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Warm Glow, Good Feelings, and Contingent Valuation

Richard C. Bishop

In the contingent valuation (CV) literature, confusion exists about warm glow and embedding effects. I show that i) some writers follow Andreoni's (1989) definition of warm glow, but others think that subjects answering CV questions load up, free of charge, on "good feelings" from supporting the environment; ii) Andreoni's warm glow would lead to embedding effects only in extreme circumstances; iii) Andreoni's warm glow should be counted in valuation studies; and iv) there is scant evidence for good feelings being the source of embedding effects. In fact, embedding effects may not be limited to CV studies.

Key words: consequentiality, embedding, nonmarket valuation, scope test

Introduction

While warm glow has not played a major role in the literature on contingent valuation (CV) over the last decade,[1] it continues to be a topic of some interest in the evolving literature (Clark and Friesen, 2008; Nunes, Blaeij, and Bergh, 2009; Nielsen and Kjær, 2011; Hausman, 2012; Kling, Phaneuf, and Zhao, 2012; Kotchen, 2015; Desvousges, Mathews, and Train, 2015).

This reconsideration of warm glow and CV is motivated by some unfinished business in the literature. As I will show below, confusion even exists about how to define the term. Disagreements also persist about whether values motivated by warm glow should be included in economic values. And some have argued that, because warm glow leads to embedding effects,[2] the CV method itself is invalid, while others do not see it that way.

Andreoni (1989) originally developed the concept of warm glow to explore motives for charitable giving.[3] Accepted theory at the time predicted that government expenditures on public

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[1] For example, in their recent update of the NOAA Panel's guidelines, Johnston et al. (2017) do not mention it, nor do several other recent papers (e.g., Haab et al., 2013, 2016; Desvousges, Mathews, and Train, 2016; Carson, Groves, and List, 2014).

[2] One type of embedding effect occurs when a bundle of goods or amenities takes on different values depending on whether they are valued alone or as parts of larger bundles. For example, suppose A and B are two sets of amenities and that the amenities in A are a proper subset of the amenities in B; A is said to be embedded in B. Assume that two CV exercises are conducted. Let V'_A be the estimated value of A if the CV exercise values A directly. Let V''_A be the value if it is estimated in a two-step process where respondents are first asked to value B and then asked to value A. An embedding effect has occurred if $V'_A > V''_A$. Later in the paper, I will term this type of embedding effect an "embedded value inconsistency." I also include scope test failures as a second type of embedding effect. When two bundles of goods or amenities are valued for a scope test, the smaller bundle is always embedded in the larger bundle. In the example, let V_B equal the estimated value of B. A scope test would test the hypothesis that $V_B \geq V'_A$, where equality holds if A is sufficient to achieve satiation. If this hypothesis is not supported by the data, this too is an embedding effect.

[3] I begin with Andreoni (1989) because of his many insights and his article's influence on the CV literature. Of course, others came before, including Olson (1965), with whom the concept of impure altruism apparently originated, and Becker (1974), who was the first to use the term "warm glow effect."

goods would completely crowd out private contributions, a prediction that did not fit the data.[4] In Andreoni's framework, warm glow reflects the utility, if any, that a consumer gains from *personally* donating toward a public good. The definition of warm glow is treated more formally later in the paper.

The first section of the paper reviews the literature. We shall see how several studies argue that warm glow leads to embedding effects in CV studies and that embedding effects invalidate the CV method. The second section expands on the literature by documenting two possible definitions of warm glow, including Andreoni's utility-theoretic definition. However, several writers, while they usually cite Andreoni for support, actually imply that they have something different in mind. According to the "good feelings hypothesis," as I term it here, people answering CV questions take advantage of the opportunity to gain positive feelings from supporting the environment and other worthwhile causes, all at no cost since the payments referred to in CV questions are hypothetical.

The third section explores the implications of Andreoni's warm glow for CV. Using welfare theory, I show that, contrary to what many writers (including the NOAA Panel) have advocated, CV studies should strive to include warm glow, where present, in value estimates. At the same time, I show how warm glow has important implications for the choice of payment vehicles used in CV studies. I also question whether Andreoni's warm glow would lead to embedding effects except under extreme conditions.

