The Use of Hypothetical Baselines in Stated Preference Surveys

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1. Introduction

Researchers using stated preference (SP) techniques have increasingly come to rely on what we call "hypothetical baselines." By the term "hypothetical baseline," we mean that respondents are provided with a description of a current state or baseline, but that this baseline is intentionally not the actual state of environmental quality, health or other baseline condition. Respondents are asked to disregard their existing status quo conditions for a new baseline. The SP researcher then poses a valuation question or choice task that is contingent not on the existing status quo state of the world, but rather the state of the world described in this new hypothetical baseline. In this paper we argue that SP researchers have often used hypothetical baselines without carefully considering the cognitive challenges this poses for respondents or the difficulties this practice creates for advising policy makers. We discuss the implications of hypothetical baselines on valuation and policy analysis, using arguments from the behavioral economics literature as well as from standard theory.

In the next, second section of the paper we define more precisely what we mean by a "hypothetical baseline." The third section presents a simple typology of four types of SP studies, two of which rely on hypothetical baselines. In the fourth section we give six examples of conditions that a SP researcher may change to create a hypothetical baseline, and in the fifth section we list four main reasons why SP analysts use hypothetical baselines in their research designs. The sixth section discusses some of the risks associated with the use of hypothetical baselines, and in the seventh, concluding section of the paper we offer some guidance for the use of hypothetical baselines in SP surveys.

2. What is a "Hypothetical Baseline"?

In his 2002 acceptance speech for his Nobel prize in Economics, Daniel Kahnemann used a deck of cards to illustrate the difference between our intuitive mind and our analytical mind. Kahnemann asked his Stockholm audience, "What is the volume of a deck of cards?" He pointed

out that our intuitive mind provides a lightning fast and very reliable answer to this question. But if one asks, "What is the sum of the area of all the cards in the deck?" our intuitive mind is stumped. One must turn to the analytical mind and take some time to do the necessary calculations. Prof. Kahnemann's point was that our intuitive mind is very fast and reliable for answering some kinds of questions, but it tends to makes mistakes—or fall prey to systematic biases-- for some types of problems.

Prof. Kahnemann might equally have used a traditional balance scale instead of a deck of cards to make his point because our intuitive mind almost instantly grasps the essence of such a scale. If the scale is in balance, the quantities on the two sides weigh the same. If one side of the scale dips down, the quantity on this side weighs more (is heavier).

In Hindu culture one of the ruler's duties is charity. The *tuladaan* ceremony was a public ritual in which the king himself was weighed, and his weight in gold was distributed to the poor. So the king sat on a balancing scale, and gold was added until the king rose and the scale balanced. The amount of gold on one side equaled the weight of the king on the other. [Figure 1a shows a 19^{th} century copy of a 17^{th} century painting showing Maharana Jai Singh of Mewar being weighed in a *tuladaan* ceremony; Figure 1b is a photograph of Maharaja Ganga Singh's *tuladaan* ceremony at his Golden Jubilee cerebration in 1937.] In this case the weight of the king was the status quo condition, and the quantity of gold to be given to the poor was unknown and to be determined.

Just like the weighing of quantities on a scale, the task in economic valuation is to find a balance between the utility or well-being an individual derives from status quo conditions (one side of the scale), and the utility or well-being derived from a new state of the world that results from a change from status quo conditions (the other side of the scale). Consider the task of comparing not gold and the weight of a king, but two levels of an individual's well-being. $W_0(Y_0,E_0)$ is the well-being an individual receives from his status quo income Y_0 and environmental quality level E_0; and $W_1(Y_0, E_1)$ is the well-being the individual receives from his

status quo income and a new level of environmental quality E_1. If the individual judges E_1 to be an improvement over E_0, then in a weighing of $W_1(Y_0, E_1)$ and $W_0(Y_0, E_0)$ on a scale, $W_1(Y_0, E_1)$ is "heavier," i.e., provides more well-being, and the scale tips in favor of $W_1(Y_0, E_1)$.

To value a policy or project that causes the change from E_0 to E_1, income Y_0 must be reduced from the side of the scale that initially held $W_1(Y_0, E_1)$ until the two sides of the scale are just in balance. The challenge in stated preference studies is to truly engage both the respondent's intuitive mind and his analytical mind in this balancing task so that the weighing of the two sides of the scale is carefully and thoughtfully done. The objective is in effect for the intuitive mind and the analytical mind to concur, to reach a consensus on the balancing of these two levels of well-being, although this is not always possible.

To achieve this goal, SP researchers have largely focused on describing the management plan and/or good or service that would achieve this new state of the world (in this example the plan that improved environmental quality from E_0 to E_1), and on the consequences of this change (the attributes of the new state of the world with E_1). The guidance to SP researchers has thus been to write contingent valuation (CV) or choice experiment (CE) scenarios that are realistic and engage the respondent in careful consideration of what the new state of the world would be worth to him or her.

In this paper our focus will be on the other side of the scale. We argue that SP researchers have paid too little attention to the respondent's assessment of the well-being associated with the status quo condition $[W_0(Y_0,E_0)]$. This lack of attention to the assessment of status quo conditions is understandable if the SP researcher leaves the respondent at her current baseline (Y_0,E_0) because it seems reasonable to assume that since the respondent has lived with (been in) this situation, she knows how she likes it (i.e. she has already experienced and thus likely assessed her current status quo conditions).

