responsibility costs are particularly significant, for example, or when a transaction is not considered to be legitimate. The conceptual correspondence of payment measures with anticipated gains and compensation measures with anticipated losses remains, but on a practical level this distinction may be thought to provide little help if values based on willingness to pay and on compensation demanded approaches are found to vary substantially.

The existence of a large disparity in expressed values is particularly troubling when it cannot be clearly ascribed to either a real component of value or an obvious source of bias. For example, experiments conducted as part of this study suggest that payment and compensation measures should be approximately the same if substitutes for a good are readily available, while they will differ significantly if no acceptable substitutes exist. However, the particular wording used when asking a survey question may exaggerate or underplay the relative uniqueness of a good and thereby result in a biased expression of its value. In both cases (with other considerations held constant) payment and compensation measures would be expected to diverge in proportion to the perceived availability of substitutes, but in the first instance the difference is real while in the second it is merely an artifact of survey procedures.

One approach to an observed variation in the two measures of value is to assume that payment methods understate and compensation approaches overstate respondents' true values. However, this interpretation is erroneous on both conceptual and practical grounds. The observed disparity, whether large or small, is not indicative of a numerical ambiguity that must be resolved (for example, by averaging high and low responses) but instead occurs because of a real difference in the two measures of value. This difference is demonstrated, for example, by the finding that a high proportion of those asked compensation questions may also refuse to negotiate any settlement.

In such cases it is not clear which approach will provide the more reliable estimate of the value of a non-market good. For example, if an attempt is made to value a potential resource loss based on an individual's compensation demanded but the transaction is not considered to be legitimate, then the subject's response will not indicate the economic value of the good but only provide evidence that the question itself is fundamentally unacceptable. If a willingness to pay estimate is employed, it is impossible to know how to interpret the response which is obtained or how it might relate to a measure of the individuals' compensation demanded.

Further research is obviously needed to better delineate the conditions under which one or the other measure of value is preferred. If, for example, willingness to pay results are multiplied by some positive factor in order to approximate compensation measures of value, the implicit assumption is that a consistent empirical relation exists between the two approaches. Accordingly, any difference in responses which exceeds this amount is assumed to be indicative of process considerations, the legitimacy of the transaction, the size of payments or the availability of substitutes in the particular situation under consideration. This may well be true, but the experimental

evidence obtained to date is insufficient to warrant much confidence in this conclusion. Further research must therefore begin with a closer examination of the reasons for the disparity and the effect of each variable on the observed size of the difference; once this has been accomplished, recommendations as to the appropriate measure of value could then be made with greatly increased confidence.

THE ROLE OF HYPOTHETICAL QUESTIONS

Attempts to directly measure the value of non-market goods have usually involved asking participants a hypothetical or contingent question which requires that the respondent imagine conditions other than those currently encountered. As discussed in Chapter IV, most economists believe that responses to such hypothetical questions should not be trusted: a standard reply follows the form that if you ask a hypothetical question you will get a hypothetical answer. This section will re-examine the logic of this assertion in light of the experimental results which have been obtained as part of this study.

In fact, the economist's dismissal involves not one but two steps. The first concerns the perceived hypothetical nature of the question under consideration, and its validity is obvious. For example, if individuals currently receive a service without charge and are asked how much they would pay if it were no longer free, it is clear that the proposed situation is hypothetical and that, at least in the usual case, a participant's verbal response will not entail a firm commitment to actual future payments. As a result, the respondent will not have to live with the consequences of his or her answer and either strategic effects or a disinterest in formulating an accurate response may arise.

The second part of the argument has to do with whether hypothetical

answers will necessarily provide misleading indications of an individual's true demands. Despite the existence of very little empirical information on the subject, it is usually assumed that they will. However, the results of this study (presented in Chapter VI) as well as those obtained by several other researchers (for example, Bohm, 1972 or Knetsch and Sinden, 1982) provide surprisingly strong evidence that responses to hypothetical questions will in many cases closely approximate respondents' actual behavior.

This is important information, because the measure of an accurate response is generally considered to be the behavior that would be revealed if an unpriced good were offered in a market where exclusion was possible. But even for private goods which are traded in well-behaved markets, a number of important costs and benefits (transactions costs, externalities, etc.) are omitted from observable, realized prices and must be incorporated on the basis of shadow calculations or more ad-hoc procedures. Additional assumptions are involved when using market data to obtain measures of aggregate welfare changes. In some cases, therefore, it is at least possible that information obtained in the context of a hypothetical market will be more accurate than that normally derived on the basis of observed behavior.

The correspondence which has been observed between actual and hypothetical responses may in part be due to the fact that the experimental situations have involved relatively minor monetary exchanges and familiar, well-defined types of goods. Many of the experiments discussed in this study, for example, compared responses to actual and hypothetical lotteries in which the prizes were an electronic calculator and a bottle of champagne. Hypothetical questions of this sort are frequently asked regarding proposed tax changes or public investment opportunities, and so long as the context is familiar subjects are generally reported to respond readily and with a fair

degree of confidence.

As a level of payment or compensation increases and the issues under consideration become more complex, hypothetical questions may provide a less accurate guide to the true preferences of individuals. Yet for these same reasons they may also represent the only possible approach: although it is relatively easy to cross-check the results of a hypothetical survey by conducting an actual lottery for a calculator, it is likely to be both politically and administratively impossible to conduct an experimental study of peoples' behavior in response to actual alterations in air quality or many other non-market goods. This distinction reflects a significant difference in the nature of the exchange. Economic trade-offs are usually based on trial and error, with participants in market decisions using past experiences, discussions with friends or consumer information to help determine the value of a particular good. In marked contrast, a number of decisions concerning the provision and valuation of non-market goods involve non-routine choices which have not been faced before and may never again be encountered. In addition, potential outcomes may well involve irreversible consequences (such as species extinction or a potential loss of life) which are difficult to understand and obviously must remain hypothetical.

In such cases, it seems futile to argue against the use of hypothetical questions so long as measures of individuals' expressed preferences are desired: the situation is incorrigibly hypothetical, and so too is the evaluation question. Instead, the best that can be done is to conduct hypothetical surveys in such a way that individuals are discouraged from engaging in deceptive response strategies and helped to first uncover and subsequently communicate their true preferences. As emphasized in earlier chapters as well as by researchers such as Fischhoff (1982), different evaluation tasks will

require a special sensitivity to these difficulties. Two general and several specific concerns appear to merit special attention on the basis of results obtained in this study.

General Concerns Associated With Hypothetical Questions

A first general source of difficulty has to do with the nature of the task at hand. In many cases participants may simply be confused by the act of being asked to evaluate a hypothetical situation and will require clear instructions regarding the experimental objectives and context. In particular, hypothetical questions which describe a relatively unfamiliar or poorly defined situation--the status of a wilderness area following proposed development, or the effect of a decline in the provision of a government service--may require an extensive description before they can be clearly understood. Many participants in the group of surveys conducted at the Provincial Museum, for example, desired additional information regarding the interview context or the likely consequences of alternative responses before they would answer any questions.

A number of other procedures might also improve subjects' understanding of the required tasks. For example, it may prove useful to allow some time--a matter of hours, days or weeks--for the discussion of key issues among participants or to encourage an independent investigation of related concerns. If participants appear to be uninterested in the subject, it may be possible to rephrase or decompose some of the questions, introduce additional information (for example, photographs or documentary evidence) or employ small prices as an inducement to respondents.

A second source of difficulty arises from the requirement that participants be able to closely define what may be vaguely held feelings or

translate them into monetary terms. Even if the nature of the exchange is clearly understood, participants may be unsure about how their preferences can successfully be expressed. In such cases the substitution of a more familiar or even multiple payment vehicles may prove helpful, as might the establishment of a frame of reference by which the decision at hand could be compared to others of a similar nature. Both approaches were employed as part of this study, although the tests were not sufficient to permit a conclusive analysis of results. In addition, more interactive elicitation procedures can be employed whereby the interviewer actively helps to clarify the implications of subjects' responses, proposes alternative formulations of the problem or even encourages participants to test a first response by questioning their answer or describing likely sources and directions of bias.

Specific Concerns Associated With Hypothetical Questions

Several more specific aspects of survey design and implementation have also been discussed in previous chapters. Each of these concerns is important in the estimation and interpretation of expressed preference measures of value, with their relative significance dependent on the specific circumstances and context within which the evaluation proceeds. The following list therefore serves only to summarize a number of key considerations that have arisen in the course of this study when using hypothetical questions to value non-market goods.

Valuation approach. A first and fundamental choice has to do with the selection of a valuation approach, which may be based on either an individual's willingness to pay to retain or to obtain a good or the level of compensation which is demanded in return for relinquishing it. In contrast to prevailing theories, the results of this study demonstrate that differences in responses

to the two approaches will in general prove to be both pervasive and significant. As a result, the choice of evaluation procedure will in many cases influence the estimated value of a non-market good; the identification of four key characteristics provides an initial guide to the anticipated magnitude of the disparity. It is also emphasized that the selection of a preferred approach must reflect both theoretical and practical concerns and may vary with either the valuation context or the nature of the good under consideration.

Payment measure. A second concern involves the selection of a payment measure, which in most cases will correspond to one of three general question formats: closed-ended (or all-or-none), open-ended, or a bidding game. The empirical results obtained in this study not only suggest that the choice could significantly influence resultant expressions of value but indicate that the variation is systematic rather than random. In particular, the estimates which were obtained using a bidding game approach consistently exceeded those expressed when either closed-ended or open-ended techniques were employed, which throws into question the accuracy of results obtained by Rowe et al. (1980), Randall et al. (1974) and others using an iterative bidding format. Although the evidence remains tentative due to the absence of an objectively defined "correct" value, the results of this study suggest that a closed-ended measure appears to offer the best opportunity for deriving unbiased estimates of value.

Motivational biases. Motivational biases have traditionally provided the major source of concern regarding the use of hypothetical questions, with both strategic and information effects assumed to ensure inaccurate responses. The experimental evidence observed in this and several previous studies, however,

suggests that the impact of motivational biases will frequently prove to be negligible in the case of well-designed and carefully implemented hypothetical surveys. As discussed in Chapter VI, the actual behavior of participants in a large number of experiments involving cash transactions was found to be surprisingly similar to the preferences which had been indicated in response to hypothetical questions.

Cognitive biases. Cognitive biases have generally been overlooked as a source of systematic error in the valuation of non-market goods. While this study provides some evidence that their impact can be anticipated and the magnitude of distortions minimized, several sources of cognitive bias--including anchoring and contextual effects--are shown to be capable of significantly influencing participants' responses to both willingness to pay and compensation demanded measures of value. Because of the unintentional nature of cognitive biases, it is recommended that survey approaches to the valuation of non-market goods employ a wide range of values and that additional research be conducted in the use of interactive interview procedures through which respondents could gain an improved perspective on their expressed values.

Framing effects. A fifth concern involves framing effects, which in a sense represents a subset of cognitive biases. Little attention has been paid in published studies of non-market values to the relation between particular question formats and individuals' expressed values. This study has shown that formally irrelevant manipulations in the wording of the survey question can result in significant variations in average responses, and proposes that the conceptual framework provided by prospect theory may prove useful in evaluating the impact of alternative decision frames.

Process considerations. Finally a number of process considerations--including those associated with regret, responsibility and blame--are shown to exert a major influence on the magnitude of subjects' expressed preferences for non-market goods. Although previous studies have focussed on the outcome of a decision, the results of this study emphasize that the particular way in which an action is presented to an individual may influence its perceived value for reasons which have little or nothing to do with the specific trade-off which is ostensibly under consideration. Process considerations are shown to affect both payment and compensation measures of value, although their influence will generally not be symmetric with respect to the two approaches.

