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Analysis

Measuring the environmental cost of hypocrisy

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ABSTRACT

This paper provides an example of how to estimate the marginal environmental cost of hypocrisy using revealed-behavior and self-identification survey responses from coffee drinkers regarding their use of cardboard and plastic (i.e., non-reusable) cups. Coffee shops provide a convenient microcosm for assessing the impact of hypocritical behavior because of (1) readily available, cheap substitutes (i.e., reusable coffee cups), (2) a relatively accurate estimate of the environmental (in particular, carbon) cost associated with using non-reusable cups, and (3) the ability to delineate hypocritical behavior by observing a choice with relatively few potential confounding factors. Hypocritical behavior is measured as a geometric mean of how often an individual takes coffee in a non-reusable cup and the degree to which the individual self-identifies as being concerned about his environmental footprint. All else equal, the more often a person takes his coffee in a non-reusable cup and the greater the degree to which he self-identifies as being concerned about his footprint, the greater the individual's "hypocrisy score." Controlling for other attitudinal and demographic characteristics (including self-identified awareness of environmental issues and willingness to pay for the convenience of using a non-reusable cup), we are able to determine the marginal effect of an individual's hypocrisy score on the environmental cost associated with the use of non-reusable coffee cups.

Epigraph

What there is in this world, I think, is a tendency for human errors to level themselves like water throughout their sphere of influence.
[Leah Price in *The Poisonwood Bible* by Barbara Kingsolver (1998).]

1. Introduction

Although not included among the Seven Deadly Sins by name, hypocrisy has, through the ages, proven itself a worthy enough transgression to merit a few good aphorisms.[1] In the 17th Century, Francois de La Rochefoucauld (1665–1678) quipped, "hypocrisy is the tribute that vice pays to virtue." Three centuries later Heschel (1955) exhorted, "hypocrisy rather than heresy is the cause of spiritual decay", and "there is great merit in knowing our subtle hypocrisies". Jung (1966) professed that, "a little less hypocrisy and a little more self-knowledge can only have good results in respect for our neighbor." Despite their poignancy, and the clarion call these aphorisms make for thoughtful discourse and introspection, economists have heretofore been reticent on the issue of hypocrisy. Our collective silence has seemed particularly deafening when it comes to expounding upon what we alone are best equipped to measure — hypocrisy's external costs. As this paper illustrates, these costs can be estimated quite easily, and possibly to great effect, since exhortations such as Heschel's and Jung's gain requisite credence when cast in monetary terms. Similar to knowing how costly are our consumptive decisions, e.g., in terms of pollution created by the production and consumption of the goods we choose, knowing what portion of these external costs are attributable to specific personal failings, such as hypocrisy, invites introspection not only of our choices, but of our motivations as well.[2]

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[1] The seven sins are (in no apparent order of declivity) wrath, greed, sloth, pride, lust, envy, and gluttony.

[2] At the very least, attempting to monetize what Heschel and Jung have so eloquently identified as the subtle, spiritual, and social burdens of hypocrisy poses a worthy academic challenge.

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To the unsuspecting eye, hypocrisy, defined by Collins English Dictionary (2003) as "the practice of professing standards, beliefs, etc., contrary to one's real character or actual behavior, especially with the pretense of virtue and piety," is merely a specific form of what the contingent-valuation literature defines as "hypothetical bias," or the disconnect between what an individual says he would do in a hypothetical setting and what he actually does when given the opportunity to do so in a real setting (Mitchell and Carson, 1989; Cummings et al., 1997).[3] But this comparison misses a crucial distinction. Hypothetical bias is, as its definition suggests, a consequence of hypothetical thinking, irrespective of the thinker's motives.[4] In contrast, hypocrisy (or, in closer context, we might say, "hypocritical bias") reflects a difference between observed behavior, or revealed preference, and deliberately chosen, symbolic representations of behavior.[5] Indeed, there is nothing hypothetical about hypocritical bias. Hypocrisy, it turns out, is a human foible in a class all its own.