Increasingly, however, in their CV/CE scenarios SP researchers do not leave respondents at their actual status quo condition (Y_0, E_0). Instead they ask respondents to first move to a new,

alternative condition (the hypothetical baseline), and then second to assess the management plan and its consequences from this new perspective or reference point.[1] To make this point more concrete, suppose the SP researcher tells the respondent to suppose that his income has increased from Y_0 to Y_2 for some reason unrelated to the management plan. The respondent's new hypothetical baseline condition is (Y_2, E_0), and now the respondent must place the well-being associated with the hypothetical baseline condition, W_0'(Y_2, E_0) on the scale, with W_1(Y_2, E_1) on the other side, then start the weighing process by removing income on the side of the scale with W_1(Y_2, E_1). Note that W_0 and W_0' will generally not be equal, nor will the respondent necessarily be familiar with the well-being associated with (Y_2, E_0). The same issue applies when asking a respondent, currently at W_0(Y_0, E_0), to evaluate the difference between W_0"(Y_0, E_2) and W_1(Y_0, E_1).

3. A Typology of Stated Preference Studies

Table 1 presents a simple typology of four types of state preference studies. The rows distinguish between (1) SP studies that use management plans and/or goods and services that are real, and (2) those studies that use management plans and/or goods and services that are hypothetical.[2] The columns distinguish between SP studies that (1) ask the respondent to value the new state of the world with the management plan and good or service from the perspective of his or her actual status quo circumstances, and (2) those SP studies that ask the respondent to view the new state of the world with the management plan and good or service from a different, hypothetical baseline condition.

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[1] Note that in choice experiments the use of hypothetical baselines occurs in both "state of the world" tasks in which alternatives cannot exist simultaneously, and in multiple option tasks in which several alternatives exist simultaneously.

[2] It is possible for a management plan to be hypothetical, and for the good or service to be real – or for both the management plan and the good or service to be hypothetical-- but this is not a distinction we wish to make in Table 1.

Case A is the simplest of the four types of SP studies. The SP researcher poses a valuation question in which the management plan and good or service are real, and the respondent is asked to value this new state of the world from his current status quo conditions. An example of Case A surveys would be a poll on an actual upcoming referendum. The respondent could be asked how she would vote given her current status quo circumstances and the real details of the proposed referendum. As another example, suppose there was an actual a H1N1 flu vaccination program that would be launched in a community in the near future. The vaccination program included a plan to charge participants a specified fee or price. Respondents could be asked whether they would choose to participate in this actual program with a real H1N1 vaccine. Case A surveys are most common in political polling and market research. A classic example of Case A using private goods is Bishop and Heberlein's study of deer hunting permits in Wisconsin (Bishop et al, 1988). Respondents were asked if they were interested in buying or selling actual hunting permits (real programs). Bishop and Heberlein evaluated willingness to pay and accept for hypothetical and real transactions of the real program (or hunting permit). Examples of Case A that involve referendum contingent valuation questions about actual programs (funding open space; riverfront improvement) are Vossler et al (2003) and Vossler and Kerkvliet (2003).

In Case B, the SP researcher poses a valuation question about a hypothetical management plan, and the respondent is asked to value this new state of the world from his status quo conditions. An example would be a CV survey in which respondents in a community without piped water services are told about a hypothetical management plan to install a water distribution network, and asked whether they would connect to the new water system at a specified connection fee and volumetric tariff given their current income, health status, and housing circumstances. As another example, a SP researcher could describe a hypothetical program to vaccinate individuals with a hypothetical vaccine that would protect against HIV infection, and ask respondents whether they would choose to be vaccinated if the hypothetical vaccine cost a specified price. In both cases the new state of the world that would result from the

implementation of the management plan is hypothetical, and the respondent is asked to value this new state of the world from his existing status quo conditions. Case B surveys are common in both CV and CE applications. The famous Exxon Valdez survey and valuation study fits into this category; the management plan was hypothetical but respondents were presented with existing status quo conditions (Carson et al 2003). Note however that in this case the U.S. Coast Guard implemented a program that was quite similar to the one described in the valuation survey (Carson et al 2003).

In Case C, the SP researcher tells the respondent to assume that for some reason unrelated to the management plan that her baseline circumstances have changed. For example, she could be told to assume that she won the lottery, or that a long-lost relative has died and left her with an unanticipated inheritance. She is thus to imagine that her baseline condition is no longer her present status quo, but this new state of the world. In Case C, the SP researcher asks the respondent to value a real management plan and/or good or service assuming she is in this new, hypothetical baseline situation.

As an example, the SP researcher could tell the respondent to assume that she had a teenage daughter (even though she does not). The SP researcher then tells the respondent about the cervical cancer vaccine (Gardasil), which is in reality the first vaccine approved by the United States Food and Drug Administration (FDA) designed to prevent a cancer. The SP researcher tells the respondent that in the United States cervical cancer strikes about 10,000 women a year and causes nearly 4,000 deaths. From her new baseline condition, not her present status quo, the respondent is then asked to whether she would purchase this cervical cancer vaccine to protect her hypothetical teenage daughter. In effect, the respondent is to consider a new hypothetical state of the world, and from this new perspective value a second state of the world that would result from the implementation of a real management plan . In our experience there are few examples of Case C surveys in the contingent valuation field; they tend to be more common in market research and for CE applications.