Additional research needs to be undertaken in each of these six areas. The experiments conducted as part of this study have demonstrated the significance of each concern in the evaluation of non-market goods, clarified several limitations of current practices and provided a more coherent framework for future analysis.

The existence of these six concerns emphasizes the complexity of the valuation process and provides a reminder of our limited understanding regarding the behavioral components of decision processes undertaken by people. Yet estimates of the value of non-market goods and activities still need to be made. What is now required is therefore a basic re-examination of cherished principles regarding how individuals select a preferred option and a renewed commitment to the basic empirical research which will over time provide an improved understanding of the methods and procedures which can be used to estimate their value.

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APPENDIX

GUIDE TO THESIS SURVEY TESTS

UBC Tests

A.	1a	WTP, prevent
	1b	WTP, prevent - reversed
	1c	WTP, maintain
	1d	WTP, maximum
	1e,f	WTP, prevent: with expenditure frame of reference, $: current, high and low
	1g,h	WTP, prevent: with expenditure frame of reference, relative ranking: current and ideal
	2a,b	WTA, base and base-reversed
	2c	WTA, minimum
	2d	WTA, base: changing $ amounts
	3a,b	WTP, prevent: high and low responsibility
	3c,d	WTA, base: high and low responsibility
	4a	WTP, prevent: provincial government (compares with 1h)
	4b-d	WTP, prevent: changing $ amounts
B.	5a,b	Aversiveness, with and without responsibility: Vancouver air pollution
	6a,b	Aversiveness, with and without responsibility: Northern animals
	7a-c	Aversiveness, with (telephone and in-person) and without responsibility: local air crash
C.	8a	WTP, closed range
	8b-d	WTP, all or none
	8e,f	WTP, bidding game (different increments)
	8g	Open-ended
	9a	WTA, closed range
	9b-d	WTA, all or none
	9e,f	WTA, bidding game (different increments)
	9g	Open-ended
	10a	WTP, closed range
	10b	WTA, closed range

Museum Tests

a., a..	WTP, entrance fee
b.,b.., b...,	WTP, annual tax
c., c.., c...,TP,	entrance fee: frame of reference
d.	WTP, maximum: entrance fee
e., e..,	WTP, maximum: frame of reference
f.	WTP, maximum: annual tax
g.	WTA, annual tax
h., h..,	WTA, annual tax
j., j.., j...,	WTP, non-user
l.	WTP, non-user: maximum

SEX: M F 1a

AIR QUALITY OPTIONS

In this survey, we encourage you to express your views regarding trade-offs between continued industrial growth and the maintenance of high levels of environmental quality in the Vancouver area.

Several of the plans for this area envision a substantial long-term increase in industrial activity and local employment opportunities. Although new developments would be required to meet legal pollution standards and to utilize pollution control equipment, continued regional growth could still result in adverse effects on the average air quality of the local environment. As a result, visibility would decline and severe smog conditions--as frequently occur in other large metropolitan areas such as Los Angeles or Toronto--could become much more frequent.

Since protection of the environment costs money, we are wanting to get an estimate of the amount you would be willing to spend in order to ensure continued high levels of air quality in the Vancouver area. When answering the following questions, consider that additional expenditures will be financed through the creation of a special "environmental quality" tax. Although the method of payment is still under consideration, assume that all students and other area residents will be required to pay an equal amount.

1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. Would you be willing to pay an annual tax of $10 in order to prevent a decline in average air quality levels? ___Yes ___No

Now, answer either a or b.

a. If yes, would you be willing to pay an annual tax of $25? ___Yes ___No

b. If no, would you be willing to pay an annual tax of $5? ___Yes ___No

4. All of us now pay for clean air in a variety of ways, including higher taxes and increased prices for many of the goods which we buy. Do you have any comments about having to pay for environmental quality?

   _____

   _____

   _____

SEX: M F 1b

AIR QUALITY OPTIONS

In this survey, we encourage you to express your views regarding trade-offs between continued industrial growth and the maintenance of high levels of environmental quality in the Vancouver area.

Several of the plans for this area envision a substantial long-term increase in industrial activity and local employment opportunities. Although new developments would be required to meet legal pollution standards and to utilize pollution control equipment, continued regional growth could still result in adverse effects on the average air quality of the local environment. As a result, visibility would decline and severe smog conditions--as frequently occur in other large metropolitan areas such as Los Angeles or Toronto--could become much more frequent.

Since protection of the environment costs money, we are wanting to get an estimate of the amount you would be willing to spend in order to ensure continued high levels of air quality in the Vancouver area. When answering the following questions, consider that additional expenditures will be financed through the creation of a special "environmental quality" tax. Although the method of payment is still under consideration, assume that all students and other area residents will be required to pay an equal amount.

1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. In order to prevent a decline in average area air quality levels would you be willing to pay an annual tax of $10? ___Yes ___No

Now, answer either a or b.

a. If yes, would you be willing to pay an annual tax of $25? ___Yes ___No

b. If no, would you be willing to pay an annual tax of $5? ___Yes ___No

4. All of us now pay for clean air in a variety of ways, including higher taxes and increased prices for many of the goods which we buy. Do you have any comments about having to pay for environmental quality?

_____

_____

_____

SEX: M F 1c

AIR QUALITY OPTIONS

In this survey, we encourage you to express your views regarding trade-offs between continued industrial growth and the maintenance of high levels of environmental quality in the Vancouver area.

Several of the plans for this area envision a substantial long-term increase in industrial activity and local employment opportunities. Although new developments would be required to meet legal pollution standards and to utilize pollution control equipment, continued regional growth could still result in adverse effects on the average air quality of the local environment. As a result, visibility would decline and severe smog conditions--as frequently occur in other large metropolitan areas such as Los Angeles or Toronto--could become much more frequent.

Since protection of the environment costs money, we are wanting to get an estimate of the amount you would be willing to spend in order to ensure continued high levels of air quality in the Vancouver area. When answering the following questions, consider that additional expenditures will be financed through the creation of a special "environmental quality" tax. Although the method of payment is still under consideration, assume that all students and other area residents will be required to pay an equal amount.

1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. Would you be willing to pay an annual tax of $10 in order to maintain present area air quality levels? ___Yes ___No

Now, answer either a or b.

a. If yes, would you be willing to pay an annual tax of $25? ___Yes ___No

b. If no, would you be willing to pay an annual tax of $5? ___Yes ___No

4. All of us now pay for clean air in a variety of ways, including higher taxes and increased prices for many of the goods which we buy. Do you have any comments about having to pay for environmental quality?

_____

_____

_____

SEX: M F 1d

AIR QUALITY OPTIONS

In this survey, we encourage you to express your views regarding trade-offs between continued industrial growth and the maintenance of high levels of environmental quality in the Vancouver area.

Several of the plans for this area envision a substantial long-term increase in industrial activity and local employment opportunities. Although new developments would be required to meet legal pollution standards and to utilize pollution control equipment, continued regional growth could still result in adverse effects on the average air quality of the local environment. As a result, visibility would decline and severe smog conditions--as frequently occur in other large metropolitan areas such as Los Angeles or Toronto--could become much more frequent.

Since protection of the environment costs money, we are wanting to get an estimate of the amount you would be willing to spend in order to ensure continued high levels of air quality in the Vancouver area. When answering the following questions, consider that additional expenditures will be financed through the creation of a special "environmental quality" tax. Although the method of payment is still under consideration, assume that all students and other area residents will be required to pay an equal amount.

1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. What is the maximum annual tax that you would be willing to pay in order to prevent a decline in average area air quality levels?

   $_____

4. All of us now pay for clean air in a variety of ways, including higher taxes and increased prices for many of the goods which we buy. Do you have any comments about having to pay for environmental quality?

   _____

   _____

   _____

AIR QUALITY OPTIONS 1e

In this survey, we encourage you to express your views regarding trade-offs between continued industrial growth and the maintenance of high levels of environmental quality in the Vancouver area.

Several of the plans for this area envision a substantial long-term increase in industrial activity and local employment opportunities. Although new developments would be required to meet legal pollution standards and to utilize pollution control equipment, continued regional growth could still result in adverse effects on the average air quality of the local environment. As a result, visibility would decline and severe smog conditions--as frequently occur in other large metropolitan areas such as Los Angeles or Toronto--could become much more frequent.

Since protection of the environment costs money, we are wanting to get an estimate of the amount you would be willing to spend in order to ensure continued high levels of air quality in the Vancouver area. When answering the following questions, consider that additional expenditures will be financed through the creation of a special "environmental quality" tax. Although the method of payment is still under consideration, assume that all students and other area residents will be required to pay an equal amount.

In order to help provide a frame of reference, we have noted below the average annual monetary payments which B.C. residents now make for a number of diverse goods and services.

- medical & health care	$140	- outdoor recreation equipment	$156
- education	$ 60	- eating in restaurants	$272
- charitable organizations	$ 59	- tobacco and alcohol	$219

1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. Suppose that, just as each tax payer now makes annual payments to charitable organizations or to maintain the quality of Vancouver's school system, you could make an annual payment to maintain the quality of Vancouver's environment. Would you be willing to pay an annual tax of $10 in order to prevent a decline in average area air quality levels?

   _____Yes _____No

Now, answer either a or b.

a. If yes, would you be willing to pay an annual tax of $25? ___Yes ___No

b. If no, would you be willing to pay an annual tax of $5? ___Yes ___No

4. All of us now pay for clean air in a variety of ways, including higher taxes and increased prices for many of the goods which we buy. Do you have any comments about having to pay for environmental quality?

AIR QUALITY OPTIONS 1f

In this survey, we encourage you to express your views regarding trade-offs between continued industrial growth and the maintenance of high levels of environmental quality in the Vancouver area.

Several of the plans for this area envision a substantial long-term increase in industrial activity and local employment opportunities. Although new developments would be required to meet legal pollution standards and to utilize pollution control equipment, continued regional growth could still result in adverse effects on the average air quality of the local environment. As a result, visibility would decline and severe smog conditions--as frequently occur in other large metropolitan areas such as Los Angeles or Toronto--could become much more frequent.

Since protection of the environment costs money, we are wanting to get an estimate of the amount you would be willing to spend in order to ensure continued high levels of air quality in the Vancouver area. When answering the following questions, consider that additional expenditures will be financed through the creation of a special "environmental quality" tax. Although the method of payment is still under consideration, assume that all students and other area residents will be required to pay an equal amount.

In order to help provide a frame of reference, we have noted below the average annual monetary payments which B.C. residents now make for a number of diverse goods and services.

- medical & health care	$140	- tickets to movies	$ 13
- education	$ 60	- reading	$ 37
- charitable organizations	$ 59	- cosmetics	$ 28

1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. Suppose that, just as each tax payer now makes annual payments to charitable organizations or to maintain the quality of Vancouver's school system, you could make an annual payment to maintain the quality of Vancouver's environment. Would you be willing to pay an annual tax of $10 in order to prevent a decline in average area air quality levels?

   _____Yes _____No

Now, answer either a or b.

a. If yes, would you be willing to pay an annual tax of $25? ___Yes ___No

b. If no, would you be willing to pay an annual tax of $5? ___Yes ___No

4. All of us now pay for clean air in a variety of ways, including higher taxes and increased prices for many of the goods which we buy. Do you have any comments about having to pay for environmental quality?

_____

_____

AIR QUALITY OPTIONS 1g

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1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. Suppose that, just as each taxpayer now makes annual payments to charitable organizations or to maintain the quality of Vancouver's school system, you could make an annual payment to maintain the quality of Vancouver's environment. We would like you to compare your willingness to pay an annual tax in order to prevent a decline in average area air quality levels to the amount you feel that you currently pay for the goods and services shown below. In each case, please indicate the relative magnitude of your current expenditure levels by rating each entry on a scale of 1 to 7. Give a ranking of 1 to your choice for the highest payment and a ranking of 7 to your choice for the lowest payment.