The distinction between hypothetical and hypocritical bias has two key implications. First, positing a hypothetical question is necessary for the measurement of hypothetical bias but not for hypocritical bias. Instead of comparing an individual's hypothetical and revealed preferences, which is necessary for the measurement of hypothetical bias, measuring hypocrisy entails comparing the individual's revealed preference with his own non-hypothetical, self-proclaimed motives; in our case with his self-proclaimed concern for the environment. Second, several approaches have been recommended to lessen or calibrate for the hypothetical nature of contingent valuation questions in an effort to correct for hypothetical bias.[6] These approaches presume a correlation that exists between stated and revealed preference that can be reconciled by making the hypothetical scenario, or its effects, seem more "real." Social psychologists have long noted, however, that there is no necessary correlation between speech and action, thus suggesting a persistent inconsistency between stated and revealed preference (Ajzen et al., 2004).[7] Hypocrisy (and the hypocritical bias that results) is one manifestation of this persistent inconsistency that we feel is especially prevalent in environmental valuation.

This paper provides an example of how to estimate the marginal environmental cost of hypocrisy using revealed-preference and self-identification survey responses from coffee drinkers regarding their use of cardboard and plastic (i.e., non-reusable) cups. Coffee shops provide a convenient microcosm for assessing the impact of hypocritical behavior because of (1) readily available, cheap substitutes (i.e., reusable coffee cups), (2) a relatively accurate estimate of the environmental (in particular, carbon) cost associated with using non-reusable cups, and (3) the ability to delineate hypocritical behavior by observing a choice with relatively few potential confounding factors.[8] In an effort to demonstrate how the effect of hypocritical behavior might best be measured, we calculate a set of "hypocrisy scores" (weighted geometric means) for each coffee drinker in order to represent in cardinal terms the extent of an individual's hypocrisy with respect to choice of cup type.[9]

The scores are purposefully simple in design, allowing for greater flexibility in their interpretation. Specifically, they are calculated as (weighted) geometric means of (1) the percentage of time (per week) the individual takes his coffee or tea in a cardboard or plastic cup (i.e., his "revealed preference", or his own accounting of how often he chooses a non-reusable cup during an average week), and (2) his expressed, general concern for the environment (i.e., his "professed standards, beliefs, etc."). The scores may therefore be interpreted as percentage measures, e.g., a coffee drinker with a score of 0.45 is exhibiting hypocrisy at the 45% level (out of a possible 100%). Although they are difficult to interpret in an absolute sense (i.e., what does 45% hypocrisy really mean?), the scores permit a meaningful interpretation in a relative sense, i.e., the higher a given score, the greater a coffee drinker's hypocrisy with respect to cup choice. By varying the score's weights, our measure of hypocrisy is based more or less on the individual's use of cardboard/plastic cups or his concern for the environment, respectively. The weights therefore reflect the inherent ambiguity in the definition of hypocrisy regarding which component of the definition – actual behavior or professed standards – is more important. The hypocrisy scores are explained in detail in Section 2.

Using a non-split sample survey administered to over 500 coffee and tea drinkers in the city of Logan, Utah, we find that, all else equal, an individual's hypocrisy score (calculated in either of three ways) has a positive effect on his contribution to carbon cost. The average hypocrisy effect is roughly $0.0002 of carbon cost per unit of hypocrisy per week ("unit of hypocrisy" is explicitly defined in Section 2). We find some evidence to suggest that the hypocrisy effect is larger for individuals who

[3] By way of comparison, Merriam-Webster (2014) defines hypocrisy as "behavior that does not agree with what someone claims to believe or feel", and Oxford Dictionaries (2014) as "the practice of claiming to have moral standards or beliefs to which one's own behavior does not conform; pretense". The American Psychological Association defines hypocrisy as "a special case of cognitive dissonance, produced when a person freely chooses to promote a behavior that they do not themselves practice" (APA, 2014). In this paper, we consider hypocrisy and cognitive dissonance to be distinct enough in meaning to represent two different concepts. As explained in detail in Section 4, cognitive dissonance is referred to in our paper as a possible public policy, i.e., as an external stimulus itself that could potentially work to reduce a coffee drinker's hypocritical behavior. This interpretation is consistent with the empirical cognitive-dissonance literature (Dickerson et al., 1992; Aronson et al., 1991; Stone et al., 1994; Fointiat, 2004; Son Hing et al., 2002; Rubens et al., 2013). One final distinction to consider is what might best be labeled "pre-existing" versus "induced hypocrisy". Pre-existing hypocrisy is the type of hypocrisy we have in mind in this paper, where the survey respondent's innately determined hypocrisy is not induced by the survey instrument itself and therefore can be accurately measured. To the contrary, hypocrisy that is induced by the survey instrument draws into question the instrument's construct validity and thus the accuracy of the hypocrisy measure.