In Case D, the SP researcher poses two hypothetical states of the world for the respondent to consider. The SP researcher first tells the respondent to assume his baseline circumstances have changed for some reason unrelated to the hypothetical management plan. The second hypothetical for him to consider is the hypothetical management plan and/or good or service. The respondent is instructed to value the state of the world that would result from the hypothetical management plan from his new hypothetical baseline. For example, a respondent who rents his house could be instructed to assume that he owned his house – a new hypothetical baseline condition. The SP researcher then describes a hypothetical management plan to deliver piped water services to his community, and asks whether he would choose to connect his house (which he is to assume that he owns) if it cost a specified connection fee and volumetric tariff.

As another example of a Case D survey, the SP researcher could tell the respondent to assume that he had a teenage daughter (even though he does not). From this new baseline condition, not his present status quo, the respondent is then asked to consider a second hypothetical: that there is a hypothetical program to vaccinate individuals with a hypothetical vaccine that would protect against HIV infection. The SP researcher then asks respondents whether they would choose to vaccinate their hypothetical teenage daughter if the hypothetical HIV vaccine cost a specified price. Case D surveys are quite common in both CV and CE applications, but rarely do SP practitioners acknowledge the double hypothetical that they have posed to respondents or think through the implications of this practice.

A review of the recent literature reveals the extent to which hypothetical baselines are being employed. We reviewed the EconLit® database for the year 2009 and the keyword "contingent valuation;" this search generated 61 studies. Of these studies, 10 focused on methods (and did not discuss baselines) and in 11 the baseline could not be determined. Of the remaining 40 studies 27 could be classified as using real baselines, 7 used hypothetical baselines, 1 used both (in two treatments) and 5 were probably hypothetical, but we could not ascertain for certain whether the baseline was hypothetical or real. Thus, at least one fifth of the CV studies in 2009,

and possibly as many as one third, used a hypothetical baseline. A review of the CE cases in 2009 showed that of the 42 studies in the database 29 used real baselines, 8 used hypothetical, 1 used both and 4 could not be placed in either category. For this small sample the ratio of hypothetical to real baselines was quite similar in recent CV and CE applications.

4. What kinds of hypothetical baseline conditions have stated preference researchers used?

There are numerous attributes of respondents' status quo conditions that SP researchers can change in a SP scenario to create hypothetical baselines. We give several examples. First, an SP researcher could tell a respondent to assume that he is in a different location. If a respondent is traveling, perhaps being interviewed in an airport, the SP researcher could tell the respondent to imagine that he was back at home. A respondent could be told to imagine that he lived in a cold climate (when in fact he does not).

Second, a SP researcher could tell a respondent to assume she was older – to move forward in time. Or a respondent could be asked to move back in time, and then asked what she would have done if she was younger and confronted with a specific contingent behavior question.

Third, a respondent could be asked to imagine that his household had more income or more assets, and then the SP researcher could ask the respondent a question about whether he would vote for the implementation of a hypothetical a management plan and/or good or service if it cost him a specified amount of his new wealth.

Fourth, a SP researcher might ask a respondent to assume that his household had infrastructure that it did not in fact have. For example, all respondents in a CV survey could be told to assume that they had a piped water connection (even though some did not), and asked whether they would connect to a sewer line at a specified price if one were available in their neighborhood.

Fifth, a SP researcher could ask a respondent to assume that he faced different risks that is actually the case. For example, he could be told to suppose that his risk of developing lung

cancer was 1 in 100 over his lifetime, instead of his actual risk. Sixth the SP researcher could put a respondent into a new state of the world (a hypothetical baseline) in which her health status was assumed to be different. She could be told to assume that she was diagnosed with a chronic health condition, such as asthma or arthritis, even though in reality no such diagnosis had been made.

Seventh, a SP researcher could tell a respondent to imagine that external economic or social conditions are different than they are in reality. For example, a respondent could be told to assume that economic conditions are good, even if the economy was in recession, and then asked about their willingness to move if offered a new job with certain attributes.

Eighth, the respondent could be instructed that they are engaged in an activity that they are not actually engaged in. Examples include asking respondents to suppose that they are buying a new house, or are interested in purchasing a camera, when they are not necessarily thinking about engaging in such activities.

There are two points worth noting from these examples of hypothetical baselines. First, they are not mutually exclusive. For example, a SP researcher might create a hypothetical baseline that shifted a respondent's status quo condition in both time and space. Second, in a general population survey, some respondents could be confronted with a new hypothetical baseline and others not. For example, if all households were told to assume that they were homeowners, some would already be homeowners. The baseline would only be hypothetical for respondents who were renters or perhaps living for free in a relative's or friend's house.