   _____ medical & health care
   _____ education
   _____ cosmetics
   _____ jewelry
   _____ charitable organizations
   _____ environmental quality
   _____ tobacco and alcohol

   Now, please indicate the approximate dollar amount you feel you currently spend each year on your highest and lowest ranked expenditure choices (in other words, numbers 1 and 7).

   Number 1 is _____ Number 7 is _____

   Annual Expenditure = $_____ Annual Expenditure = $_____

4. All of us now pay for clean air in a variety of ways, including higher taxes and increased prices for many of the goods which we buy. Do you have any comments about having to pay for environmental quality?

_____

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1. For how how have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. Suppose that, just as each taxpayer now makes annual payments to charitable organizations or to maintain the quality of Vancouver's school system, you could make an annual payment to maintain the quality of Vancouver's environment. We would like you to compare your willingness to pay an annual tax in order to prevent a decline in average area air quality levels to the amount you feel you would like to pay for the goods and services shown below. In each case, please indicate the relative magnitude of your ideal expenditure levels by rating each entry on a scale of 1 to 7. Give a ranking of 1 to your choice for the highest payment and a ranking of 7 to your choice for the lowest payment.

   _____ medical & health care _____ education

   _____ cosmetics _____ jewelry

   _____ charitable organizations _____ environmental quality

   _____ tobacco and alcohol

   Now, please indicate the approximate dollar amount you feel you currently spend each year on your highest and lowest ranked expenditure choices (in other words, numbers 1 and 7).

   Number 1 is _____ Number 7 is _____

   Annual Expenditure = $ _____ Annual Expenditure = $ _____

4. All of us now pay for clean air in a variety of ways, including higher taxes and increased prices for many of the goods which we buy. Do you have any comments about having to pay for environmental quality?

SEX: M F 2a

AIR QUALITY OPTIONS

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Since protection of the environment costs money, lower standards of environmental protection could result in substantial financial savings for the Provincial government. We are wanting to get an estimate of the amount of monetary compensation that you would require in order to accept lower levels of air quality in the Vancouver area. When answering the following questions, consider that savings will be distributed through a decrease in Provincial taxes or an equivalent annual payment. Although the method of payment is still under consideration, assume that all students and other area residents will be compensated an equal amount.

1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. Would you be willing to accept a decrease in your annual taxes or an annual payment of $10 if as a result average air quality levels declined?
   ___Yes ___No

Now, answer either a or b.

a. If yes, would you be willing to accept a decrease in your annual taxes or an annual payment of $5? ___Yes ___No

b. If no, would you be willing to accept a decrease in your annual taxes or an annual payment of $25? ___Yes ___No

4. All of us now pay for clean air in a variety of ways, including higher taxes and increased prices for many of the goods which we buy. Do you have any comments about the possibility of receiving monetary payments in return for accepting lower levels of environmental quality?

   _____

   _____

SEX: M F 2b

AIR QUALITY OPTIONS

In this survey, we encourage you to express your views regarding trade-offs between continued industrial growth and the maintenance of high levels of environmental quality in the Vancouver area.

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1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. Would you be willing to accept a decline in average area air quality levels if as a result your annual taxes decreased by $10 or you received an equivalent annual payment?

   ___Yes ___No

Now, answer either a or b.

a. If yes, would you be willing to accept a decrease in your annual taxes or an annual payment of $5? ___Yes ___No

b. If no, would you be willing to accept a decrease in your annual taxes or an annual payment of $25? ___Yes ___No

4. All of us now pay for clean air in a variety of ways, including higher taxes and increased prices for many of the goods which we buy. Do you have any comments about the possibility of receiving monetary payments in return for accepting lower levels of environmental quality?

   _____

   _____

SEX: M F 2c

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1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. What is the minimum decrease in your annual taxes or the minimum annual payment that you would be willing to accept if as a result average area air quality levels declined?

   $_____

4. All of us now pay for clean air in a variety of ways, including higher taxes and increased prices for many of the goods which we buy. Do you have any comments about the possibility of receiving monetary payments in return for accepting lower levels of environmental quality?

   _____

   _____

   _____

SEX: M F 2d

AIR QUALITY OPTIONS

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1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. Would you be willing to accept a decrease in your annual taxes or an annual payment of $100 if as a result average air quality levels declined?

   ___Yes ___No

   Now, answer either a or b.

   a. If yes, would you be willing to accept a decrease in your annual taxes or an annual payment of $25? ___Yes ___No

   b. If no, would you be willing to accept a decrease in your annual taxes or an annual payment of $200? ___Yes ___No

4. All of us now pay for clean air in a variety of ways, including higher taxes and increased prices for many of the goods which we buy. Do you have any comments about the possibility of receiving monetary payments in return for accepting lower levels of environmental quality?

   _____

   _____

SEX: M F 3a

AIR QUALITY OPTIONS

In this survey, we encourage you to express your views regarding trade-offs between continued industrial growth and the maintenance of high levels of environmental quality in the Vancouver area. You have been selected as part of a small sample of Vancouver area residents, and your answers to the following questions could serve as an input to the formation of Government policies.

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Since protection of the environment costs money, we are wanting to get an estimate of the amount you would be willing to spend in order to ensure continued high levels of air quality in the Vancouver area. When answering the following questions, consider that additional expenditures will be financed through the creation of a special "environmental quality" tax. Although the method of payment is still under consideration, assume that all students and other area residents will be required to pay an equal amount.

1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. Would you be willing to pay an annual tax of $10 in order to prevent a decline in average area air quality levels? _____yes _____no

Now, answer either a or b.

a. If yes, would you be willing to pay an annual tax of $25? __yes __no

b. If no, would you be willing to pay an annual tax of $5? __yes __no

4. All of us now pay for clean air in a variety of ways, including higher taxes and increased prices for many of the goods which we buy. Do you have any comments about having to pay for environmental quality?

   _____

   _____

   _____

SEX: M F 3b

AIR QUALITY OPTIONS

In this survey, we encourage you to express your views regarding trade-offs between continued industrial growth and the maintenance of high levels of environmental quality in the Vancouver area. You have been randomly selected as part of a large sample of Vancouver area residents, and your answers to the following questions will serve as an input to a University of British Columbia student research project.

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1. For how long have you lived in the Vancouver area?

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2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. Would you be willing to pay an annual tax of $10 in order to prevent a decline in average area air quality levels? ____yes ____no

Now, answer either a or b.

a. If yes, would you be willing to pay an annual tax of $25? ___yes ___no

b. If no, would you be willing to pay an annual tax of $5? ___yes ___no

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_____

_____

_____

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1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. Would you be willing to accept a decrease in your annual taxes or an annual payment of $10 if as a result average area air quality levels declined?

   _____Yes _____No

Now, answer either a or b.

a. If no, would you be willing to accept a decrease in your annual taxes or an annual payment of $25? _____Yes _____No

b. If yes, would you be willing to accept a decrease in your annual taxes or an annual payment of $5?

   _____Yes _____No

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_____

_____

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1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

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   _____rented _____self-owned

3. Would you be willing to accept a decrease in your annual taxes or an annual payment of $10, if as a result average area air quality levels declined?

   _____yes _____no

Now, answer either a or b?

a. If no, would you be willing to accept a decrease in your annual taxes or an annual payment of $25? _____Yes _____No

b. If yes, would you be willing to accept a decrease in your annual taxes or an annual payment of $5?

   _____yes _____no

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_____

_____

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1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. Suppose that, just as each taxpayer now makes annual payments to charitable organizations or to maintain the quality of Vancouver's school system, you could make an annual payment to maintain the quality of Vancouver's environment. In order to help determine the Province's relative expenditure priorities, we would like you to compare the amount of money the Province should spend on environmental quality to the amount you feel is currently spent on the goods and services shown below. In each case, please indicate the relative magnitude of the Province's ideal expenditure levels by rating each entry on a scale of 1 to 7. Give a ranking of 1 to your choice for the highest payment and a ranking of 7 to your choice for the lowest payment.

   _____ medical & health care
   _____ education
   _____ cosmetics
   _____ jewelry
   _____ charitable organizations
   _____ environmental quality
   _____ tobacco and alcohol

   Now, please indicate the approximate dollar amount you feel you currently spend each year on your highest and lowest ranked expenditure choices (in other words, numbers 1 and 7).

   Number 1 is _____ Number 7 is _____

   Annual Expenditure = $_____ Annual Expenditure = $_____

4. All of us now pay for clean air in a variety of ways, including higher taxes and increased prices for many of the goods which we buy. Do you have any comments about having to pay for environmental quality?

_____

_____

SEX: M F 4b

AIR QUALITY OPTIONS

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1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. Would you be willing to pay an annual tax of $100 in order to prevent a decline in average area air quality levels? ___Yes ___No

Now, answer either a or b.

a. If yes, would you be willing to pay an annual tax of $200? ___Yes ___No

b. If no, would you be willing to pay an annual tax of $25? ___Yes ___No

4. All of us now pay for clean air in a variety of ways, including higher taxes and increased prices for many of the goods which we buy. Do you have any comments about having to pay for environmental quality?

_____

_____

_____

SEX: M F 4c

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1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. Would you be willing to pay an annual tax of $100 in order to prevent a decline in average area air quality levels? ___Yes ___No

Now, answer either a or b.

a. If yes, would you be willing to pay an annual tax of $200? ___Yes ___No

b. If no, would you be willing to pay an annual tax of $50? ___Yes ___No

4. All of us now pay for clean air in a variety of ways, including higher taxes and increased prices for many of the goods which we buy. Do you have any comments about having to pay for environmental quality?

_____

_____

_____

SEX: M F 4d

AIR QUALITY OPTIONS

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1. For how long have you lived in the Vancouver area?

   _____less than 1 year _____1-5 years _____more than 5 years

2. Do you live in rented or self-owned housing?

   _____rented _____self-owned

3. Would you be willing to pay an annual tax of $10 in order to prevent a decline in average area air quality levels? ___Yes ___No

Now, answer either a or b.

a. If yes, would you be willing to pay an annual tax of $50? ___Yes ___No

b. If no, would you be willing to pay an annual tax of $5? ___Yes ___No

4. All of us now pay for clean air in a variety of ways, including higher taxes and increased prices for many of the goods which we buy. Do you have any comments about having to pay for environmental quality?

_____

_____

_____

AVERSIVENESS SCALE

The aim of this study is to measure the aversiveness of different unpleasant events, by asking people how strongly they wish that each of these events wouldn't happen to them.

We use a scale in which an event gets a score of 0 if you do not mind it happening to you, and a high score if you have a strong wish to avoid it.

First, consider the following reference event:

"Having a stomach flu for a week, with nausea and fever."

Assign this event a score of 10.

With this anchor in mind, indicate how strongly you wish that each of the events listed below shouldn't happen to you by circling a number on the scale below the event. If you wish to use a number greater than 20, write your response in the space provided at the right of the scale.

Read all the descriptions quickly before you start marking. Your ratings should indicate how you order the different events, by the strength of your wish that they shouldn't happen to you.