[4] An exception is "warm glow" bias, which is rooted in the positive or negative framing of the hypothetical question. For example, Andreoni (1995) finds that contributions to a public good differ considerably when the contribution is framed as creating a positive externality for society (warm glow) as opposed to avoiding a negative externality created by purchasing a competing public good.

[5] Although we refer to observed behavior and revealed preference interchangeably, there is a slight distinction between the two terms. One can think of the former as a special case of the latter, as the latter also refers to past behavior that a survey participant recounts about him- or herself (which is the case for our survey), rather than solely behavior that the researcher is able to observe firsthand.

[6] Examples include calibration using real payment bids for comparable goods (Fox et al., 1998), using certainty responses to adjust responses to bid values (Champ et al., 1997), and reminding respondents of their budget constraints (Loomis et al., 1996).

[7] For example, in LaPiere's (1934) study on racial prejudice, a Chinese couple stopped at more than 250 businesses and received service without hesitation 95% of the time; yet, in response to a letter of inquiry, 92% of the establishments replied they would not accept members of the Chinese race.

[8] In contrast, assessing hypocritical behavior based on the choice of when and where to drive an automobile is more difficult, since points (1) and (3) do not as readily apply.

[9] We acknowledge that the extent of hypocrisy measured in this study is for a single commodity, all else equal, and thus our hypocrisy score is a partial measure. We are not measuring the extent of an individual's hypocrisy in a broader context, e.g., based on the individual's choices over a bundle of commodities over time. Nor are we measuring what might be considered the larger costs associated with the hypocrisy of drinking coffee in the first place, e.g., in terms of the need for international shipping, processing, and potential rainforest destruction. The coffee shops that agreed to participate in this study would never have permitted us to broach issues related to these types of costs with their customers, as this line of questioning would have maligned the very product they strive to profit from — coffee itself.

are less-educated, more-conservative, and male.[10,11] All else equal, having a greater need for convenience, being less informed about environmental issues, being female, being low or middle income, and having attained a relatively low education level also have positive effects on an individual's contribution to carbon cost.

Ironically, the positive effect of hypocrisy found in this study suggests that the bias stated-preference practitioners universally attribute to the hypothetical nature of their survey method may instead, at least partially, be attributable to the survey participant's ingrained hypocritical behavior. In other words, what could be driving the apparent hypothetical bias (or, the divergence between stated and revealed willingness-to-pay (WTP)) is actually the extent of the average individual's hypocrisy, which in turn is driven by individuals who, for whatever reason, are more prone to exhibit hypocritical behavior than make inaccurate self-assessments in hypothetical settings of what their behavior would be in real-life situations.[12] Thus, in addition to demonstrating how a broader estimate of the cost of hypocrisy might be measured, e.g., for more environmentally damaging consumption choices such as frequency and distance of travel, mode of transportation, home size, and proportion of locally grown food consumed, this study also demonstrates how stated-preference practitioners might go about decoupling hypocritical from hypothetical bias.

To reiterate, this paper demonstrates how the economic effects of a human foible – hypocrisy – might best be measured in a microcosm where potential factors that could otherwise confound the estimation of an individual's hypocrisy score are either absent or relatively easy to identify and control for. As a result of its tight empirical focus on a relatively novel behavioral effect, the paper therefore does not contribute exclusively to any one specific literature. In particular, because its focus is not on an anomalous behavior (witnessed in the laboratory, field, or real market) that draws into question a basic tenet of neoclassical microeconomic theory, the paper cannot comfortably be placed in the camp of behavioral economics. Rather, its focus is on empirically measuring the consequences of a given behavior, not on the behavior's linkage to standard theory. With this proviso in mind, the next section describes the survey instrument and our sample of coffee and tea drinkers. Section 3 presents our empirical results. Section 4 summarizes our findings and their implications. A technical appendix (Appendix C) derives a social net benefit measure of hypocrisy in the context of classical demand theory.