Once Andreoni's warm glow has been explored, I turn to the good feelings hypothesis. The good feelings hypothesis has no economic theoretical foundation. Empirical evidence from CV studies shows that embedding effects can occur for private goods where good feelings are implausible. Furthermore, experimental studies involving private goods and real transactions, discussed below, show that embedding effects can occur even where CV is not involved. I will also forge a link between the good feelings hypothesis and the literature on hypothetical bias and consequentiality. The final section summarizes the major findings of the paper.

Literature Review

Kahneman and Knetsch (1992) (hereafter, KK) were the first to link warm glow and CV. Since KK is 25 years old, it may be helpful to summarize and reinterpret it in modern terms. One of KK's CV studies illustrates well the main thrust of their paper. It involved a telephone survey of residents of the greater Vancouver, BC, region. Approximately one-third of respondents (Group 1) were asked to place a value on a large basket of environmental services, including "preserving wilderness areas, protecting wildlife, providing parks, preparing for disasters, controlling air pollution, insuring water quality, and routine treatment and disposal of industrial wastes" (KK, p. 60). This is a long list, so let us refer to it as the ELL (for environmental laundry list). Group 1 was then asked to allocate a share of their values for the ELL to a subset of services involving preparedness for natural disasters. In a third step, members of Group 1 were asked to allocate a part of their values for natural disaster preparedness toward emergency rescue equipment and personnel. A second subsample (Group 2) followed only the last two steps, first valuing disaster preparedness and then allocating a share to rescue personnel and equipment. Group 3 valued only added rescue personnel and equipment. Notice how embedding worked here. Rescue equipment and personnel were embedded in disaster preparedness, which was, in turn, embedded in the ELL.

Table 1 presents the mean values for the three subsamples. Consider first the table's main diagonal ($136, $152, $123). Group 1's average value for the ELL was close to Group 2's average value for disaster preparedness and Group 3's average value for rescue equipment and personnel. Statistical testing showed that the median values were not statistically different.[5] Using today's term, KK's study failed three between-sample scope tests.

[4] Andreoni (1993, 2006) cites the relevant literature to date.

[5] Medians rather than means were compared to avoid problems of outliers.

Table 1. Mean Values for Three Environmental Goods

	Subsample		
Public Good	**Group 1**	**Group 2**	**Group 3**
Environmental services	$136		
Improved disaster preparedness	$29	$152	
Improved personnel and equipment for rescue	$14	$75	$123

Source: Kahneman and Knetsch (1992, p. 61).

Next, notice that Group 1's mean value for added rescue equipment and personnel was only $14 when they were embedded in the ELL, yet Group 3's mean value was $123 when rescue personnel and equipment were not embedded at all. I will refer to such results as "embedded value inconsistencies." KK found this result particularly problematic for the CV method:

> The assessed value of a public good is demonstrably arbitrary, because willingness to pay for the same good can vary over a wide range depending on whether the good is assessed on its own or embedded as part of a more inclusive package. (p. 58)

This is an example of what I will refer to as "embedding effects," which I define to include both scope test failures and embedded value inconsistencies. Scope test failures are embedding effects because the smaller bundle in scope tests is always embedded in the larger bundle.

By way of explaining the source of embedding effects, KK (p. 64) offered "the general hypothesis that responses to the CVM question express a willingness to acquire a sense of moral satisfaction (also known as a 'warm glow of giving' . . .) by a voluntary contribution to the provision of a public good." They cite Andreoni for support. These findings led KK to conclude that CV is fatally flawed (KK, p. 57).

Despite challenges to KK from Smith (1992) and Harrison (1992), a group of economists—referred to here as "the CV critics"—adopted KK's views on embedding effects and warm glow and often cited KK as a prominent source. The CV critics are well represented in the edited volume by Hausman (1993), which was the culmination of work done on behalf of Exxon Corporation in the aftermath of the *Exxon Valdez* oil spill. Within that volume, critiques of CV based partially on warm glow include papers by Diamond and Hausman (1993); Diamond et al. (1993); Schkade and Payne (1993); Shavell (1993); Daum (1993); and Plott (1993); later papers from this group include Diamond and Hausman (1994); Diamond (1996a,b); Schkade and Payne (1994); and Hausman (2012).[6] The CV critics declared the CV method to be invalid in no uncertain terms, as illustrated by Hausman's (2012) title "Contingent Valuation: From Dubious to Hopeless."