1. You need to use crutches for 3 weeks after spraining your ankle in a fall. You slipped while walking to the bus on a snowy day.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

2. You accidentally throw an envelope containing $10 into the fire.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

3. You are out for dinner with a new friend of the opposite sex. At the end of an excellent meal you accidentally spill a cup of hot coffee on your friend's lap.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

4. You buy a used car worth $1000; 6 months later it stops running due to your negligence. You have it towed to a garage and are told it will cost $300 to repair.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

5. You buy the last ticket for a lottery at a fair. A stranger who is standing nearby asks to buy the ticket from you and you agree. Later you hear that this person won a $50 prize.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

6. Your wallet is stolen in the swimming pool dressing room; inside were all your ID cards and $20 cash.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

7. You invite several friends over for dinner and fix a special meal using exotic ingredients. The next day you have a severe stomach ache and learn that two of your guests were briefly hospitalized for treatment.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

8. You are helping a friend who is moving to a new apartment; as you are carrying his stereo out to the car you slip and the stereo is badly smashed.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

9. You read in the newspaper that environmental quality in Vancouver has declined substantially in recent years, and that average area air pollution levels are now the worst of any major Canadian city.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

10. Your car runs out of gas on a country road late at night; you have to walk nearly a mile to the nearest house and must wake up the owners to get assistance.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

6. Your wallet is stolen in the swimming pool dressing room; inside were all your ID cards and $20 cash.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

7. You invite several friends over for dinner and fix a special meal using exotic ingredients. The next day you have a severe stomach ache and learn that two of your guests were briefly hospitalized for treatment.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

8. You are helping a friend who is moving to a new apartment; as you are carrying his stereo out to the car you slip and the stereo is badly smashed.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

9. You read in the newspaper that environmental quality in Vancouver has declined substantially in recent years, and that average area air pollution levels are now the worst of any major Canadian city. You remember that a narrowly defeated issue in last year's elections concerned whether an "environmental quality" tax should be instituted, but you were pressed for time that day and didn't vote.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

10. Your car runs out of gas on a country road late at night; you have to walk nearly a mile to the nearest house and must wake up the owners to get assistance.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

6. Your wallet is stolen in the swimming pool dressing room; inside were all your ID cards and $20 cash.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

7. You invite several friends over for dinner and fix a special meal using exotic ingredients. The next day you have a severe stomach ache and learn that two of your guests were briefly hospitalized for treatment.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

8. You are helping a friend who is moving to a new apartment; as you are carrying his stereo out to the car you slip and the stereo is badly smashed.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

9. You read in the newspaper that the development of new mines and townsites in northern British Columbia is threatening the continued survival of several rare species of large mammals.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

10. Your car runs out of gas on a country road late at night; you have to walk nearly a mile to the nearest house and must wake up the owners to get assistance.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

6. Your wallet is stolen in the swimming pool dressing room; inside were all your ID cards and $20 cash.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 ___
flu

7. You invite several friends over for dinner and fix a special meal using exotic ingredients. The next day you have a severe stomach ache and learn that two of your guests were briefly hospitalized for treatment.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 ___
flu

8. You are helping a friend who is moving to a new apartment; as you are carrying his stereo out to the car you slip and the stereo is badly smashed.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 ___
flu

9. You read in the newspaper that the development of new mines and townsites in northern British Columbia is threatening the continued survival of several rare species of large mammals. You remember that a narrowly defeated issue in last year's elections concerned whether development should be halted to protect the endangered animals, but you were pressed for time that day and didn't vote.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 ___
flu

10. Your car runs out of gas on a country road late at night; you have to walk nearly a mile to the nearest house and must wake up the owners to get assistance.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 ___
flu

6. Your wallet is stolen in the swimming pool dressing room; inside were all your ID cards and $20 cash.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

7. You invite several friends over for dinner and fix a special meal using exotic ingredients. The next day you have a severe stomach ache and learn that two of your guests were briefly hospitalized for treatment.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

8. You are helping a friend who is moving to a new apartment; as you are carrying his stereo out to the car you slip and the stereo is badly smashed.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

9. You hear on the radio that 3 persons injured in a local air crash have died due to a shortage of blood.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

10. Your car runs out of gas on a country road late at night; you have to walk nearly a mile to the nearest house and must wake up the owners to get assistance.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 __
flu

6. Your wallet is stolen in the swimming pool dressing room; inside were all your ID cards and $20 cash.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 ___
flu

7. You invite several friends over for dinner and fix a special meal using exotic ingredients. The next day you have a severe stomach ache and learn that two of your guests were briefly hospitalized for treatment.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 ___
flu

8. You are helping a friend who is moving to a new apartment; as you are carrying his stereo out to the car you slip and the stereo is badly smashed.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 ___
flu

9. You hear on the radio that 3 persons injured in a local air crash have died due to a shortage of blood. You remember that last week you received a telephone call from a Hospital volunteer and were asked to contribute blood, but you were in a rush and refused.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 ___
flu

10. Your car runs out of gas on a country road late at night; you have to walk nearly a mile to the nearest house and must wake up the owners to get assistance.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 ___
flu

6. Your wallet is stolen in the swimming pool dressing room; inside were all your ID cards and $20 cash.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 ___
flu

7. You invite several friends over for dinner and fix a special meal using exotic ingredients. The next day you have a severe stomach ache and learn that two of your guests were briefly hospitalized for treatment.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 ___
flu

8. You are helping a friend who is moving to a new apartment; as you are carrying his stereo out to the car you slip and the stereo is badly smashed.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 ___
flu

9. You hear on the radio that 3 persons injured in a local air crash have died due to a shortage of blood. You remember that last week you were stopped on the street by a Hospital volunteer and were asked to contribute blood, but you were in a rush and refused.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 ___
flu

10. Your car runs out of gas on a country road late at night; you have to walk nearly a mile to the nearest house and must wake up the owners to get assistance.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 ___
flu

8a

We are interested in determining the monetary value which you place upon a number of potentially pleasant experiences and things. Below you will find 10 brief descriptions. Imagine that you have been given the opportunity to purchase each item or experience. No additional information is provided other than that shown. On the associated scale, please circle the dollar amount which best indicates the maximum amount of money which you would be willing to pay to experience the event or to obtain the item which is described.

1. A ticket entitling you to dinner for two at the Vancouver restaurant of your choice.

   $15.00 20.00 25.00 30.00 35.00

2. An organic avocado.

   $ 0.25 .50 .75 1.00 1.25

3. A set of 4 handmade pottery mugs.

   $ 5.00 10.00 15.00 20.00 25.00

4. A lottery ticket which gives you a 1 in 30 chance to win a pocket-size electronic calculator.

   $ 0.20 .40 .60 .80 1.00

5. A quart of pure maple syrup.

   $ 2.00 4.00 6.00 8.00 10.00

6. The one day rental of an umbrella on a very rainy day.

   $ 0.50 1.50 2.50 3.50 4.50

7. Two tickets to a concert of your choice at the Orpheum Theatre.

   $ 5.00 10.00 15.00 20.00 25.00

8. An empty seat on a very crowded bus; you have a half-hour ride ahead of you.

   $ 0.20 .40 .60 .80 1.00

9. A 4-foot tall potted indoor plant.

   $ 5.00 10.00 15.00 20.00 25.00

10. A place at the front of the line in a busy cinema queue.

    $ 1.00 2.00 3.00 4.00 5.00

8b

We are interested in determining the monetary value which you place upon a number of potentially pleasant experiences and things. Below you will find 10 brief descriptions. Imagine that you have been given the opportunity to purchase each item or experience at the price shown. No negotiation is permitted, and whether you decide to purchase the item is entirely your own decision. Please indicate by circling either "yes" or "no" whether you would be willing to pay this price in order to experience the event or obtain the item which is described.

1. A ticket entitling you to dinner for two at the Vancouver restaurant of your choice.

   $15.00 Yes No

2. An organic avocado.

   $ 0.25 Yes No

3. A set of 4 handmade pottery mugs.

   $ 5.00 Yes No

4. A lottery ticket which gives you a 1 in 30 chance to win a pocket-size electronic calculator.

   $ 0.20 Yes No

5. A quart of pure maple syrup.

   $ 2.00 Yes No

6. The one day rental of an umbrella on a very rainy day.

   $ 0.50 Yes No

7. Two tickets to a concert of your choice at the Orpheum Theatre.

   $ 5.00 Yes No

8. An empty seat on a very crowded bus; you have a half-hour ride ahead of you.

   $ 0.20 Yes No

9. A 4-foot tall potted indoor plant.

   $ 5.00 Yes No

10. A place at the front of the line in a busy cinema queue.

    $ 1.00 Yes No

8c

We are interested in determining the monetary value which you place upon a number of potentially pleasant experiences and things. Below you will find 10 brief descriptions. Imagine that you have been given the opportunity to purchase each item or experience at the price shown. No negotiation is permitted, and whether you decide to purchase the item is entirely your own decision. Please indicate by circling either "yes" or "no" whether you would be willing to pay this price in order to experience the event or obtain the item which is described.

1. A ticket entitling you to dinner for two at the Vancouver restaurant of your choice.

   $25.00 Yes No

2. An organic avocado.

   $ 0.75 Yes No

3. A set of 4 handmade pottery mugs.

   $ 15.00 Yes No

4. A lottery ticket which gives you a 1 in 30 chance to win a pocket-size electronic calculator.

   $ 0.60 Yes No

5. A quart of pure maple syrup.

   $ 6.00 Yes No

6. The one day rental of an umbrella on a very rainy day.

   $ 2.50 Yes No

7. Two tickets to a concert of your choice at the Orpheum Theatre.

   $15.00 Yes No

8. An empty seat on a very crowded bus; you have a half-hour ride ahead of you.

   $ 0.60 Yes No

9. A 4-foot tall potted indoor plant.

   $15.00 Yes No

10. A place at the front of the line in a busy cinema queue.

    $ 3.00 Yes No

8d

We are interested in determining the monetary value which you place upon a number of potentially pleasant experiences and things. Below you will find 10 brief descriptions. Imagine that you have been given the opportunity to purchase each item or experience at the price shown. No negotiation is permitted, and whether you decide to purchase the item is entirely your own decision. Please indicate by circling either "yes" or "no" whether you are willing to pay this price in order to experience the event or obtain the item which is described.

1. A ticket entitling you to dinner for two at the Vancouver restaurant of your choice.
   $35.00 Yes No

2. An organic avocado.
   $ 1.25 Yes No

3. A set of 4 handmade pottery mugs.
   $25.00 Yes No

4. A lottery ticket which gives you a 1 in 30 chance to win a pocket-size electronic calculator.
   $ 1.00 Yes No

5. A quart of pure maple syrup.
   $10.00 Yes No

6. The one day rental of an umbrella on a very rainy day.
   $ 4.50 Yes No

7. Two tickets to a concert of your choice at the Orpheum Theatre.
   $25.00 Yes No

8. An empty seat on a very crowded bus; you have a half-hour ride ahead of you.
   $ 1.00 Yes No

9. A 4-foot tall potted indoor plant.
   $25.00 Yes No

10. A place at the front of the line in a busy cinema queue.
    $ 5.00 Yes No

8e

We are interested in determining the monetary value which you place upon a number of potentially pleasant experiences and things. Below you will find 10 brief descriptions. Imagine that you have been given the opportunity to purchase each item or experience through a process of successive bids, as used in an auction. In each case, the bidding will start at the price shown and increase by the specified amount until the sum which is charged is first considered to be excessive, at which point you no longer want to purchase the good. On the associated scale, please record the dollar amount which best indicates this maximum amount of money which you would be willing to pay to experience the event or to obtain the item which is described.