2. The Coffee Shop Survey

The coffee shop survey was conducted in four Logan, Utah coffee shops during the months of December 2011 to February 2012 (Appendix A contains a copy of the survey instrument). Two of the shops are located on the campus of Utah State University – one in the student union building, the other in the main library – and two are located off-campus near the city's downtown area.[13] Although the four shops are stratified geographically (Logan boasts only six coffee shops total), no effort was made to randomly select coffee and tea drinkers into the sample. As a result, our study is based on a convenience sample; a sample that nevertheless has two strengths.

The first strength is its size. Because it is short and to-the-point, the average respondent was able to complete the survey within an estimated 3 min.[14] In addition, baristas at each location were instructed on how to encourage customers to complete the survey, specifically by mentioning the relatively short amount of time necessary to complete it, and the fact that their participation would help advance scientific research being conducted at Utah State University. Therefore, while not every type of coffee/tea drinker is adequately represented in our sample (e.g., more rushed individuals and those predisposed not to participate in surveys to begin with are likely under-represented), a large number of customers at each location willingly chose to participate in the survey. Further, since we have no theory or evidence to suggest that under-represented individuals are likely to be more or less hypocritical than those who actually participated in the survey, we cannot say whether (and in which direction) sampling bias might be influencing our results.

Definitions and summary statistics for variables used in our analysis are presented in Table 1. The study's two key variables are *envcost* and *hyp*[#]. Variable *envcost* represents an individual's weekly environmental cost associated with using non-reusable rather than reusable cups. The cost is calculated as the product of (1) the number of non-reusable cups used per week (both cardboard and plastic), i.e., variable *cups* in Table 1, (2) the amount of embodied carbon per non-reusable cup (in pounds), and (3) the per-pound equivalent carbon price. In turn, the number of non-reusable cups used per week is self-reported by the survey respondent. Embodied carbon dioxide (CO_2) per cup is estimated to be 0.25 lb (Alliance for Environmental Innovation, 2000; Carbonrally.com, 2012), and the per-pound equivalent price of $35 per ton represents the expected average carbon price through the year 2020 (Point Carbon, 2010).[15] Thus, for example, an individual who uses five non-reusable cups per week is estimated to produce the equivalent of roughly $0.02 in weekly environmental costs associated with the carbon emitted through the life-cycle of the cups. The

[10] Or stated more bluntly, less-educated, more-conservative, male, coffee-drinking hypocrites have larger negative impacts on the environment.

[11] We acknowledge the relatively minuscule *marginal* costs associated with the use of non-reusable cups, and reemphasize the demonstrative nature of the ensuing analysis. If we were instead analyzing a market with larger potential costs associated with hypocritical behavior, such as choice of transportation mode (i.e., private automobile vs. mass transit vs. biking or walking) or choice of vacation destination (i.e., distances traveled by plane), our empirical results would naturally carry greater policy relevance. Nevertheless, as we show below the typical coffee drinker in our sample chooses a non-reusable cup roughly 60% of the time per week. To the extent that our sample is representative of the wider population of coffee drinkers worldwide, this translates into roughly 960 million non-reusable cups used per day (based on estimates from the ICO (2013) of 1.6 billion cups of coffee consumed per day). Based on estimates of the carbon content of a cardboard cup – roughly 0.25 lb of carbon per cup (Alliance for Environmental Innovation, 2000) – and the cost per pound of carbon in the atmosphere – roughly $0.005 (Point Carbon, 2010) – this translates into a daily aggregate carbon cost worldwide of approximately $4.5 million associated with the use of non-reusable coffee cups.

[12] For example, in their study of the social net benefits of curbside recycling Aadland and Caplan (2006) exploit the stated- and revealed-preference features of their data to estimate a mean bias in stated WTP, which they attribute solely to the inaccurate valuation of a hypothetical recycling program by a subset of their sample. Using the same basic approach as in this paper to control for the extent of an individual's hypocrisy (in specific, including a question on their survey similar to question 12 on the coffee shop survey — see Appendix A) Aadland and Caplan (2006) could have calibrated their WTP estimate to account for both hypothetical and hypocritical bias. In specific, a version of question 12 could have been asked of households located in communities that had curbside recycling programs in place at the time of survey. Hypocrisy scores could then have been calculated based upon versions of questions 1 and 2 of our survey (i.e., questions related to the "revealed preference" component of the scores) and question 12 (the "professed standards" component).