The NOAA Panel on Contingent Valuation (Arrow et al., 1993) gave considerable weight to KK and the CV critics in its report. As Arrow et al. summarized it, the critics had concluded that "individuals' responses to CV questions serve the same function as charitable contributions – not only to support the organization in question, but also to feel the 'warm glow' that attends donating to worthy causes (see Andreoni, 1989)." It then went on to state, "If this is so, CV responses should not be taken as reliable estimates of true willingness to pay, but rather as indicative of approval for the environmental program in question" (Arrow et al., 1993, p. 2605). The NOAA Panel (Arrow et al., 1993, p. 4607) viewed embedding, which was directly linked to warm glow in their thinking, as "perhaps the most important internal argument against the reliability of the CV approach. . . [and] potentially a very damaging criticism of the method.'

However, and this is an important point, the NOAA Panel report stopped short of adopting the conclusion of the CV critics regarding the lack of validity of the CV method. Instead, one of the panel's guidelines for survey design stated, "The survey should be designed to deflect the general

[6] The reader familiar with this literature may have noted the absence of the famous bird study (Desvousges et al., 1992; Boyle et al., 1994) from the studies cited so far. Interestingly, there is no mention of warm glow in these papers. However, the CV critics do cite the bird study as further evidence of the problems they associate with warm glow.

'warm-glow' of giving" (Arrow et al., 1993, p. 4609). To deflect warm glow, they recommended that respondents be provided with rich information, including information about substitutes. They also prescribed the use of scope tests—presumably at least partly because of their concerns about embedding effects from warm glow. But they limited themselves to validity testing of individual studies and did not find the CV critics' broader conclusions about the lack of validity of the CV method to be convincing.[7] If their guidelines are followed, then

> CV studies provide useful information. We think it is fair to describe such information as reliable by the standards that seem to be implicit in similar contexts, like market analysis for a new and innovative product and the assessment of other damages normally allowed in court proceedings. (Arrow et al., 1993, p. 4610)

Some later authors aligned themselves with the NOAA Panel by considering warm glow to be a threat to the validity of CV studies (Krupnick and Adamowicz, 2007; Stewart et al., 2002).[8] Others have argued that values associated with warm glow should not be "deflected" but should be counted in valuation studies (Champ et al., 1997; Chilton and Hutchinson, 1999, 2000; Nunes and Schokkaert, 2003; Nunes and Onofri, 2004; Nunes, Blaeij, and Bergh, 2009). Champ et al. (1997) appears to have been the first to address warm glow in a welfare economics context, a direction I will elaborate on in a later section.

Hackl and Pruckner (2005) questioned whether CV results are much affected by warm glow. Interestingly, Kotchen's (2015) reconsideration of donation mechanisms in CV studies dealt with warm glow in some detail and never raised the possibility that the presence of warm glow might invalidate the values he estimated.

Finally, there is one issue that has not been taken up in the literature. A clear theoretical case for linking warm glow, as Andreoni defined it, to paying taxes has not been made (Carson, Flores, and Meade, 2001). The lack of formal attention to warm glow and taxation is unfortunate given that many studies frame their CV questions as referenda on taxes and the provision of public goods. Taxation and warm glow will be considered more fully below.

Defining Warm Glow and the Good Feelings Hypothesis

A slightly simplified version of Andreoni's (1989) model can be set up to formally define warm glow. Let the utility of consumer i (with the standard properties) be written as[9]

$$U_i = U_i(Q_i, G), \tag{1}$$

where Q_i is consumption of conventional goods and services and G is total donations by all consumers.

Following Andreoni, optimization involves maximization of U_i, subject to

$$Y = PQ_i + g_i, \tag{2}$$

$$G = g_i + G_{-1}, \tag{3}$$

[7] The distinction between validity of studies and the validity of methods is important and often neglected. See Bishop and Boyle (2017, 2018).