1. A ticket entitling you to dinner for two at the Vancouver restaurant of your choice.
   Starting Price: $15.00
   Increase by : $ 5.00 $_____

2. An organic avocado.
   Starting Price: $ 0.25
   Increase by : $ 0.25 $_____

3. A set of 4 handmade pottery mugs.
   Starting Price: $ 5.00
   Increase by : $ 5.00 $_____

4. A lottery ticket which gives you a 1 in 30 chance to win a pocket-size electronic calculator.
   Starting Price: $ 0.20
   Increase by : $ 0.20 $_____

5. A quart of pure maple syrup.
   Starting Price: $ 2.00
   Increase by : $ 2.00 $_____

6. The one day rental of an umbrella on a very rainy day.
   Starting Price: $ 0.50
   Increase by : $ 1.00 $_____

7. Two tickets to a concert of your choice at the Orpheum Theatre.
   Starting Price: $ 5.00
   Increase by : $ 5.00 $_____

8. An empty seat on a very crowded bus; you have a half-hour ride ahead of you.
   Starting Price: $ 0.20
   Increase by : $ 0.20 $_____

9. A 4-foot tall potted indoor plant.
   Starting Price: $ 5.00
   Increase by : $ 5.00 $_____

10. A place at the front of the line in a busy cinema queue.
    Starting Price: $ 1.00
    Increase by : $ 1.00 $_____

8f

We are interested in determining the monetary value which you place upon a number of potentially pleasant experiences and things. Below you will find 10 brief descriptions. Imagine that you have been given the opportunity to purchase each item or experience through a process of successive bids, as used in an auction. In each case, the bidding will start at the price shown and increase by the specified amount until the sum which is charged is first considered to be excessive, at which point you no longer want to purchase the good. On the associated scale, please record the dollar amount which best indicates this maximum amount of money which you would be willing to pay to experience the event or to obtain the item which is described.

1. A ticket entitling you to dinner for two at the Vancouver restaurant of your choice.
   Starting Price: $15.00
   Increase by : $10.00 $_____

2. An organic avocado.
   Starting Price: $ 0.25
   Increase by : $ 0.50 $_____

3. A set of 4 handmade pottery mugs.
   Starting Price: $ 5.00
   Increase by : $10.00 $_____

4. A lottery ticket which gives you a 1 in 30 chance to win a pocket-size electronic calculator.
   Starting Price: $ 0.20
   Increase by : $ 0.40 _____

5. A quart of pure maple syrup.
   Starting Price: $ 2.00
   Increase by : $ 4.00 $_____

6. The one day rental of an umbrella on a very rainy day.
   Starting Price: $ 0.50
   Increase by : $ 1.00 _____

7. Two tickets to a concert of your choice at the Orpheum Theatre.
   Starting Price: $ 5.00
   Increase by : $10.00 $_____

8. An empty seat on a very crowded bus; you have a half-hour ride ahead of you.
   Starting Price: $ 0.20
   Increase by : $ 0.40 $_____

9. A 4-foot tall potted indoor plant.
   Starting Price: $ 5.00
   Increase by : $10.00 $_____

10. A place at the front of the line in a busy cinema queue.
    Starting Price: $ 1.00 1.00
    Increase by : $ 2.00 $_____

8g

We are interested in determining the monetary falue which you place upon a number of potentially pleasant experiences and things. Below you will find 10 brief descriptions. Imagine that you have been given the opportunity to purchase each item or experience. No additional information is provided other than that shown. In the space provided, please write in the dollar amount which best indicates the maximum amount of money which you would be willing to pay to experience the event or to obtain the item which is described.

1. A ticket entitling you to dinner for two at the Vancouver restaurant of your choice.

   _____

2. An organic avocado.

   _____

3. A set of 4 handmade pottery mugs.

   _____

4. A lottery ticket which gives you a 1 in 30 chance to win a pocket-size electronic calculator.

   _____

5. A quart of pure maple syrup.

   _____

6. The one day rental of an umbrella on a very rainy day.

   _____

7. Two tickets to a concert of your choice at the Orpheum Theatre.

   _____

8. An empty seat on a very crowded bus; you have a half-hour ride ahead of you.

   _____

9. A 4-foot tall potted indoor plant.

   _____

10. A place at the front of the line in a busy cinema queue.

    _____

We are interested in determining the monetary value which you place upon a number of potentially pleasant experiences and things. Below you will find 10 brief descriptions. Imagine in each case that you own the item or the right to the experience which is described and that it is now up for sale. No additional information is provided other than that shown. On the associated scale, please circle the dollar amount which best indicates the minimum amount of money which you would be willing to accept in return for giving up the item or your right to experience the event which is described.

1. A ticket entitling you to dinner for two at the Vancouver restaurant of your choice.

   $15.00 20.00 25.00 30.00 35.00

2. An organic avocado.

   $ 0.25 .50 .75 1.00 1.25

3. A set of 4 handmade pottery mugs.

   $ 5.00 10.00 15.00 20.00 25.00

4. A lottery ticket which gives you a 1 in 30 chance to win a pocket-size electronic calculator.

   $ 0.20 .40 .60 .80 1.00

5. A quart of pure maple syrup.

   $ 2.00 4.00 6.00 8.00 10.00

6. The one day rental of an umbrella on a very rainy day.

   $ 0.50 1.50 2.50 3.50 4.50

7. Two tickets to a concert of your choice at the Orpheum Theatre.

   $ 5.00 10.00 15.00 20.00 25.00

8. An empty seat on a very crowded bus; you have a half-hour ride ahead of you.

   $ 0.20 .40 .60 .80 1.00

9. A 4-foot tall potted indoor plant.

   $ 5.00 10.00 15.00 20.00 25.00

10. A place at the front of the line in a busy cinema queue.

    $ 1.00 2.00 3.00 4.00 5.00

9b

We are interested in determining the monetary value which you place upon a number of potentially pleasant experiences and things. Below you will find 10 brief descriptions. Imagine in each case that you own the item or the right to the experience which is described and that it is now up for sale at the price shown. No negotiation is permitted, and whether you decide to sell the item is entirely your own decision. Please indicate by circling either "yes" or "no" whether you would be willing to accept this price in return for giving up the item or your right to experience the event which is described.

1. A ticket entitling you to dinner for two at the Vancouver restaurant of your choice.

   $15.00 Yes No

2. An organic avocado.

   $ 0.25 Yes No

3. A set of 4 handmade pottery mugs.

   $ 5.00 Yes No

4. A lottery ticket which gives you a 1 in 30 chance to win a pocket-size electronic calculator.

   $ 0.20 Yes No

5. A quart of pure maple syrup.

   $ 2.00 Yes No

6. The one day rental of an umbrella on a very rainy day.

   $ 0.50 Yes No

7. Two tickets to a concert of your choice at the Orpheum Theatre.

   $ 5.00 Yes No

8. An empty seat on a very crowded bus; you have a half-hour ride ahead of you.

   $ 0.20 Yes No

9. A 4-foot tall potted indoor plant.

   $ 5.00 Yes No

10. A place at the front of the line in a busy cinema queue.

    $ 1.00 Yes No

9c

We are interested in determining the monetary value which you place upon a number of potentially pleasant experiences and things. Below you will find 10 brief descriptions. Imagine in each case that you own the item or the right to the experience which is described and that it is now up for sale at the price shown. No negotiation is permitted, and whether you decide to sell the item is entirely your own decision. Please indicate by circling either "yes" or "no" whether you would be willing to accept this price in return for giving up the item or your right to experience the event which is described.

1. A ticket entitling you to dinner for two at the Vancouver restaurant of your choice.

   $25.00 Yes No

2. An organic avocado.

   $ 0.75 Yes No

3. A set of 4 handmade pottery mugs.

   $15.00 Yes No

4. A lottery ticket which gives you a 1 in 30 chance to win a pocket-size electronic calculator.

   $ 0.60 Yes No

5. A quart of pure maple syrup.

   $ 6.00 Yes No

6. The one day rental of an umbrella on a very rainy day.

   $ 2.50 Yes No

7. Two tickets to a concert of your choice at the Orpheum Theatre.

   $15.00 Yes No

8. An empty seat on a very crowded bus; you have a half-hour ride ahead of you.

   $ 0.60 Yes No

9. A 4-foot tall potted indoor plant.

   $15.00 Yes No

10. A place at the front of the line in a busy cinema queue.

    $ 3.00 Yes No

We are interested in determining the monetary value which you place upon a number of potentially pleasant experiences and things. Below you will find 10 brief descriptions. Imagine in each case that you own the item or the right to the experience which is described and that it is now up for sale at the price shown. No negotiation is permitted, and whether you decide to sell the item is entirely your own decision. Please indicate by circling either "yes" or "no" whether you would be willing to accept this price in return for giving up the item or your right to experience the event which is described.

1. A ticket entitling you to dinner for two at the Vancouver restaurant of your choice.

   $35.00 Yes No

2. An organic avocado.

   $ 1.25 Yes No

3. A set of 4 handmade pottery mugs.

   $25.00 Yes No

4. A lottery ticket which gives you a 1 in 30 chance to win a pocket-size electronic calculator.

   $1.00 Yes No

5. A quart of pure maple syrup.

   $10.00 Yes No

6. The one day rental of an umbrella on a very rainy day.

   $ 4.50 Yes No

7. Two tickets to a concert of your choice at the Orpheum Theatre.

   $25.00 Yes No

8. An empty seat on a very crowded bus; you have a half-hour ride ahead of you.

   $ 1.00 Yes No

9. A 4-foot tall potted indoor plant.

   $25.00 Yes No

10. A place at the front of the line in a busy cinema queue.

    $ 5.00 Yes No

9e

We are interested in determining the monetary value which you place upon a number of potentially pleasant experiences and things. Below you will find 10 brief descriptions. Imagine in each case that you own the item or the right to the experience which is described and that it is now up for sale through a process of successive bids, as used in an auction. In each case, the bidding will start at the price shown and increase by the specified amount until the sum which is offered is considered to be just sufficient, at which point you agree to sell the good. On the associated scale, please record the dollar amount which best indicates this minimum amount of money which you would be willing to accept in return for giving up the item or your right to experience the event which is described.

1. A ticket entitling you to dinner for two at the Vancouver restaurant of your choice.
   Starting Price: $15.00
   Increase by : $ 5.00 $_____

2. An organic avocado.
   Starting Price: $ 0.25
   Increase by : $ 0.25 $_____

3. A set of 4 handmade pottery mugs.
   Starting Price: $ 5.00
   Increase by : $ 5.00 $_____

4. A lottery ticket which gives you a 1 in 30 chance to win a pocket-size electronic calculator.
   Starting Price: $ 0.20
   Increase by : $ 0.20 $_____

5. A quart of pure maple syrup.
   Starting Price: $ 2.00
   Increase by : $ 2.00 $_____

6. The one day rental of an umbrella on a very rainy day.
   Starting Price: $ 0.50
   Increase by : $ 1.00 $_____

7. Two tickets to a concert of your choice at the Orpheum Theatre.
   Starting Price: $ 5.00
   Increase by : $ 5.00 $_____

8. An empty seat on a very crowded bus; you have a half-hour ride ahead of you.
   Starting Price: $ 0.20
   Increase by : $ 0.20 $_____

9. A 4-foot tall potted indoor plant.
   Starting Price: $ 5.00
   Increase by : $ 5.00 $_____

10. A place at the front of the line in a busy cinema queue.
    Starting Price: $ 1.00
    Increase by : $ 1.00 $_____

9f

We are interested in determining the monetary value which you place upon a number of potentially pleasant experiences and things. Below you will find 10 brief descriptions. Imagine in each case that you own the item or the right to the experience which is described and that it is now up for sale through a process of successive bids, as used in an auction. In each case, the bidding will start at the price shown and increase by the specified amount until the sum which is offered is considered to be just sufficient, at which point you agree to sell the good. On the associated scale, please record the dollar amount which best indicates this minimum amount of money which you would be willing to accept in return for giving up the item or your right to experience the event which is described.