[13] Logan is Cache County's largest city, located in the northeast corner of Utah (see red highlighted areas in Figs. 1 and 2). In 2009, Logan's population consisted of 46,000 people residing in 16,000 households (U.S. Census Bureau, 2010). At the time of the survey, each of the four coffee shops provided small discounts for use of reusable cups. The average discount was 10 cents per cup (none of the shops allowed for free refills). Therefore, to the extent that the reusable-cup discounts may be biasing our hypocrisy scores and WTP-for-convenience estimates relative to coffee drinkers located outside of the study area who frequent shops that do not offer discounts, the bias is downward. As pointed out in Section 3, we control for any differences in discounts across coffee shops with location dummy variables.

[14] This estimate is based on pretests conducted with friends and colleagues, as well as informal feedback from actual survey participants.

[15] The Alliance for Environmental Innovation and carbonrally.com report an estimate of embodied CO_2 solely for cardboard coffee cups. A similar estimate for plastic cups (used for iced coffee and tea drinks) is presently unavailable. Thus, we have assumed embodied carbon in plastic cups is equal to that in cardboard cups.

Fig. 1. Location of Utah. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

Fig. 2. Location of Cache County, Utah. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

$0.02 cost estimate is calculated as follows: (5 cups) × (0.000134 t of CO_2 per cup) × ($35 per ton of CO_2) = $0.02, where the 0.000134 t of CO_2 per cup is determined according to the relation 0.25 lb = 0.000134 t. As Table 1 indicates, the average coffee drinker in our sample contributes $0.01 of CO_2 damage to the environment per week.

As alluded to in Section 1, variable *hyp[#]* is calculated as a weighted geometric mean of variables *envcon* and *% cups*, where *envcon* represents the "professing standards, beliefs, etc." portion of hypocrisy's definition and *% cups* represents the "actual behavior" portion.[16] An appealing aspect of the individual's coffee-cup choice is the relative ease with which it lends itself to a test of hypocritical behavior in strict accordance with hypocrisy's definition. The definition is unconcerned with what might abet a person's hypocrisy, i.e., it does not confuse or excuse hypocrisy as mere forgetfulness, laziness, or ignorance, or the natural consequence of being a consumer or citizen. Nor does the definition distinguish rational from irrational hypocrisy (as purely economic thinking is predisposed to do).[17] Thus, we believe that the fundamental meaning of the definition can be captured in a single variable such as *hyp[#]*, which, although somewhat opaque in its intra-personal interpretation, does permit a clearer interpersonal comparison, i.e., an individual with a higher *hyp[#]* can be thought of as behaving more hypocritically.

Still, hypocrisy's definition gives no hint about which of its portions – profession of standards, beliefs, etc., or actual behavior – is more important, which in turn creates the need for examining various weighting schemes.[18] In this study, variable *hyp1* is a standard geometric mean with equal weight applied to *envcon* and *% cups*, i.e., $hyp1 = \sqrt{(envcon)(\%\ cups)}$, while *hyp2* and *hyp3* give relatively more (less) weight to *envcon*, respectively. In particular, $hyp2 = \sqrt{\left((envcon)^{0.5}\right)\left((\%\ cups)^{2}\right)}$ and $hyp3 = \sqrt{\left((envcon)^{2}\right)\left((\%\ cups)^{0.5}\right)}$.[19] As Table 1 indicates, the average coffee drinker in our sample exhibits hypocritical behavior at the rates of 56%, 55%, and 54%, respectively, based on the definitions of *hyp1*, *hyp2*, and *hyp3*.[20]

A potential concern about the statistical validity of our hypocrisy measure arises due to the possibility of a predetermined relationship between *hyp[#]* and *envcost*. This concern hinges on the possibility of confounding correlation between *% cups*, which is included multiplicatively in the definition of *hyp[#]*, and *cups*, which is included linearly in the definition of *envcost*. Theoretically, there is no reason why a positive relationship should necessarily exist between these two variables. For example, consider Individual *A*, who visits a coffee shop only twice per week and each time takes her coffee in a cardboard cup. Individual *B*, on the other hand, visits a coffee shop six times per week and takes his coffee in a cardboard cup four of those times. Relatively speaking,