5. Why would researchers choose to use hypothetical baselines?

There are four main reasons why SP researchers choose to shift respondents away from their status quo conditions and to ask them to value a hypothetical management plan from the perspective of an alternative, hypothetical baseline condition. First, it is of course possible that the SP researcher really wants to know what households would do if circumstances changed and people were confronted with a new policy or program. In a rapidly growing economy in which

household incomes are doubling every 10 years, government infrastructure planners need to know the value households will place on different services when these new services become available and when incomes are much higher, not how households value such services today. In such a case, a hypothetical baseline in which households are told to assume that they have more income than they do today may be the most policy-relevant baseline condition. Similarly, if the present conditions are for some reason abnormal or in disequilibrium, the SP researcher may choose to instruct respondents to return to their "normal" status quo state of the world, and answer the valuation question from this perspective.

Second, SP researchers may be forced to shift the respondent to a hypothetical baseline condition in order to ask a sensible valuation question. This situation has arisen in numerous surveys of foreign tourists visiting cultural heritage or national parks in developing countries. For example, suppose the Government of Ecuador wanted to learn more about whether foreign tourists would pay higher entrance fees to visit the Galapagos Islands if the islands were managed in different ways, i.e., subject to different management plans that would control invasive species, limit the number of tourists with access to sensitive natural areas, and preserve the native habitat. If a SP researcher interviews a foreign tourist as he is leaving the Galapagos, what precisely would the respondent be asked? What the researcher wants to know is whether the tourist would have decided to visit the Galapagos if the entrance fee had been higher and the islands had been as described in a hypothetical management plan. But this question requires that the respondent be moved back in time to the point before he made a decision to visit the Galapagos. Alternatively, the respondent could be told to both move forward in time and space, and to assume that he was back home and contemplating a second, return trip to the Galapagos. Would the respondent decide to return to the Galapagos if the new entrance fee and the new hypothetical management plan were in place? Of course, one trip to the Galapagos might be sufficient for this tourist, however much he liked it the first time. In this case the use of a hypothetical baseline not only helps the SP researcher ask a sensible question, but also it helps address a particularly challenging

sampling issue. The researcher might wish to have a random sample of tourists who are considering trips to Ecuador, but such a group would be difficult to identify. A choice based sample (sample of people who have chosen to visit Ecuador already) is clearly a biased sample but is a practical alternative to the sampling problem.

Third, SP researchers may use a hypothetical baseline simply as a matter of their own convenience. For example, consider again our example of a SP researcher who wants to know whether or not households in a community without a piped water distribution system would connect to such a system if one were installed. Renters and homeowners will definitely behave differently because a household that is renting will typically not be willing to pay an upfront charge to connect a house (and bear the costs of changes to indoor plumbing) that they do not own. The SP researcher would thus need to employ two different survey instruments: one for renters and one for homeowners.[3] Homeowners could be asked whether they would connect to the new piped distribution system at a specified connection charge and tariff. Renters could perhaps be asked whether they would agree to pay a surcharge on their monthly rent if the landlord connected their house to the distribution system and provided them with piped water. But fielding two different survey instruments (or one survey instrument with different sections for owners and renters) is somewhat complicated. An easy solution is to simply tell the renters to pretend that they are homeowners, and ask all respondents the same questions.

As another example, baseline risks of a disease may vary widely across a sample population, and determining the baseline risk of different households may be difficult or impossible. A SP researcher can attempt to "make" the variation in baseline risk go away by telling respondents to assume it is a single value in order to make it easier for the researcher to understand factors affecting respondents' valuation of a hypothetical management plan other than baseline risk.

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[3] Or alternatively employ skip patterns with a section for owners and another section for renters.

Fourth, the use of a hypothetical baseline may help a respondent to remove herself from political or social controversies surrounding status quo conditions and thus take a fresh look at a policy problem from a different, perhaps more neutral perspective. If a status quo condition is controversial, some respondents may have preconceived ideas or well-established positions on how to solve a problem. This can lead to scenario or payment vehicle rejection. SP researchers may decide to use a hypothetical baseline in order to minimize such protest responses. A related reason for using a hypothetical baseline may be to remove a strong status quo bias that a policy maker or client of the SP researcher feels is unjustified. In this case the SP researcher may employ a hypothetical baseline to reduce such status quo bias, effectively forcing a respondent to think about two new states of the world, and not anchoring on the status quo. Note that this involves a judgment that the status quo bias is unreasonable – something that in itself needs to be assessed or justified.

CE researchers can use this strategy of eliminating the default or status quo option, forcing the respondent to choose between two new alternatives. In this case the CE researcher presents the respondent with two alternatives, each with different attributes (e.g. Breffle and Rowe, 2002). Neither is the respondent's status quo condition. In this case the CE researcher has employed an implicit hypothetical baseline: "you cannot stay where you are." Often in CE surveys the respondent is given little explanation as to *why* she cannot stay where she is, i.e., why she must choose between the two (or more) alternatives presented in a choice task.

Breffle and Rowe discuss the merits of including or excluding a status quo alternative in a choice experiment. They argue that in some cases a status quo or actual baseline may not be possible as that situation will not exist in the future. They also argue that presenting a status quo or baseline may provide an "easy out" for respondents who do not wish to engage in the complexity of the stated preference task. They do point out that a status quo option will be necessary when determination of market shares (or the % Yes) is required, and when non-

marginal welfare measures (e.g. more than the marginal rates of substitution) are required. We return to discuss the pros and cons of excluding status quo options below.