[8] While it does involve some of the CV critics, I have not included recent literature dealing with adding-up tests to address whether scope differences are "adequate" (Diamond, 1996b; Desvousges, Mathews, and Train, 2012, 2016; Hausman, 2012; Elbakidze and Nayga, 2015; Haab et al., 2013, 2016; Whitehead, 2016). Warm glow has not played a role in this branch of the literature.

[9] This utility function, which I borrow with simplifications from Andreoni, is written to rule out nonpaternalistic altruism (Flores, 2002; Jacobsson, Johannesson, and Borgquist, 2007). That is to say, only the good or amenity in question enters directly into the utility function, not the utility of others. Whether nonpaternalistic altruism could be present for environmental amenities remains an open question, although it seems implausible. People who are willing to pay for environmental improvements for altruistic reasons seem to be focusing on the environmental resources, not the overall welfare of their fellows.

where Y is income, P represents the price vector for conventional goods, g_i is the donation toward the public good from consumer i, and G_{-1} is total donations from all consumers other than i, which are exogenous.

In keeping with the environmental theme of this paper, G might be total donations toward grizzly bear protection. I assume that there is a monotonic positive relationship between donations and grizzly bear protection, which is known to the consumers. Total donations can then serve as an index for total grizzly protection. The solution to this problem leads to optimal consumption and an optimal donation, (Q_i^*, g_i^*). This implies an indirect utility function of the form

$$U_i = V_i(P, Y, G|g_i), \tag{4}$$

where wellbeing is determined by prices, income, and total donations (G) by consumer i and all others, and conditional on the donation of consumer i.

To define warm glow, assume that, in the status quo, there is no opportunity for consumer i to donate toward grizzly protection, although the opportunity to donate is available to others, so that G_{-1} is still realized. Compare this to the case where the consumer does have the opportunity to donate. What is the gain in welfare for this consumer from this opportunity? Throughout this part of the paper, I will assume that the income effect is 0. Allowing an income effect would complicate the notation without adding insights. The compensating surplus associated with this opportunity to donate, C^*, is given by

$$V_i(P, Y - C^*, G^*|g_i^*) = V_i(P, Y, G_{-1}|0), \tag{5}$$

where $G^* = G_{-1} + g_i^*$ and the right side evaluates maximum utility conditional on forcing consumer i's donation to 0. C^* represents the consumer's total WTP for the opportunity to donate toward grizzly protection when donations from others equal G_{-1}.[10]

This formulation illustrates how the consumer's utility from the donation may be enhanced from two sources. First, she may gain utility from the increase in the supply of the public good resulting from her donation, which increases the total supply of grizzly preservation to $G^* = g_i^* + G_{-1}$. To calculate this part of her welfare gain, assume that consumer i is barred from donating, but consumer j, who previously had not donated, steps forward to increase total donations by an equal amount. Grizzly protection reaches $G^* = G_{-1} + g_j$, despite the fact that $g_i = 0$. Consumer i's welfare gain can be defined as $\dot{C}$ from

$$V_i(P, Y - \dot{C}, G^*|0) = V_i(P, Y, G_{-1}|0). \tag{6}$$

If $\dot{C} > 0$, then consumer i gets utility from the increase in grizzly protection even if she does not personally donate toward its supply.

Second, utility may be enhanced by the act of personally donating. Assume, again as a thought experiment, that when consumer i contributes g_i^*, consumer k, who had planned to donate, does not contribute an equivalent amount so that total supply of grizzly protection remains at G_{-1}, even after consumer i donates. Define as $\ddot{C}$ from

$$V_i(P, Y - \ddot{C}, G_{-1}|g_i^*) = V_i(P, Y, G_{-1}|0). \tag{7}$$

If $\ddot{C} > 0$, consumer i would get utility from donating even if doing so would not increase total amount of grizzly protection. $\ddot{C}$ is motivated entirely by warm glow. Continuing to link this formulation to the definitions provided by Andreoni (1989), if $\dot{C} > 0$ and $\ddot{C} = 0$, then "pure altruism" holds. If $\dot{C} = 0$ and $\ddot{C} > 0$, then "pure egoism" holds, and if both are positive, then the donation is motivated by "impure altruism." Under pure egoism and impure altruism, the utility gained from donating includes the value of warm glow.