[16] As question 12 of the survey indicates, *envcon* is based on a five-point scale in response to a single, general question about the individual's self-perceived concern for the environment (see Appendix A). We purposefully eschewed using Dunlap et al.'s (2000) New Ecological Paradigm (NEP) scale to gauge each individual's level of environmental concern because of the anticipated time it would take to complete the series of 15 questions necessary to create the scale. The NEP is better suited to an online survey format, where the typical respondent would have more time to complete the survey. We also worded the *envcon* question as generally as possible in order to reduce the potential for a respondent to bias their answers to other key survey questions. For example, if our *envcon* question had asked respondents about their concerns regarding excessive use of disposable material and the resulting pressure such usage puts on landfill space – rather than just about their concern for the environment in general – it is more likely that at least some of the respondents would have felt pressure to bias their answers to the questions for cups and *% cups* in order not to appear hypocritical. As a result, *envcon* can be thought of as measuring an individual's moral standard for the environment in general, as opposed to just for the issue of waste management in specific.

[17] Hypocrisy is also not to be confused with the gap between intention and action, or with boldfaced lying, as encountered by Davies et al. (2002).

[18] Note that there is no theoretical basis upon which to formulate a quantitative measure of hypocrisy, only the admittedly loose guidance provided by its definition.

[19] Recall that both *envcon* and *% cups* are measures bounded by zero and one. Thus, for example, $(envcon)^{0.5}$ adds weight to *envcon*, while $(envcon)^2$ reduces the weight. We leave the reader to decide which of these weighting schemes more accurately reflects the definition's true meaning.

[20] While it is also possible to define hypocrisy scores as weighted arithmetic means of *envcon* and *% cups*, e.g., $hyp[\#] = \alpha(envcon) + (1-\alpha)(\%\ cups)$, $0 < \alpha < 1$, this type of additive measure potentially suffers from a "zeros problem" whenever comparisons are made across individuals who have zero values for either *% cups* or *envcon*, respectively. In particular, two individuals may still register positive *hyp[#]* values, e.g., when *% cups* = 0 0 and *envcon* > 0 for both individuals, even though *% cups* = 0 means that we intuitively have no basis upon which to determine which individual is behaving more hypocritically.

Table 1
Variable definitions and summary statistics.

Variable	Description	Mean (SD)
envcon	General concern for the environment (0 = "unconcerned", 0.25, 0.50, 0.75, 1 = "very concerned").	0.80 (0.22)
cups	Number of non-reusable cups used per week.	2.31 (2.59)
% cups	*cups* per number of trips to coffee shop per week.	0.60 (0.44)
envcost	Carbon cost ($/wk), calculated as *cups* × 0.000134 t of CO_2 per cup × $35 per ton of CO_2.	0.01 (0.01)
hyp1	Hypocrisy score calculated as $\sqrt{(envcon)(\%\ cups)}$.	0.56 (0.37)
hyp2	Hypocrisy score calculated as $\sqrt{\left((envcon)^{0.5}\right)\left((\%\ cups)^{2}\right)}$.	0.55 (0.41)
hyp3	Hypocrisy score calculated as $\sqrt{\left((envcon)^{2}\right)\left((\%\ cups)^{0.5}\right)}$.	0.54 (0.35)
WTP_p	Predicted willingness to pay for convenience of using non-reusable cups.	−0.19 (0.28)
WTP_p^*	Adjusted willingness to pay (negative WTP_p values censored at zero).	0.04 (0.10)
t	Randomized tax (bid) value (in $), $t_i \in$ (0.05,0.1,0.15,0.2,0.25).	0.15 (0.07)
accept	1 = accepted *t*, 0 = otherwise.	0.32 (0.47)
male	1 = male, 0 = female.	0.44 (0.50)
young[a]	1 = 25 years old or less, 0 = otherwise.	0.35 (0.48)
middle	1 = between 26 and 50 years old, 0 = otherwise.	0.55 (0.50)
married	1 = currently married, 0 = otherwise.	0.43 (0.50)
lowinc	1 = annual income $50,000 or less, 0 = otherwise.	0.65 (0.48)
midinc	1 = annual income between $50,001 and $100,000.	0.23 (0.42)
lowed	1 = has obtained less than an associates degree, 0 = otherwise.	0.38 (0.49)
mided	1 = has obtained either associates or bachelors degree, 0 = otherwise.	0.28 (0.45)
politic	Political identity (0 = "very liberal", 0.25, 0.50, 0.75, 1 = "very conservative").	0.30 (0.25)
liberal	1 = *politic* <0.5, 0 = otherwise.	0.63 (0.48)
polinf	How informed about politics (0 = "uninformed", 0.25, 0.50, 0.75, 1 = "very informed").	0.66 (0.26)
envinf	How informed about the environment (0 = "uninformed", 0.25, 0.50, 0.75, 1 = "very informed").	0.71 (0.23)
hinfo	1 = *envinf* >0.5, 0 = otherwise.	0.70 (0.46)
loc1	1 = Survey completed at Citrus and Sage coffee shop (off-campus), 0 = otherwise.	0.15 (0.36)
loc2	1 = Survey completed at Cafe Ibis, 0 = otherwise (off-campus), 0 = otherwise.	0.53 (0.50)
loc3	1 = Survey completed at Taggert Student Center (on-campus), 0 = otherwise.	0.20 (0.40)