1. A ticket entitling you to dinner for two at the Vancouver restaurant of your choice.
   Starting Price: $15.00
   Increase by : $10.00 $_____

2. An organic avocado.
   Starting Price: $ 0.25
   Increase by : $ 0.25 $_____

3. A set of 4 handmade pottery mugs.
   Starting Price: $ 5.00
   Increase by : $10.00 $_____

4. A lottery ticket which gives you a 1 in 30 chance to win a pocket-size electronic calculator.
   Starting Price: $ 0.20
   Increase by : $ 0.40 $_____

5. A quart of pure maple syrup.
   Starting Price: $ 2.00
   Increase by : $ 4.00 $_____

6. The one day rental of an umbrella on a very rainy day.
   Starting Price: $ 0.50
   Increase by : $ 2.00 $_____

7. Two tickets to a concert of your choice at the Orpheum Theatre.
   Starting Price: $ 5.00
   Increase by : $10.00 $_____

8. An empty seat on a very crowded bus; you have a half-hour ride ahead of you.
   Starting Price: $ 0.20
   Increase by : $ 0.40 $_____

9. A 4-foot tall potted indoor plant.
   Starting Price: $ 5.00
   Increase by : $10.00 $_____

10. A place at the front of the line in a busy cinema queue.
    Starting Price: $ 1.00
    Increase by : $ 2.00 $_____

9g

We are interested in determining the monetary value which you place upon a number of potentially pleasant experiences and things. Below you will find 10 brief descriptions. Imagine in each case that you own the item or the right to the experience which is described and that it is now up for sale. No additional information is provided other than that shown. In the space provided, please write in the dollar amount which best indicates the minimum amount of money which you would be willing to accept in return for giving up the item or your right to experience the event which is described.

1. A ticket entitling you to dinner for two at the Vancouver restaurant of your choice.

   _____

2. An organic avocado.

   _____

3. A set of 4 handmade pottery mugs.

   _____

4. A lottery ticket which gives you a 1 in 30 chance to win a pocket-size electronic calculator.

   _____

5. A quart of pure maple syrup.

   _____

6. The one day rental of an umbrella on a very rainy day.

   _____

7. Two tickets to a concert of your choice at the Orpheum Theatre.

   _____

8. An empty seat on a very crowded bus; you have a half-hour ride ahead of you.

   _____

9. A 4-foot tall potted indoor plant.

   _____

10. A place at the front of the line in a busy cinema queue.

    _____

10a

We are interested in determining the monetary value which you place upon a number of potentially pleasant experiences and things. Below you will find 10 brief descriptions. Imagine in each case that you have been given the opportunity to purchase the item or experience which is described. Please circle the number on the associated dollar scale which most closely indicates how much money you would pay to experience the event or to obtain the item which is described.

---

1. A ticket entitling you to dinner for two at the Vancouver restaurant of your choice.

   $10.00 $20.00 $30.00 $40.00 $50.00

2. An organic avocado.

   $.20 $.40 $.60 $.80 $1.00

3. A set of four handmade pottery mugs.

   $2.00 $6.00 $10.00 $14.00 $18.00

4. A lottery ticket which gives you a 1 in 40 chance to win a bottle of imported champagne.

   $.20 $.40 $.60 $.80 $1.00

5. A quart of pure maple syrup.

   $2.00 $4.00 $6.00 $8.00 $10.00

6. The one-day rental of an umbrella on a very rainy day.

   $.50 $1.50 $2.50 $3.50 $4.50

7. Two tickets to a concert of your choice at the Orpheum Theatre.

   $5.00 $10.00 $15.00 $20.00 $25.00

8. An empty seat on a very crowded bus; you have a one-half hour ride ahead of you.

   $.20 $.40 $.60 $.80 $1.00

9. A ten-inch potted indoor plant.

   $2.00 $4.00 $6.00 $8.00 $10.00

10. A place at the front of the line in a busy cinema queue.

    $.50 $1.50 $2.50 $3.50 $4.50

10b

We are interested in determining the monetary value which you place upon a number of potentially pleasant experiences and things. Below you will find 10 brief descriptions. Imagine in each case that you own the item or the right to the experience which is described. Please circle the number on the associated dollar scale which most closely indicates the price at which you would sell the item or your right to the experience which is described.

---

1. A ticket entitling you to dinner for two at the Vancouver restaurant of your choice.

   $10.00 $20.00 $30.00 $40.00 $50.00

2. An organic avocado.

   $.20 $.40 $.60 $.80 $1.00

3. A set of four handmade pottery mugs.

   $2.00 $6.00 $10.00 $14.00 $18.00

4. A lottery ticket which gives you a 1 in 40 chance to win a bottle of imported champagne.

   $.20 $.40 $.60 $.80 $1.00

5. A quart of pure maple syrup.

   $2.00 $4.00 $6.00 $8.00 $10.00

6. The one-day rental of an umbrella on a very rainy day.

   $.50 $1.50 $2.50 $3.50 $4.50

7. Two tickets to a concert of your choice at the Orpheum Theatre.

   $5.00 $10.00 $15.00 $20.00 $25.00

8. An empty seat on a very crowded bus; you have a one-half hour ride ahead of you.

   $.20 $.40 $.60 $.80 $1.00

9. A ten-inch potted indoor plant.

   $2.00 $4.00 $6.00 $8.00 $10.00

10. A place at the front of the line in a busy cinema queue.

    $.50 $1.50 $2.50 $3.50 $4.50

Economic Value of the B.C. Provincial Museum a.

In this survey, we encourage you to express your views regarding the economic value of the B.C. Provincial Museum in Victoria.

The Museum exhibits serve a number of functions and are viewed by people of all ages. A wide range of objects made by traditional Indian cultures are displayed for public viewing and preserved for research purposes. Artifacts of early B.C. explorers, traders, and loggers are exhibited along with characteristic displays and accompanying stories of more recent B.C. life. Representative animal and plant species of the Province are also collected and shown in natural settings to illustrate the evolution and diversity of B.C.'s natural resource heritage.

While the collection, classification and exhibition of these objects costs money, entrance to the Provincial Museum is free of charge. In order to roughly measure its economic value, we are wanting to get an estimate of the amount you would be willing to spend in order to visit the Museum if an entrance fee were required. Assume that all adults will be required to pay an equal amount.

1. Do you live in British Columbia? _____Yes _____No

2. If yes, in which of the following areas do you live?

   _____Victoria _____other, Vancouver Island

   _____Vancouver _____other, Mainland B.C.

3. If no, in which of the following areas do you live?

   _____other Province of Canada _____other country

4. Would you be willing to pay an entrance fee of $3.00 in order to visit the Provincial Museum?

   _____Yes _____No

Now, answer either a or b.

a. If yes, would you be willing to pay an entrance fee of $5.00? ____Yes ____No

b. If no, would you be willing to pay an entrance fee of $1.00? ____Yes ____No

5. All British Columbia taxpayers now pay for the operation of the Provincial Museum in a variety of ways, including higher Provincial income taxes and slightly increased prices for some of the goods which we buy. Do you have any comments about using entrance fees rather than general tax revenues as a means of paying for Museum services?

_____

_____

_____

_____

Economic Value of the B.C. Provincial Museum a..

In this survey, we encourage you to express your views regarding the economic value of the B.C. Provincial Museum in Victoria.

The Museum exhibits serve a number of functions and are viewed by people of all ages. A wide range of objects made by traditional Indian cultures are displayed for public viewing and preserved for research purposes. Artifacts of early B.C. explorers, traders, and loggers are exhibited along with characteristic displays and accompanying stories of more recent B.C. life. Representative animal and plant species of the Province are also collected and shown in natural settings to illustrate the evolution and diversity of B.C.'s natural resource heritage.

While the collection, classification and exhibition of these objects costs money, entrance to the Provincial Museum is free of charge. In order to roughly measure its economic value, we are wanting to get an estimate of the amount you would be willing to spend in order to visit the Museum if an entrance fee were required. Assume that all adults will be required to pay an equal amount.

1. Do you live in British Columbia? _____Yes _____No

2. If yes, in which of the following areas do you live?

   _____Victoria _____other, Vancouver Island

   _____Vancouver _____other, Mainland B.C.

3. If no, in which of the following areas do you live?

   _____other Province of Canada _____other country

4. Would you be willing to pay an entrance fee of $4.00 in order to visit the Provincial Museum?

   _____Yes _____No

Now, answer either a or b.

a. If yes, would you be willing to pay an entrance fee of $5.00? ____Yes ____No

b. If no, would you be willing to pay an entrance fee of $3.00? ____Yes ____No

5. All British Columbia taxpayers now pay for the operation of the Provincial Museum in a variety of ways, including higher Provincial income taxes and slightly increased prices for some of the goods which we buy. Do you have any comments about using entrance fees rather than general tax revenues as a means of paying for Museum services?

_____

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Economic Value of the B.C. Provincial Museum b.

In this survey, we encourage you to express your views regarding the economic value of the B.C. Provincial Museum in Victoria.

The Museum exhibits serve a number of functions and are viewed by people of all ages. A wide range of objects made by traditional Indian cultures are displayed for public viewing and preserved for research purposes. Artifacts of early B.C. explorers, traders, and loggers are exhibited along with characteristic displays and accompanying stories of more recent B.C. life. Representative animal and plant species of the Province are also collected and shown in natural settings to illustrate the evolution and diversity of B.C.'s natural resource heritage.

While the collection, classification and exhibition of these objects costs money, entrance to the Provincial Museum is free of charge. In order to roughly measure its economic value, we are wanting to get an estimate of the amount you would be willing to spend in order to visit the Museum if an entrance fee were required. Assume that all adults will be required to pay an equal amount.

1. Do you live in British Columbia? _____Yes _____No

2. If yes, in which of the following areas do you live?

   _____Victoria _____other, Vancouver Island

   _____Vancouver _____other, Mainland B.C.

3. If no, in which of the following areas do you live?

   _____other Province of Canada _____other country

   How many days do you plan to spend in Victoria?

   _____1 day _____2-5 days _____more than 5 days

4. To assist you in developing a frame of reference, we have noted below the approximate adult entrance prices which must be paid to visit a number of other exhibits.

Vancouver Aquarium	$3.75	Butchart Gardens, Victoria	$5.00
Disneyland, Los Angeles, . . .	$9.25	Undersea World, Victoria	$3.95
Sea World, San Diego	$8.95	American Museum of Natural History, New York City	$2.00

(suggested price

   In light of the level of payments shown above, would you be willing to pay an admission price of $3.00 in order to visit the Provincial Museum?

   _____Yes _____No

Now, answer either a or b.

a. If yes, would you be willing to pay an entrance fee of $5.00? ____Yes ____No

b. If no, would you be willing to pay an entrance fee of $1.00? ____Yes ____No

5. All British Columbia taxpayers now pay for the operation of the Provincial Museum in a variety of ways, including higher Provincial income taxes and slightly increased prices for some of the goods which we buy. Do you have any comments about using entrance fees rather than general tax revenues as a means of paying for Museum services?

Economic Value of the B.C. Provincial Museum b..

In this survey, we encourage you to express your views regarding the economic value of the B.C. Provincial Museum in Victoria.

The Museum exhibits serve a number of functions and are viewed by people of all ages. A wide range of objects made by traditional Indian cultures are displayed for public viewing and preserved for research purposes. Artifacts of early B.C. explorers, traders, and loggers are exhibited along with characteristic displays and accompanying stories of more recent B.C. life. Representative animal and plant species of the Province are also collected and shown in natural settings to illustrate the evolution and diversity of B.C.'s natural resource heritage.

While the collection, classification and exhibition of these objects costs money, entrance to the Provincial Museum is free of charge. In order to roughly measure its economic value, we are wanting to get an estimate of the amount you would be willing to spend each year in order to visit the Museum if an entrance fee were required. Assume that all adults will be required to pay an equal amount.

1. Do you live in British Columbia? _____Yes _____No

2. If yes, in which of the following areas do you live?

   _____Victoria _____other, Vancouver Island

   _____Vancouver _____other, Mainland B.C.

3. If no, in which of the following areas do you live?

   _____other Province of Canada _____other country

   How many days do you plan to spend in Victoria?

   _____1 day _____2-5 days _____more than 5 days

4. To assist you in developing a frame of reference, we have noted below the approximate adult entrance prices which must be paid to visit a number of other exhibits.