[10] Note that this is not consumer i's compensating surplus for the entire grizzly protection program. It is her maximum willingness to donate conditional on G_{-1}. See Champ et al. (1997).

However, though they cite Andreoni (1989) when they speak of warm glow, some writers do not seem to mean Andreoni's concept. Perhaps this possibility comes out most clearly in a quotation from Diamond and Hausman (1993, p. 27): "For hypothetical contributions, one can achieve a 'warm glow' from an unlimited number of large answers." In other words, Diamond and Hausman hypothesize that people answer CV questions by loading up on good feelings from expressing general support for the environment or some other public good, all at no cost, since they do not really have to pay. While less explicit in other writings, many other statements could be interpreted this way. For example, in another paper, Diamond and Hausman (1994, p. 57) refer to warm glow from expressing "support for protecting the environment." Plott (1993, p. 472) refers to "satisfaction from expressing their views and from being 'good people."' Krupnick and Adamowicz (2007, p. 49) write of the desire to appear "public spirited." The NOAA Panel refers to doing "something praiseworthy" (Arrow et al., 1993, p. 4607). This interpretation is referred to here as the "good feelings hypothesis" to distinguish it from "warm glow" as Andreoni used the term.

As we have seen, the CV critics and the NOAA Panel have said that values motivated by warm glow should not be counted as economic values and that warm glow leads to embedding effects. In the next section, I will argue that, when Andreoni's definition of warm glow holds, neither argument stands up to theoretical scrutiny.

Warm Glow, Welfare Economics, and Contingent Valuation

Warm Glow and Donation Vehicles

In a CV exercise using a donation vehicle, the goal should be to estimate C^*, as defined in equation (5) above. This is true even if C^* is motivated partly or entirely from warm glow.

This formulation is of limited applicability, however. Modern CV studies do not use donation vehicles very often because of the possibility of free riding. Taxes are favored as a payment vehicle in most studies today.

Warm Glow and Referenda

Taxes played a prominent role in Andreoni (1989), but always in the context of whether public good provision through taxes crowds out private giving. He did not deal with referenda or voting. Nevertheless, a consumer could get utility—positive or negative—from personally paying taxes toward provision of a public good, in addition to any utility gained from the public good itself if the referendum passed. I will continue to refer to this as warm glow, with the caveat that this part of the discussion goes beyond Andreoni's use of the term.

Abstracting from CV for a moment, suppose that an actual referendum is to be conducted on whether to support grizzly protection through taxation. Let T equal the total new taxes to be collected if the referendum passes. I continue to assume that the amount paid, in this case T, can serve as an index for the amount of grizzly protection. Let t_i equal the tax that would be levied against consumer i if the referendum passed. Assume the total taxes to be paid by others are known to the consumer and equal T_{-1}. Then, letting T represent total grizzly protection,

$$T = t_i + T_{-1}. \tag{8}$$

Consumer i will be motivated to vote yes in the referendum if

$$V_i(P, Y - t_i, T_{-1}, t_i) > V_i(P, Y, 0, 0) \tag{9}$$

and vote against the referendum otherwise.[11] If the referendum fails, utility will be limited to $V_i(P, Y, 0, 0)$. If the referendum passes, compensating surplus will be generated equal to C_i^T, defined

[11] Here, indirect utility is not conditional because the tax to be paid by the consumer is an exogenously determined parameter rather than an endogenous variable determined via the consumer's optimization problem as it was in the donation part of the discussion.

implicitly by

$$V_i(P, Y - t_i - C_i^T, T_{-1}, t_i) \quad = \quad V_i(P, Y, 0, 0). \tag{10}$$

The same principles would apply in a CV study using a referendum question. Consumer becomes respondent i, and let τ_i represent the randomly determined tax amount in the CV question that she is asked to answer.[12] The respondent is assumed to treat the tax as a real possibility.[13] Substituting τ_i for t_i in equation (9) predicts the respondent's vote. The expected value of compensating surplus, symbolized as $\bar{C}^T$, would then be estimated using random utility theory in the usual way. The estimated value could be influenced by warm glow.