6. What are the risks of using hypothetical baseline conditions?

SP researchers have often assigned respondents to hypothetical baseline conditions without sufficient reflection on the potential risks and complications involved. There are numerous reasons to be concerned about invoking a hypothetical baseline that moves respondents away from their actual status quo conditions. Many of these reasons are based on the insights from behavioral economics. We first review the potential problems arising from hypothetical baselines in general, and then provide a more formal analysis of the risks associated with hypothetical baselines.

6.1. Status quo bias and reference dependence is not captured

First, and perhaps most importantly, there are numerous legitimate reasons why people may place special value on maintaining their status quo condition. Tversky and Kahnemann (1979) pointed out that there is something special about an individual's reference point for valuing gains and losses. An individual's reference point need not be the current status quo conditions, but in most instances it probably is. In some cases the status quo may be a disequilibrium state, and individuals may anticipate shifting back to their standard reference condition, but we have never seen a SP researcher make this case for the use of a hypothetical baseline as the normal reference point. If the usual reference point is the current status quo condition, and losses measured relative to a reference point are especially painful, SP researchers should be cautious about moving respondents away from their status quo baseline because the resulting utility measures will not reflect the special value associated with the stability and comfort of normalcy. When CE researchers do not use a hypothetical baseline and allow respondents to default to their real status quo conditions, they often discover a positive utility

associated with the constant in their choice models, indicating something special about the status quo that is not captured in their listed attributes (e.g. Scarpa et al, 2005; Boxall et al, 2009)[4].

This tendency to choose the default condition is at the core of many of the policy recommendations of behavioral economists. Thaler and Sunstein (2008) have argued that in numerous instances a policy maker can design a set of choices for members of the public so that the choice of the default option enhances individuals' welfare, effectively taking advantage of people's inclination to gravitate toward this default option. For some policy problems, people will be asked to choose one option or another. A policy maker, influenced by behavioral economics, wants to enhance the chances that people will end up with the option that ex post they wish they had. The typical policy set-up is thus similar to a CE choice task in which the status quo option has been removed. The policy maker attempts to characterize one of the available choices as the default option, perhaps by making it the option assigned to the individual if nothing is done.

The issue of a hypothetical baseline for SP researchers is different. In the typical economic valuation study there is no presumption that the SP researcher knows ex ante (i.e., before the study) which policy option or alternative is best for a respondent. The analyst wants to assess individuals' preferences, and often to predict their behavior, as objectively as possible. An individual's preferences and behavior will depend on her current baseline conditions, and she may be under no legal, social, or moral obligation to change this status quo. A SP researcher who assigns a respondent a hypothetical baseline may lose important information about a respondent's unwillingness (loss in utility) to move from his existing status quo conditions to the hypothetical baseline state of the world.

6. 2. Hypothetical baselines may be more cognitively challenging

[4] Other research has illustrated the importance of including an actual baseline in modeling behavior. Barton and Berglund, for example, show that including actual information on the status quo significantly improves the performance of a stated preference statistical model, relative to simply using a generic status quo parameter in the model. Hess and Rose, in a transportation application, show that parameters associated with "real" reference alternatives are different than parameters associated with hypothetical designed alternatives. These results provide additional evidence suggesting that the inclusion of information about the actual baseline is important in understanding preferences and tradeoffs.

The use of a hypothetical baseline coupled with a hypothetical management plan and/or a hypothetical good or service is probably cognitively more challenging for a respondent than confronting a single hypothetical state of the world. To the best of our knowledge SP researchers have not yet investigated how this increased cognitive burden affects the welfare measures associated with the hypothetical management plan, but there are reasons for pessimism. SP researchers know that many respondents tire easily and do not enjoy thinking about complex tasks; they thus try to minimize both the number of choice tasks presented to respondents and the complexity of each. Pictures, videos, and other visual aids are often used to make it easy for respondents' intuitive minds to understand a hypothetical management plan and its consequences. There is no *a priori* reason why one should not be just as careful explaining a hypothetical baseline condition as a hypothetical management plan. In our experience SP researchers almost never pay as much attention to hypothetical baselines as to hypothetical management plans and/or goods or services. Typically the information describing a hypothetical baseline is presented in a single sentence or phrase, whereas a few paragraphs (or more) may be devoted to the description of the hypothetical management plan and good or service. This can often result in an ambiguous or vague hypothetical baseline. The risk here is that respondents may interpret or imagine the hypothetical baseline state of the world differently than the SP researcher intended, thus introducing additional bias or noise into the valuation estimates. For example, if a respondent is asked to consider a hypothetical baseline of health risks (likelihood of dying from an illness this year) but they know that their own risk is different from this, they may decide to respond using their own perception of the baseline, a blend of their perception and the provided hypothetical baseline, or the provided baseline. The researcher will not know which baseline is being used.