Vancouver Aquarium	$3.75	Butchart Gardens, Victoria	$5.00
Disneyland, Los Angeles, . . .	$9.25	Undersea World, Victoria	$3.95
Sea World, San Diego	$8.95	American Museum of Natural History, New York City	$2.00 (suggested price)

   In light of the level of payments shown above, would you be willing to pay an admission price of $4.00 in order to visit the Provincial Museum?

   _____Yes _____No

Now, answer either a or b.

a. If yes, would you be willing to pay an entrance fee of $5.00? ____Yes ____No

b. If no, would you be willing to pay an entrance fee of $3.00? ____Yes ____No

5. All British Columbia taxpayers now pay for the operation of the Provincial Museum in a variety of ways, including higher Provincial income taxes and slightly increased prices for some of the goods which we buy. Do you have any comments about using entrance fees rather than general tax revenues as a means of paying for Museum services?

c

Economic Value of the B.C. Provincial Museum

b...

In this survey, we encourage you to express your views regarding the economic value of the B.C. Provincial Museum in Victoria.

The Museum exhibits serve a number of functions and are viewed by people of all ages. A wide range of objects made by traditional Indian cultures are displayed for public viewing and preserved for research purposes. Artifacts of early B.C. explorers, traders, and loggers are exhibited along with characteristic displays and accompanying stories of more recent B.C. life. Representative animal and plant species of the Province are also collected and shown in natural settings to illustrate the evolution and diversity of B.C.'s natural resource heritage.

While the collection, classification and exhibition of these objects costs money, entrance to the Provincial Museum is free of charge. In order to roughly measure its economic value, we are wanting to get an estimate of the amount you would be willing to spend in order to visit the Museum if an entrance fee were required. Assume that all adults will be required to pay an equal amount.

1. Do you live in British Columbia? _____Yes _____No

2. If yes, in which of the following areas do you live?

   _____Victoria _____other, Vancouver Island

   _____Vancouver _____other, Mainland B.C.

3. If no, in which of the following areas do you live?

   _____other Province of Canada _____other country

   How many days do you plan to spend in Victoria?

   _____1 day _____2-5 days _____more than 5 days

4. To assist you in developing a frame of reference, we have noted below the approximate adult entrance prices which must be paid to visit a number of other exhibits.

Vancouver Aquarium	$3.75	Butchart Gardens, Victoria	$5.00
Centennial Museum, Vancouver .	$2.50	Undersea World, Victoria	$3.95
Museum of Anthropology, Vanc.	$1.50	American Museum of Natural History, New York City . . . . . (suggested price)	$2.00

   In light of the level of payments shown above, would you be willing to pay an admission price of $3.00 in order to visit the Provincial Museum?

   _____Yes _____No

Now, answer either a or b.

a. If yes, would you be willing to pay an entrance fee of $5.00? ____Yes ____No

b. If no, would you be willing to pay an entrance fee of $1.00? ____Yes ____No

5. All British Columbia taxpayers now pay for the operation of the Provincial Museum in a variety of ways, including higher Provincial income taxes and slightly increased prices for some of the goods which we buy. Do you have any comments about using entrance fees rather than general tax revenues as a means of paying for Museum services?

Economic Value of the B.C. Provincial Museum C.

In this survey, we encourage you to express your views regarding the economic value of the B.C. Provincial Museum in Victoria.

The Museum exhibits serve a number of functions and are viewed by people of all ages. A wide range of objects made by traditional Indian cultures are displayed for public viewing and preserved for research purposes. Artifacts of early B.C. explorers, traders, and loggers are exhibited along with characteristic displays and accompanying stories of more recent B.C. life. Representative animal and plant species of the Province are also collected and shown in natural settings to illustrate the evolution and diversity of B.C.'s natural resource heritage.

While the collection, classification and exhibition of these objects costs money, entrance to the Provincial Museum is free of charge. In order to roughly measure its economic value, we are wanting to get an estimate of the amount you would be willing to spend in order to visit the Museum if an entrance fee were required. Assume that all adults will be required to pay an equal amount.

1. Do you live in British Columbia? _____Yes _____No

2. If yes, in which of the following areas do you live?

   _____Victoria _____other, Vancouver Island

   _____Vancouver _____other, Mainland B.C.

3. If no, in which of the following areas do you live?

   _____other Province of Canada _____other country

   How many days do you plan to spend in Victoria?

   _____1 day _____2-5 days _____more than 5 days

4. What is the maximum entrance fee that you would be willing to pay in order to visit the Provincial Museum?

   $_____

5. All British Columbia taxpayers now pay for the operation of the Provincial Museum in a variety of ways, including higher Provincial income taxes and slightly increased prices for some of the goods which we buy. Do you have any comments about using entrance fees rather than general tax revenues as a means of paying for Museum services?

_____

_____

_____

_____

Economic Value of the B.C. Provincial Museum

d.

In this survey, we encourage you to express your views regarding the economic value of the B.C. Provincial Museum in Victoria.

The Museum exhibits serve a number of functions and are viewed by people of all ages. A wide range of objects made by traditional Indian cultures are displayed for public viewing and preserved for research purposes. Artifacts of early B.C. explorers, traders, and loggers are exhibited along with characteristic displays and accompanying stories of more recent B.C. life. Representative animal and plant species of the Province are also collected and shown in natural settings to illustrate the evolution and diversity of B.C.'s natural resource heritage.

While the collection, classification and exhibition of these objects cost money, entrance to the Provincial Museum is free of charge. In order to roughly measure its economic value, we are wanting to get an estimate of the amount you would be willing to spend in order to visit the Museum if an entrance fee were required. Assume that all adults will be required to pay an equal amount.

1. Do you live in British Columbia? _____Yes _____No

2. If yes, in which of the following areas do you live?

   _____Victoria _____other, Vancouver Island

   _____Vancouver _____other, Mainland B.C.

3. If no, in which of the following areas do you live?

   _____other Province of Canada _____other country

4. To assist you in developing a frame of reference, we have noted below the approximate adult entrance prices which must be paid to visit a number of other exhibits.

Vancouver Aquarium	$3.75	Butchart Gardens, Victoria	$5.00
Disneyland, Los Angeles	$9.25	Undersea World, Victoria	$3.95
Sea World, San Diego	$8.95	American Museum of Natural History, New York City . . . . . (suggested price)	$2.00

   In light of the level of payments shown above, what is the maximum fee that you would be willing to pay in order to visit the Provincial Museum?

   $_____

5. Do you have any comments about using entrance fees rather than general tax revenues as a means of paying for Museum services?

_____

_____

_____

Economic Value of the B.C. Provincial Museum

d..

In this survey, we encourage you to express your views regarding the economic value of the B.C. Provincial Museum in Victoria.

The Museum exhibits serve a number of functions and are viewed by people of all ages. A wide range of objects made by traditional Indian cultures are displayed for public viewing and preserved for research purposes. Artifacts of early B.C. explorers, traders, and loggers are exhibited along with characteristic displays and accompanying stories of more recent B.C. life. Representative animal and plant species of the Province are also collected and shown in natural settings to illustrate the evolution and diversity of B.C.'s natural resource heritage.

While the collection, classification and exhibition of these objects cost money, entrance to the Provincial Museum is free of charge. In order to roughly measure its economic value, we are wanting to get an estimate of the amount you would be willing to spend in order to visit the Museum if an entrance fee were required. Assume that all adults will be required to pay an equal amount.

1. Do you live in British Columbia? _____Yes _____No

2. If yes, in which of the following areas do you live?

   _____Victoria _____other, Vancouver Island

   _____Vancouver _____other, Mainland B.C.

3. If no, in which of the following areas do you live?

   _____other Province of Canada _____other country

4. To assist you in developing a frame of reference, we have noted below the approximate adult entrance prices which must be paid to visit a number of other exhibits:

Vancouver Aquarium	$3.75	Butchart Gardens, Victoria	$5.00
Centennial Museum, Vancouver . .	$2.50	Undersea World, Victoria	$3.95
Museum of Anthropology, Vanc. .	$1.50	American Museum of Natural History, New York City . . . . . (suggested price)	$2.00

   In light of the level of payments shown above, what is the maximum fee that you would be willing to pay in order to visit the Provincial Museum?

   $_____

5. Do you have any comments about using entrance fees rather than general tax revenues as a means of paying for Museum services?

_____

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Economic Value of the B.C. Provincial Museum

e.

In this survey, we encourage you to express your views regarding the economic value of the B.C. Provincial Museum in Victoria.

The Museum exhibits serve a number of functions and are viewed by people of all ages. A wide range of objects made by traditional Indian cultures are displayed for public viewing and preserved for research purposes. Artifacts of early B.C. explorers, traders, and loggers are exhibited along with characteristic displays and accompanying stories of more recent B.C. life. Representative animal and plant species of the Province are also collected and shown in natural settings to illustrate the evolution and diversity of B.C.'s natural resource heritage.

While the collection, classification and exhibition of these objects costs money, entrance to the Provincial Museum is free of charge. Instead, all of us now pay for the operation of the Museum in a variety of ways, including higher Provincial income taxes and slightly increased prices for some of the goods which we buy. In order to roughly measure its economic value, we are wanting to estimate the amount you are willing to spend each year in order to ensure that the present quality of Museum exhibits is maintained. When answering the following questions, assume that payments will continue to be made as part of Provincial tax assessments and that all adult citizens of the Province will be required to pay an equal amount.

1. In which of the following areas of B.C. do you live?

_____Victoria _____other, Vancouver Island

_____Vancouver _____other, Mainland B.C.

2. Would you be willing to make an annual tax payment of $3.00 to ensure that the present quality of Museum exhibits is maintained?

_____Yes _____No

Now, answer either a or b.

a. If yes, would you be willing to make an annual payment of $5.00?

_____Yes _____No

b. If no, would you be willing to make an annual payment of $1.00?

_____Yes _____No

3. Do you have any comments about using general tax revenues rather than entrance fees as a means of paying for Museum services?

_____

_____

_____

_____

Economic Value of the B.C. Provincial Museum

e..

In this survey, we encourage you to express your views regarding the economic value of the B.C. Provincial Museum in Victoria.

The Museum exhibits serve a number of functions and are viewed by people of all ages. A wide range of objects made by traditional Indian cultures are displayed for public viewing and preserved for research purposes. Artifacts of early B.C. explorers, traders, and loggers are exhibited along with characteristic displays and accompanying stories of more recent B.C. life. Representative animal and plant species of the Province are also collected and shown in natural settings to illustrate the evolution and diversity of B.C.'s natural resource heritage.

While the collection, classification and exhibition of these objects costs money, entrance to the Provincial Museum is free of charge. Instead, all of us now pay for the operation of the Museum in a variety of ways, including higher Provincial income taxes and slightly increased prices for some of the goods which we buy. In order to roughly measure its economic value, we are wanting to estimate the amount you are willing to spend each year in order to ensure that the present quality of Museum exhibits is maintained. When answering the following questions, assume that payments will continue to be made as part of Provincial tax assessments and that all adult citizens of the Province will be required to pay an equal amount.

1. In which of the following areas of B.C. do you live?

_____Victoria _____other, Vancouver Island

_____Vancouver _____other, Mainland B.C.

2. Would you be willing to make an annual tax payment of $5.00 to ensure that the present quality of Museum exhibits is maintained?

_____Yes _____No

Now, answer either a or b.

a. If yes, would you be willing to make an annual payment of $10.00?

_____Yes _____No

b. If no, would you be willing to make an annual payment of $3.00?

_____Yes _____No

3. Do you have any comments about using general tax revenues rather than entrance fees as a means of paying for Museum services?

_____

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Economic Value of the B.C. Provincial Museum

In this survey, we encourage you to express your views regarding the economic value of the B.C. Provincial Museum in Victoria.