Would the warm glow from personally paying taxes be positive or negative? The one study I know of is the experiment by Eckel, Grossman, and Johnston (2005). They failed to find evidence of warm glow (positive or negative) from paying taxes. Still, one suspects that, given people's aversion to paying taxes, the effect could be negative. That is, people might gain less utility from a public good if they have to pay a tax to get it than if the cost were assessed through some potentially more neutral vehicle, such as an equivalent change in the price vector. This is a topic that deserves additional empirical research.

Warm glow would not invalidate the results of such a CV study. To the contrary, CV studies should seek to include values motivated by warm glow.

That warm glow might vary across payment vehicles has important implications for CV study design (Chilton and Hutchinson, 1999). If the payment vehicle in a CV exercise does not match the way payments would actually be made, then the possibility of bias arises; people may get different amounts of warm glow from paying in different ways. If the grizzly protection program in the example would actually be paid for from tax revenues, then the CV exercise should seek to include it in the values estimated. As Carson, Flores, and Meade (2001) emphasized, where there is utility, there is value.[14] However, if grizzly protection would actually be paid for by means other than taxes, using taxes in the CV question could lead to biased value estimates. This concern is not new. For decades, most researchers have designed their CV with full awareness of possible vehicle bias (Mitchell and Carson, 1989). One advantage to using taxes may be to assure that, all else equal, estimated values would likely be underestimates of true values because of the public's aversion to paying taxes.

Warm Glow from Taxes and Embedding Effects

Consider scope tests next. Two levels of grizzly protection can be represented by T (as before) and αT, where $0 < \alpha < 1$. Respondent i's vote for the smaller program would be determined by the same logic as in equation (9), except that now taxes paid by others (and the corresponding amount of grizzly protection) would be αT_{-1}.[15] Calculated as usual, the expected values of compensating surplus for the two situations would be $\bar{C}^T$ (as before) and $\bar{C}^\alpha$, respectively. Making standard assumptions about the utility function and assuming that satiation is not an issue, the scope test would involve the null hypothesis that $\bar{C}^T \geq \bar{C}^\alpha$. Equality would be expected if respondents are pure egoists, but, as with donations, this would not be a scope test failure. [16] For altruists and impure altruists, the inequality would be expected to hold. Nothing about the presence of warm glow would lead one to expect scope test failure.

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[12] Strictly speaking, a referendum CV question would not explicitly state the taxes paid by others. The standard form of referendum CV questions would point out that if a majority votes positively, the grizzly protection program will be implemented. Hence, it is implicit that T_{-1} will be sufficient so that there will be sufficient funding when τ_i is added to achieve the level of grizzly protection specified in the scenario.

[13] See the discussion of consequentiality later in the paper.

[14] Recall that I ruled out nonpaternalistic altruism by a plausible assumption. See footnote 9. I have also chosen to ignore certain economic anomalies discussed in Andreoni (2006).

[15] Note that αT_{-1} is implicit in the CV scenario. See footnote 12.

[16] This result was originally demonstrated by Chilton and Hutchinson (2000).

Regarding embedded value inconsistencies, there is nothing in the theory of warm glow that would lead one to predict embedded value inconsistencies in CV studies that use tax vehicles. Whatever the causes of such inconsistencies, warm glow is not among them. We need to look elsewhere for explanations.

The Good Feelings Hypothesis

The good feelings hypothesis can be critically evaluated from four directions: theory, empirical evidence from CV studies, empirical evidence from experimental studies, and the trend toward designing CV questions to be consequential.

Theory and Good Feelings

The first point to be made is that the good feelings hypothesis, in contrast to Andreoni's warm glow, lacks a clearly spelled out foundation in economic theory. Rather, it might best be viewed as an *ex post* rationalization of seeming anomalies in CV study results.