6.3. A More Formal Analysis of Reference Dependence, Status Quo Bias and Hypothetical Baselines

A recurring finding in the behavioral and experimental economics literature is reference dependence. One interpretation of reference dependence is that the individuals use the status quo or baseline as a utility reference point, and they judge losses and gains relative to this point. Status quo bias is a related effect discussed in the literature (Samuelson and Zeckhauser, 1988; Thaler and Sunstein 2008). Status quo bias is a case of an individual assigning greater utility to the status quo situation (or default condition) than can be explained by attributes of the options or goods. Many studies using choice experiments report the presence of status quo bias (Adamowicz et al 1998, Meyerhoff and Liebe 2009, Scarpa et al 2005, 2007, Boxall et al 2009). What are the implications of using a hypothetical baseline in cases where status quo bias or reference dependence is expected to be present? A slightly more formal analysis of reference dependence and status quo bias sheds light on this question.

One formulation of reference dependence is the following (based on DellaVigna 2009, see also Koszegi and Rabin 2006). Utility (V) is a function of the good x, as well as the deviation of x from the reference point r. Utility can be expressed as:

$$V(x \mid r) = \begin{cases} V(x) - V(r) & \text{if } x \geq r \text{ and} \\ k\,[V(x) - V(r)] & \text{if } x < r \end{cases}$$

where k>1 is the loss aversion parameter. This formulation clearly illustrates that losses are treated differently than gains and that the location of the reference point will significantly affect utility calculations and decisions. DellaVigna (2009) reports that values of k are commonly around 2.25.

There is considerable discussion about the formation of r – the reference point. Most often the reference point is assumed to be the status quo or baseline. However, Koszegi and Rabin (2006) have argued that the reference point may be better thought of as an expectation of outcomes, which may or may not be the status quo. This means that status quo bias may in fact be

somewhat different than reference dependence. We will investigate the implications of these two issues shortly.

For now let us assume that the reference point (r) is the status quo or baseline. Consider the case of a stated preference researcher who presents a hypothetical baseline or status quo. Let the hypothetical baseline reference point be labeled r_h and the "real" reference point be r_r. The utility calculation should be based on $V(x \mid r_r)$, however, the respondent may be convinced that the baseline is r_h resulting in decisions based on $V(x \mid r_h)$, which may be very different than the "real" utility structure. Alternately, the respondent may engage in some form of updating or averaging in which their knowledge of the situation suggests $V(x \mid r_r)$ but because of the baseline information presented they modify this to reflect new information as $V(x \mid g(r_r , r_h))$, where g() represents an updating function. The latter formulation more closely resembles Koszegi and Rabin's concept of reference points reflecting expectations, but now the information on the hypothetical baseline has been assumed to influence the formation of the reference point, and the stated preference researcher does not know what the respondent's perceived status quo is.

It is apparent that if utility is reference dependent, and the description of the baseline deviates from the real baseline, utility and values will be affected. Evaluations that involve losses relative to the baseline will be most likely to be severely affected.

Focusing on status quo bias, independent of reference point arguments, also has implications for the use of hypothetical baseline when such "biases" exist. *Status quo* bias can be represented as a positive amount of utility in the indirect utility for the status quo option. The status quo or baseline utility is V_0 in the equation below, while the alternative or program is V_1. Utility is a function of income (y) and quality (q). The parameter α_0 represents the preference for the baseline independent income and quality.

$$V_0 = \alpha_0 + \beta\, f(y) + \delta q_0 + \varepsilon_0$$
$$V_1 = \quad \beta\, f(y - c_1) + \delta q_1 + \varepsilon_1$$

In empirical work it is often discovered that $\alpha_0 > 0$, indicating status quo bias. However, questions remain regarding the source of this preference for the status quo (Scarpa et al 2005). Some studies have suggested that $\alpha_0 > 0$ arises from complexity of the choice context and thus a kind of processing cost that leads to avoidance of a decision (Boxall et al 2009). This may explain some of the findings of the popularity of default options (Thaler and Sunstein, 2008). It is also possible that in stated preference surveys $\alpha_0 > 0$ because of payment vehicle rejection, protests of some form, or scenario rejection. These outcomes may arise from the increase complexity associated with hypothetical baselines, as described in section 6.2.

However, if the reason that $\alpha_0 > 0$ is due to a pure preference for the status quo, then providing a hypothetical baseline may generate an α_0 that is different than the "real" α_0 that would arise from a real baseline. Alternately, not providing a baseline at all and simply asking individuals to choose between two non-baseline options (as in Breffle and Rowe 2002) will generate information on parameters β and δ, but will not provide α_0. In this case one will be able to measure the marginal utilities or marginal rates of substitution, but one cannot accurately measure the percent of respondents who would choose an option (e.g. % Yes votes in a referendum context) or the non-marginal willingness to pay for a change.

6.4. Hypothetical baselines and policy relevance

The introduction of hypothetical baseline conditions may make the results of the valuation study less policy relevant. Policy makers will usually want to know how people will behave if confronted with a policy intervention. Their behavior will depend on their actual baseline status quo conditions, not the state of the world described in the hypothetical baseline. SP researchers may argue that they can utilize econometric models to predict how sample respondents would behave under actual baseline conditions even though they were presented with a hypothetical baseline. The behavioral economics literature reviewed above, and recent research in experimental economics, suggests that prediction of this type will be difficult. Alpizar et al

(2008) provide an example that illustrates this point. They show that if the contexts between stated and revealed preference valuations differ, then comparison between the two methods may not be valid. In our case the hypothetical baseline could constitute a different context relative to the real situation.