[a] The youngest person to complete a survey was 17 years of age.

Individual *A*'s total number of cups is small (*cups* = 2), and her percentage of cups large (*% cups* = 100), while Individual *B*'s total number of cups is large (*cups* = 4) and his percentage small (*% cups* = 67). In this case, the relationship between *cups* and *% cups* is negative rather than positive. A similar example can just as easily be constructed showing a positive rather than negative relationship. In general, therefore, one might expect positive and negative relationships of this sort to offset, or at least counterbalance one another to some degree in any given dataset. For our particular dataset, the linear relationship between *cups* and *% cups* is positive and statistically significant, similar to the statistically significant linear correlations that exist between several of the regression model's explanatory variables and *envcost*.

As importantly, Bohrnstedt and Goldberger (1969) show that statistical relationships between variables such as *hyp[#]* and *envcost* are indeed valid (i.e., not predetermined) because the exact covariance between *hyp[#]* – which, again, is defined as the product of two random variables – and *envcost* is an exceedingly complicated collection of expectation and covariance terms. Therefore, one cannot necessarily determine a priori, from their respective definitions alone, how these types of random variables will correlate with one another in any given dataset. Notwithstanding Bohrnstedt and Goldberger (1969), we have calculated Pearson correlation coefficients for each explanatory variable used in our regression analysis in order to assess the relative strength of *hyp[#]*'s linear relationship with *envcost*.[21] Results are reported in Section 3.

Additional variables of interest in our regression analysis include WTP_p and *politic*. Variable WTP_p is the individual's predicted willingness-to-pay (*WTP*) for the convenience of using a non-reusable cup. Convenience, in turn, is a catch-all for foibles such as forgetfulness and laziness, which might otherwise confound our estimates of hypocrisy's effects on environmental cost. Table 1 reports means for two measures of WTP_p. The first, $WTP_p = -\$0.19$ per non-reusable cup, is an empirically estimated mean WTP based on an interval regression model (discussed in Section 3). The second, $WTP_p^* = \$0.04$ per cup, results from having censored all negative WTP_p values at zero (roughly 72% of our sample of 521 observations). Variable WTP_p^* accounts for the fact that paying individuals for the 'inconvenience' of using a non-reusable cup (i.e., considering the possibility of negative WTP for use of a cardboard or plastic cup) is unrealistic.[22]

The survey question used to create the variable *politic* was included in the survey in order to deflect the participant's attention away from the environmental concern question (which was used to create *envcon*). The goal here was to preclude the participant from correctly guessing that the survey's intent was to measure hypocrisy. As an added bonus, *politic* controls for political viewpoint, similar to how WTP_p controls for convenience. As indicated in Table 1, the average individual in our sample self-identifies as having left-of-center political beliefs (which, based on Cache County's historical voting record, is unrepresentative of the county's population at large).[23]

[21] Point biserial, rather than Pearson, correlation coefficients are calculated for all dummy variables used in the regression analyses in order to correct for the nominal vs. quantitative nature of these calculations.