The problems this can create for analysis can be illustrated by reconsidering results from KK's case study, summarized earlier in Table 1. Recall that disaster preparedness was worth much more when valued first (by Group 2) than when valued second, as a part of the ELL (by Group 1). But why should subjects in Group 1 stop gaining free good feelings when they came to disaster preparedness? Couldn't they have gained even more good feelings by expressing larger values when answering the second question? Or, if the desire for good feelings were satiated when the first item was valued, would Group 1's values for disaster preparedness be valid measures of WTP? There is no economic theory to fall back on to address such questions. The good feelings hypothesis lacks theoretical traction.

Empirical Evidence from CV Studies

The allegation that scope test failures—whether due to seeking good feelings or for other reasons—are an endemic flaw in the CV method would be more compelling if studies consistently failed scope tests. They do not. Surveys of a broad range of studies that conducted scope tests (Carson, 1997; Desvousges, Mathews, and Train, 2012) showed that many passed.

Furthermore, when scope test failures do occur, the literature shows that the good feelings hypothesis is only one of many possible causes. I have already stressed that valid studies might appear to fail scope tests when respondents have strong egoistic motives and hence express values that are heavily affected by warm glow. Carson (1997) listed other possible reasons: poor survey design;[17] inadequate sample size; differences in respondents' perceived probabilities that the good would be provided under the base and scope scenarios;[18] and use of survey modes, such as shopping mall intercept and telephone surveys, that do not encourage subjects to pay close attention to the questions being asked. Finally, people may not prefer the larger good. As Chilton and Hutchinson (2000) pointed out, satiation would lead to valid studies that appear to fail scope tests. In fact, negative scope effects are even possible. Heberlein et al. (2005) found negative scope effects for increasing wolf populations in northern Wisconsin. That is, people living in the area were willing to pay more to increase the population to 300 wolves than to 800 wolves.[19] Deeper investigation showed that many people preferred the smaller over the larger increase because they feared that the larger population would conflict with other goals such as protection of pets, livestock, and the deer

[17] For example, Bateman and Brouwer (2006) found that, in their study, results from a dichotomous choice CV question passed a scope test, but results from an open-ended question did not. This may indicate that open-ended questions are a poor choice when designing CV studies.

[18] Powe and Bateman (2004) showed that scope test failure may occur if subjects question the realism of the larger project.

[19] The baseline population was the then current population, estimated at about 200 wolves.

herd. Within the context of these and possibly other reasons for anomalous scope effects, the case for the good feelings hypothesis does not seem very compelling.

Turning to embedded value inconsistencies, Carson and Mitchell (1995) showed that such inconsistencies are not necessarily ruled out by theory. This makes them less useful as a validity test than seemed to be the case at first glance. Nevertheless, some authors (see, e.g., McFadden, 1994; Payne et al., 2000; Bateman et al., 2004) have suggested that differences between values of a good depending on the level embedding, as reported in the literature, have sometimes been too large to be credible. For example, looking again at Table 1, it may strain credibility to think that disaster preparedness should be worth $152 by itself and yet only $29 when embedded in the ELL. Assuming that one accepts this argument, the question is whether the good feelings hypothesis lies at the heart of the problem.

One approach to addressing this question would be to investigate whether embedded value inconsistencies occur for pure private goods. If the good feelings hypothesis explains the phenomenon, it should disappear in such cases, since "good causes" would not enter in. This does not seem to be the case. As just one example, Shiell and Gold (2002) used CV to estimate WTP for vaccinations and found that embedded value inconsistency persisted even when the vaccinations were a pure private good.

Experimental Evidence

Two laboratory studies are also relevant. Bateman et al. (1997) involved opportunities to pay real money for real vouchers that could be exchanged for a main course and/or a dessert at a local restaurant. Clark and Friesen (2008) also conducted an experiment involving real money and private consumption opportunities. They dealt with three bundles of goods: 10 small containers of orange juice; the juice plus five pens and some correction tape;[20] and the juice, pens, and correction tape, plus a disposable camera. Both Bateman et al. (1997) and Clark and Friesen (2008) used an incentive-compatible mechanism, the so-called BDM mechanism (Becker, DeGroot, and Marschak, 1964).