Cognitive difficulties with hypothetical baselines may also introduce additional measurement errors into individuals' response to choice tasks. The econometric models estimated with respondents' choices conditioned on a hypothetical baseline will fail to adequately capture the heterogeneity across individuals. Importantly, to the best of our knowledge SP researchers have never compared (a) forecasts of behavior at status quo conditions based on a structural model estimated from responses using hypothetical baselines, to (b) respondents' stated behavioral intentions from their actual status quo conditions[5]. The use of a hypothetical baseline will make it difficult to provide measures of the proportion of respondents who would choose the actual baseline, relative to the proposed programs – often an important piece of information for policy analysis.

6. 5. Ethical implication of hypothetical baselines

The ethical issues involved in telling respondents to imagine a counterfactual, hypothetical baseline have not been adequately examined. For example, if a SP researcher tells respondents to suppose that their risk of infection is higher than it actually is, in the absence of better information, respondents may anchor their behavior on this hypothetical baseline risk, and take actions that may adversely affect their well-being. Hypothetical baselines are an easy conduit for spreading misinformation (Whittington, 2004).

7. Recommendations on use of hypothetical baselines

[5] Breffle and Rowe (2002) is, to a certain degree, are an exception to this statement. They compare models with explicit baseline (status quo) options to "forced choice" scenarios.

In this section of the paper we offer guidance to SP practitioners who are considering the use of a hypothetical baseline in their survey instrument. Our guidance is in the form of a checklist of issues for SP researchers to consider.

7.1. "Eyes wide open"

Albert Hirschman (1970)'s admonition to policy analysts to keep their "eyes wide open" is sound advice for SP researchers using hypothetical baselines. Too often SP researchers confront respondents with a double hypothetical, i.e., a hypothetical baseline and a hypothetical management plan, without carefully thinking through the risks involved or the reasons for doing it. We do not argue that hypothetical baselines should never be used, but in our opinion they are not an option of first choice because they will typically be cognitively more difficult for respondents and may not provide policy relevant predictions of behavior.

7.2. Detailed descriptions of the hypothetical baseline and debriefing questions

If a SP researcher decides that a hypothetical baseline is required, its description should typically be comparable in detail to the description provided in the scenario about the hypothetical management plan. Also, we want to see debriefing and open-ended questions in the survey instrument specifically focused on the hypothetical baseline state-of-the world to provide more confidence that the respondent has heard the story in the scenario about the hypothetical baseline and has interpreted it in the manner that the SP researcher intended. For example, if respondents were told to imagine that they had to move to another country, we would want some assurance that the respondent took this instruction seriously. It would be useful to know if the respondent had ever lived in a foreign country for an extended period or seriously considered moving to a foreign country. If respondents were told to assume that their health status was different than it is today, or that they had a specific health condition, debriefing questions should be used to determine whether the respondent had ever considered such a possibility, known

anyone with this hypothetical baseline health condition, or generally accepted the possibility that such a hypothetical baseline could happen. Respondents should also be probed on their views of baseline probabilities or risks presented to them to assess whether they feel that these correspond to their actual or perceived baseline conditions.

7.3. Assessment of forecasts of behavior based on choices conditioned on hypothetical baselines

For most policy discussions, SP researchers need to be able to describe what respondents would do in response to a policy change in light of their actual status quo conditions – not in response to a hypothetical baseline state-of-the world. When respondents are presented with a hypothetical baseline and then given choice tasks (asked valuation questions), their responses can be used to estimate behavioral models. The parameters from such models can then be used to generate welfare-theoretic estimates of the hypothetical management plan, and to forecast respondents' behavior under actual status quo conditions. SP researchers should compare such model forecasts with what respondents say they would do under actual status quo conditions (i.e., a split-sample of respondents is asked about the hypothetical management plan without the hypothetical baseline).

7.4. Ethical implications of hypothetical baselines

SP researchers employing hypothetical baselines should provide an explicit discussion of the ethical implications of presenting a hypothetical baseline state-of-the-world to respondents. The researchers should provide respondents with a debriefing at the end of the interview that explains the reasons why the hypothetical baseline was used. We are not suggesting that such a discussion is a substitute for Institutional Review Board (IRB) approval of the survey instrument and research project. Yet because so little attention has been paid to hypothetical baselines in the SP literature, it would be good practice for researchers to ensure their readers that respondents

have not be mislead or harmed in some way by being told about either the hypothetical baseline or the hypothetical management plan and/or good or service.

8. Conclusions

We have outlined a phenomenon that appears to be relatively common and increasing in the stated preference literature – the use of hypothetical baselines. We have also described what we believe are the reasons that hypothetical baselines are used and some of the potential pitfalls associated with the use of hypothetical baselines for stated preference research. To the best of our knowledge, this issue has not been formally recognized in the SP literature. Our interest in this area has been heighted by the linkages between findings in behavioral economics and stated preference research. Behavioral economists have illustrated the importance of default conditions and the phenomena of status quo bias and reference dependence, and are vigorously investigating underlying reasons for these conditions. We suggest that stated preference researchers consider parallel work on the implications of these features of choice behavior on SP designs, particularly the design of the baseline.