The Museum exhibits serve a number of functions and are viewed by people of all ages. A wide range of objects made by traditional Indian cultures are displayed for public viewing and preserved for research purposes. Artifacts of early B.C. explorers, traders, and loggers are exhibited along with characteristic displays and accompanying stories of more recent B.C. life. Representative animal and plant species of the Province are also collected and shown in natural settings to illustrate the evolution and diversity of B.C.'s natural resource heritage.

While the collection, classification and exhibition of these objects costs money, entrance to the Provincial Museum is free of charge. Instead, all of us now pay for the operation of the Museum in a variety of ways, including higher Provincial income taxes and slightly increased prices for some of the goods which we buy. In order to roughly measure its economic value, we are wanting to estimate the amount you are willing to spend each year in order to ensure that the present quality of Museum exhibits is maintained. When answering the following questions, assume that payments will continue to be made as part of Provincial tax assessments and that all adult citizens of the Province will be required to pay an equal amount.

1. In which of the following areas of B.C. do you live?

_____Victoria _____other, Vancouver Island

_____Vancouver _____other, Mainland B.C.

2. Would you be willing to make an annual tax payment of $10.00 to ensure that the present quality of Museum exhibits is maintained?

_____Yes _____No

Now, answer either a or b.

a. If yes, would you be willing to make an annual payment of $20.00?

_____Yes _____No

b. If no, would you be willing to make an annual payment of $5.00?

_____Yes _____No

3. Do you have any comments about using general tax revenues rather than entrance fees as a means of paying for Museum services?

_____

_____

_____

_____

Economic Value of the B.C. Provincial Museum

f.

In this survey, we encourage you to express your views regarding the economic value of the B.C. Provincial Museum in Victoria.

The Museum exhibits serve a number of functions and are viewed by people of all ages. A wide range of objects made by traditional Indian cultures are displayed for public viewing and preserved for research purposes. Artifacts of early B.C. explorers, traders, and loggers are exhibited along with characteristic displays and accompanying stories of more recent B.C. life. Representative animal and plant species of the Province are also collected and shown in natural settings to illustrate the evolution and diversity of B.C.'s natural resource heritage.

While the collection, classification and exhibition of these objects costs money, entrance to the Provincial Museum is free of charge. Instead, all of us now pay for the operation of the Museum in a variety of ways, including higher Provincial income taxes and slightly increased prices for some of the goods which we buy. In order to roughly measure its economic value, we are wanting to estimate the amount you are willing to spend each year in order to ensure that the present quality of Museum exhibits is maintained. When answering the following questions, assume that payments will continue to be made as part of Provincial tax assessments and that all adult citizens of the Province will be required to pay an equal amount.

1. In which of the following areas of B.C. do you live?

   _____Victoria _____other, Vancouver Island

   _____Vancouver _____other, Mainland B.C.

2. What is the maximum annual tax payment that you would be willing to make in order to ensure that the present quality of Museum exhibits is maintained?

   $_____

3. Do you have any comments about using general tax revenues rather than entrance fees as a means of paying for Museum services?

_____

_____

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_____

g.

Economic Value of the B.C. Provincial Museum

In this survey, we encourage you to express your views regarding the economic value of the B.C. Provincial Museum in Victoria.

The Museum exhibits serve a number of functions and are viewed by people of all ages. A wide range of objects made by traditional Indian cultures are displayed for public viewing and preserved for research purposes. Artifacts of early B.C. explorers, traders, and loggers are exhibited along with characteristic displays and accompanying stories of more recent B.C. life. Representative animal and plant species of the Province are also collected and shown in natural settings to illustrate the evolution and diversity of B.C.'s natural resource heritage.

While the collection, classification and exhibition of these objects costs money, entrance to the Provincial Museum is free of charge. Instead, each B.C. taxpayer now pays for the operation of the Provincial Museum in a variety of ways, including higher Provincial income taxes and slightly increased prices for some of the goods which we buy. Decreasing the quality and range of Museum exhibits could therefore result in substantial financial savings for the Provincial Government. In order to roughly measure the economic value of current Museum services, we are wanting to get an estimate of the amount of monetary payment that would just compensate you if the quality or range of services provided by the Museum were to substantially decline.

When answering the following questions, assume that all savings will be distributed through a decrease in annual Provincial taxes or an equivalent cash payment and that all adult citizens of the Province will be compensated an equal amount.

1. In which of the following areas of B.C. do you live?

_____Victoria _____other, Vancouver Island

_____Vancouver _____other, Mainland B.C.

2. Would you be willing to accept an annual tax reduction of $5.00 if as a result funding for the Provincial Museum would decrease and the quality of Museum services would decline?

_____Yes _____No

Now, answer either a or b.

a. If no, would you be willing to accept an annual tax reduction of $10.00?

_____Yes _____No

b. If yes, would you be willing to accept an annual tax reduction of $3.00?

_____Yes _____No

3. Do you have any comments about the possibility of receiving a tax saving in return for a decline in the quality of the Provincial Museum?

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Economic Value of the B.C. Provincial Museum

h.

In this survey, we encourage you to express your views regarding the economic value of the B.C. Provincial Museum in Victoria.

The Museum exhibits serve a number of functions and are viewed by people of all ages. A wide range of objects made by traditional Indian cultures are displayed for public viewing and preserved for research purposes. Artifacts of early B.C. explorers, traders, and loggers are exhibited along with characteristic displays and accompanying stories of more recent B.C. life. Representative animal and plant species of the Province are also collected and shown in natural settings to illustrate the evolution and diversity of B.C.'s natural resource heritage.

While the collection, classification and exhibition of these objects costs money, entrance to the Provincial Museum is free of charge. Instead, each B.C. taxpayer now pays for the operation of the Provincial Museum in a variety of ways, including higher Provincial income taxes and slightly increased prices for some of the goods which we buy. Permanently closing the Museum to all visitors could therefore result in substantial financial savings for the Provincial Government. In order to roughly measure its economic value, we are wanting to get an estimate of the amount of monetary payment that would just compensate you for the closure of the Museum.

When answering the following questions, assume that all savings will be distributed through a decrease in annual Provincial taxes or an equivalent cash payment and that all adult citizens of the Province will be compensated an equal amount.

1. In which of the following areas of B.C. do you live?

   _____Victoria _____other, Vancouver Island

   _____Vancouver _____other, Mainland B.C.

2. Would you be willing to accept an annual tax reduction of $5.00 if as a result funding for the Provincial Museum would cease and the Museum would be closed to all visitors?

   _____Yes _____No

Now, answer either a or b.

a. If no, would you be willing to accept an annual tax reduction of $10.00?

   _____Yes _____No

b. If yes, would you be willing to accept an annual tax reduction of $2.00?

   _____Yes _____No

3. Do you have any comments about the possibility of receiving a tax saving in return for the closure of the Provincial Museum?

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Economic Value of the B.C. Provincial Museum h..

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_____Yes _____No

Now, answer either a or b.

a. If no, would you be willing to accept an annual tax reduction of $25.00?

_____Yes _____No

b. If yes, would you be willing to accept an annual tax reduction of $2.00?

_____Yes _____No

3. Do you have any comments about the possibility of receiving a tax saving in return for the closure of the Provincial Museum?

_____

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Economic Value of the B.C. Provincial Museum

In this survey, we encourage you to express your views regarding the economic value of the B.C. Provincial Museum in Victoria.

What is the Provincial Museum all about? The Museum exhibits serve a number of functions and are viewed by people of all ages. A wide range of objects made by traditional Indian cultures are displayed for public viewing and preserved for research purposes. Artifacts of early B.C. explorers, traders, and loggers are exhibited along with characteristic displays and accompanying stories of more recent B.C. life. Representative animal and plant species of the Province are also collected and shown in natural settings to illustrate the evolution and diversity of B.C.'s natural resource heritage.

Why are we interested in your views? While another group of surveys is being conducted at the Museum itself, it is felt that other residents of the Province - people who may live outside Victoria or who may not have ever visited the Museum - may also attach a value to its operation and continued existence. For example, some people may have plans to visit the Museum at some time in the future. Other people may feel that the Museum helps to record the history and culture of B.C., and for these people just knowing that the Museum exists may be of value.

While the collection, classification and exhibition of these objects costs money, entrance to the Provincial Museum is free of charge. Instead, all of us now pay for the operation of the Museum in a variety of ways, including higher Provincial income taxes and slightly increased prices for some of the goods which we buy. In order to roughly measure its economic value, we are wanting to get an estimate of the amount you are willing to spend each year in order to ensure that the present quality of Museum exhibits is maintained. This payment will ensure that Museum exhibits remain open to visitors and preserves your opportunity to visit the Museum at some future time.

When answering the following questions, assume that payments will continue to be made as part of Provincial tax assessments and that all adult citizens of the Province will be required to pay an equal amount.

1. Do you live in this area? _____Yes _____No

2. If no, in which of the following areas do you live?

   _____Victoria _____other, Vancouver Island

   _____Vancouver _____other, Mainland B.C.

3. Have you ever visited the B.C. Provincial Museum in Victoria? ____Yes ____No

4. Do you have any future plans to visit the Museum? ____Yes ____No

5. Would you be willing to make an annual tax payment of $3.00 in order to ensure that the present quality of Museum services is maintained?

   _____Yes _____No

Now, answer either a or b.

a. If yes, would you be willing to make an annual payment of $5.00? ____Yes ____No

b. If no, would you be willing to make an annual payment of $1.00? ____Yes ____No

Economic Value of the B.C. Provincial Museum

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When answering the following questions, assume that payments will continue to be made as part of Provincial tax assessments and that all adult citizens of the Province will be required to pay an equal amount.

1. Do you live in this area? _____Yes _____No

2. If no, in which of the following areas do you live?

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3. Have you ever visited the B.C. Provincial Museum in Victoria? ____Yes ____No

4. Do you have any future plans to visit the Museum? ____Yes ____No

5. Would you be willing to make an annual tax payment of $5.00 in order to ensure that the present quality of Museum services is maintained?

   _____Yes _____No

Now, answer either a or b.

a. If yes, would you be willing to make an annual payment of $10.00? ____Yes ____No

b. If no, would you be willing to make an annual payment of $3.00? ____Yes ____No

Economic Value of the B.C. Provincial Museum

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When answering the following questions, assume that payments will continue to be made as part of Provincial tax assessments and that all adult citizens of the Province will be required to pay an equal amount.

1. Do you live in this area? _____Yes _____No

2. If no, in which of the following areas do you live?

   _____Victoria _____other, Vancouver Island

   _____Vancouver _____other, Mainland B.C.

3. Have you ever visited the B.C. Provincial Museum in Victoria? ____Yes ____No

4. Do you have any future plans to visit the Museum? ____Yes ____No

5. Would you be willing to make an annual tax payment of $10.00 in order to ensure that the present quality of Museum services is maintained?

   _____Yes _____No

Now, answer either a or b.

a. If yes, would you be willing to make an annual payment of $20.00? ____Yes ____No

b. If no, would you be willing to make an annual payment of $5.00? ____Yes ____No

Economic Value of the B.C. Provincial Museum j.

In this survey, we encourage you to express your views regarding the economic value of the B.C. Provincial Museum in Victoria.

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1. Do you live in this area? _____Yes _____No

2. If no, in which of the following areas do you live?

   _____Victoria _____other, Vancouver Island

   _____Vancouver _____other, Mainland B.C.

3. Have you ever visited the B.C. Provincial Museum in Victoria? ____Yes ____No

4. Do you have future plans to visit the Museum? ____Yes ____No

5. What is the maximum annual payment that you would be willing to make in order to ensure that the present quality of Museum exhibits is maintained?

   $_____

6. Do you have any comments about using general tax revenues rather than entrance fees as a means of paying for Museum services?

_____

_____

_____