CV was not involved in either study. Hence, good feelings about hypothetical donations toward worthy causes could not have entered in. The goods were private goods and people had to actually pay to obtain them. Yet both studies found statistically significant embedded value inconsistencies (what they termed "order effects" or "part-whole biases").

Clark and Friesen (2008) had one other result of interest here. In a separate treatment, they estimated values when the bundles would be donated to specific charities. They found no embedded value inconsistencies in this part of their experiment.

Of course, two studies cannot be considered definitive, but they are suggestive. Are embedding effects a phenomenon limited to CV studies or do they exist in other contexts? Both groups of researchers speculated about deeper problems in economics itself. Bateman et al. (1997, p. 331) concluded that their results "may be a symptom of some fundamental properties of individuals' preferences which conventional theory does not allow for." Clark and Friesen echoed similar concerns.

Good Feelings and Consequentiality

It has become clear over recent years that estimated WTP based on responses to CV questions that stress the hypothetical nature of the transaction will tend to exceed estimated WTP based on actual transaction for the same good or amenity. This result has been termed "hypothetical bias."[21] More recent work has so far shown that hypothetical bias disappears when CV questions are well-designed, incentive compatible, and consequential (Vossler and Evans, 2009; Herriges et al., 2010;

[20] For younger readers, correction tape was used to correct typographical errors on text produced on typewriters.

[21] Meta-analyses by List and Gallet (2001), Little and Berrens (2004), and Murphy et al. (2005) cited the prior literature on hypothetical bias.

Carson and Groves, 2006; Poe and Vossler, 2011; Vossler, Doyon, and Rondeau, 2012; Vossler and Watson, 2013; Interis and Petrolia, 2014; Hwang, Petrolia, and Interis, 2014; Carson, Groves, and List, 2014).

Most well-designed CV questions used in applied field studies today are consequential. Researchers design scenarios to emphasize their relevance to pending decisions. Payment vehicles are chosen that could be implemented and that would require subjects to actually pay if the policy or project described in the scenario were implemented. The good feelings hypothesis would seem to be inapplicable for such CV questions. Gaining good feelings free of charge no longer holds if the respondent believes their answers could actually affect the supply of the public good in question and there is a chance they will actually have to pay.

Summary

The results of this reconsideration of warm glow and CV can be summarized in five conclusions:

1. *The literature displays confusion about the definition of warm glow.* Confusion between Andreoni's warm glow and the good feelings hypothesis may have contributed to the issues raised in this paper.

2. *Values motivated by Andreoni's warm glow are valid economic values.* CV studies should seek to include values associated with warm glow, not avoid or deflect them.

3. *As Andreoni used the term, the theory of warm glow would only predict scope test failures if egoism is a dominant motive for a large share of respondents, and, even then, CV results would not be invalidated.* In a world of pure and impure altruists, nothing in the theory of warm glow helps explain scope test failures.

4. *Nor does Andreoni's theory lead to the predictions of embedded value inconsistencies in CV studies.* More research is needed to better understand this phenomenon. That research probably needs to begin outside of CV studies. Perhaps experimental studies along the lines of Bateman et al. (1997) and Clark and Friesen (2008) would be the best starting point. In the meantime, why employ valuation sequences in CV studies at all? It is hard enough to estimate valid values for a single good. Why try to value several embedded goods?

5. *Though the good feelings hypothesis is plausible on a superficial level, it lacks a theoretical foundation and empirical support.* It also does not apply when CV exercises are consequential.

As noted earlier, the more extreme CV critics (see, e.g., KK Hausman, 2012; Diamond and Hausman, 1993) have concluded that the CV method is fatally flawed. For all the reasons presented in this paper, the case for declaring the CV method invalid based on warm glow and/or good feelings is weak to nonexistent.

The purpose of this paper has not been to argue that scope test failures and embedded value inconsistencies are irrelevant to the validity of CV studies. We have lots of work to do if CV tools are to be improved. Scope test failures and embedded value inconsistencies should be priorities in future investigations. However, warm glow and the good feelings hypothesis do not appear to be helpful in gaining insights.

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