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References

Adamowicz, Wiktor, Peter Boxall, Michael Williams, and Jordan Louviere. (1998). "Stated Preference Approaches to Measuring Passive Use Values: Choice Experiments versus Contingent Valuation". *American Journal of Agricultural Economics* 80 (1): 64–75.

Alpizar, F. F. Carlsson and O. Johansson-Stenman. (2008). "Does context matter more for hypothetical than actual contributions? Evidence from a natural field experiment. *Experimental Economics.* 11: 299-314.

Barton, D. N. and O. Berglund. 2010. Valuing irrigation water using a choice experiment: an 'individual status quo' modelling of farm specific water scarcity. *Environment and Development Economics.* 15:321-340.

Beggs, Alan, and Kathryn Graddy. (2009). "Anchoring Effects: Evidence from Art Auctions." *American Economic Review*. 99:3, 1027-1039.

Boxall, P., W. Adamowicz and A. Moon. (2009). Complexity in choice experiments: choice of the status quo alternative and implications for welfare measurement. *Land Economics*53(4): 503-519.

Bishop, Richard C., Thomas A. Heberlein, Daniel W. McCollum, and Michael P. Welsh.(1988). *A Validation Experiment for Valuation Techniques,* Madison, WI: University of Wisconsin-Madison, College of Agricultural and Life Sciences, Center for Resource Policy Studies.

Breffle, W.S. and R.D. Rowe. (2002). "Comparing Choice Question Formats for Evaluating Natural Resource Tradeoffs." *Land Economics* 78(2):298-314.

Carson. R., R. Mitchell, M. Hanemann, R. Kopp, S. Presser and P. Ruud. (2003). Contingent valuation and lost passive use: Damages from the Exxon Valdez oil spill, *Environmental and Resource Economics* 25: pp. 257–286.

DellaVigna, Stefano, (2009) "Psychology and Economics: Evidence from the Field", *Journal of Economic Literature*. 47(2): 315–72.

Hess, S. and J.M. Rose. 2009. Should reference alternatives in pivot design SC surveys be treated differently? *Environmental and Resource Economics*. 42:297-317.

Hirschmann, Albert O. (1970). *Exit, Voice, and Loyalty*. Harvard University Press. 162 pages.

Huber, J. W. Kip Viscusi and J. Bell (2008), "Reference Dependence in Iterative Choices," *Organizational Behavior and Human Decision Processes*, 106.2 (July), 143-152.

Kahnemann, Daniel, and Amos Tversky. (1979). „Prospect Theory: An Analysis of Decision under Risk. *Econometrica*. 47, 2: 263-292.

Knetsch, Jack, and Wei-Kang Wong. (2009). "The endowment effect and the reference state: Evidence and manipulations." *Journal of Economic Behavior & Organization*. 71, 407-413.

Koszegi, Botond, and Matthew Rabin. (2006). "Reference-Dependent Consumption Paths." *American Economic Review*. 99:3, 909-936.

Meyerhoff, J. and U. Liebe. 2009. "Status quo effect in choice experiments: empirical evidence on attitudes and choice task complexity. *Land Economics. 85(3): 515-528.*

Samuelson, William, and Richard Zeckhauser. (1988). "Status quo Bias in Decision Making." *Journal of Risk and Uncertainty*. 1: 7-59.

Scarpa, Riccardo, Silvia Ferrini, and Kenneth Willis. (2005). "Performance of Error Component Models for Status-Quo Effects in Choice Experiments." In *Applications of Simulation Methods in Environmental and Resource Economics* , ed. Riccardo Scarpa and Anna Alberini. Dordrecht: Springer.

Scarpa, Riccardo, Kenneth Willis, and Melinda Acutt. (2007). "Valuing Externalities from Water Supply: Status Quo, Choice Complexity and Individual Random Effects in Panel Kernel Logit Analysis of Choice Experiments". *Journal of Environmental Planning and Management* 50 (4): 449–66.

Thaler, Richard H., and Cass R. Sunstein. (2008). *Nudge – Improving Decisions about Health, Wealth, and Happiness*. New Haven: Yale University Press. 293 pages.

Viscusi, Kip W., Joel Huber and Jason Bell (2008), "The Economic Value of Water Quality," *Environmental and Resource Economics*, 41, No. 2 (October), 169-187.

Whittington, Dale. (2004). "Ethical Issues with Contingent Valuation Surveys in Developing Countries: A Note on Informed Consent and other Concerns." *Environmental and Resources Economics*. 28: 4, 507-515.

Table 1 – A Typology of Stated Preference Studies

	Respondent's baseline is real	Respondent's baseline is hypothetical
Proposed Management plan in CV/CE scenario, and good or service, are real	Case A	Case C
Management plan and/or good or service are hypothetical	Case B	Case D

Figure 1a - Jai Singh of Mewar being weighed in gold (Udaipur, about 1820)

Figure 1b – Ganga Singh of Bikaner being weighed in gold.(Bikaner, 1937)

Source: Maharaja: The Splendor of India's Royal Courts. Exhibition, Victoria & Albert Museum. October 10, 2009- January 17, 2010. London, UK.