[22] Or, perhaps better said, more unrealistic than is the case for other types of environmental goods, such as wilderness designation, enhanced mountain-biking trails, curbside recycling, or enhanced water flows for rafting and kayaking, each of which entail more admissible opportunity costs.

[23] Our sample is, however, more representative of the city's gender composition (44% male for our sample vs. 49% for Logan city) and income distribution (65% (23%) low- (mid-) income for our sample vs. 69% (23.5%) for Logan city) (U.S. Census Bureau, 2010).

3. Empirical Model and Results

We estimate a simple ordinary least squares (OLS) model of hypocrisy's effect on individual *i*'s carbon cost,[24]

$$envcost_i = \mathbf{X}_i\alpha + \epsilon_i \quad (1)$$

where $\mathbf{X}_i$ represents a vector of explanatory variables including individual *i*'s demographic characteristics a lá survey questions 5–9, and self-perceptions a lá survey questions 10–13 (see Appendix A). Also included in vector $\mathbf{X}_i$ is the individual's hypocrisy score and predicted willingness-to-pay for convenience. The α term represents a vector of corresponding (constant) coefficients to be estimated, and ϵ_i is an *i.i.d* error term.

The individual's predicted willingness-to-pay, WTP_p, is derived from prior interval regression analysis following Woolridge (2002). Accordingly, based on his response to a given bid value, t_i, the individual's latent willingness-to-pay, WTP_l is placed in one of two regions: $(-\infty, t_i)$ in the event of answering "no" to the willingness-to-pay question, and (t_i, ∞) in the event of answering "yes."[25] WTP_l for individual *i* (in its reduced form, as a solution to a standard random-utility model) is assumed linear in both its deterministic and random components,

$$WTP_{li} = \mathbf{Y}_i\beta + \mu_i \quad (2)$$

where, similar to vector $\mathbf{X}_i$, $\mathbf{Y}_i$ represents a vector of explanatory variables (which in this case includes t_i), β represents a vector of corresponding (constant) coefficients to be estimated, and μ_i is a corresponding *i.i.d* error term. For estimation purposes we define binary choice variable, $accept_i$, as equaling one if the respondent accepts t_i and zero if not. Thus, $accept_i = 1$ responses imply $WTP_{li} > t_i$ and $accept_i = 0$ implies $WTP_{li} \leq t_i$ (Caplan et al., 2010). Using Eq. (2), the probability that respondent *i* accepts bid t_i is,

$$P_i = Pr[accept_i = 1] = Pr[WTP_{li} > t_i] = Pr[\mu_i > t_i - \mathbf{Y}_i\beta] = \Phi(\mathbf{Y}_i\beta - t_i) \quad (3)$$

where $\Phi(\cdot)$ is a standard normal cumulative distribution function, with the last equality following from $\Phi(\cdot)$'s symmetry. Using Eq. (3), the associated log likelihood function defined over all individuals $i = 1,\ldots,N$, is,

$$LogL = \sum_{i=1}^{N}[accept_i(\ln(P_i)) + (1 - accept_i)(\ln(1 - P_i))] \quad (4)$$

Table 2
Regression results for *envcost*.

Explanatory variable	Model with *hyp1* (Standard error[a])	Model with *hyp2* (Standard error[a])	Model with *hyp3* (Standard error[a])
constant	−0.002	−0.003	−0.000
	(0.002)	(0.002)	(0.003)
hyp1	0.015***	–	–
	(0.001)		
hyp2	–	0.015***	–
		(0.001)	
hyp3	–	–	0.013***
			(0.001)
WTP_p^{*}[b]	0.076***	0.074***	0.081***
	(0.009)	(0.009)	(0.009)
male	−0.001	−0.001	−0.002*
	(0.001)	(0.001)	(0.001)
young	−0.002	−0.002	−0.001
	(0.001)	(0.001)	(0.002)
middle	−0.002**	−0.002**	−0.002*
	(0.001)	(0.001)	(0.001)
lowinc	0.005***	0.005***	0.005***
	(0.001)	(0.002)	(0.002)
midinc	0.005***	0.005***	0.006***
	(0.002)	(0.002)	(0.002)
lowed	0.008***	0.007***	0.008***
	(0.001)	(0.001)	(0.001)
mided	0.006***	0.005***	0.006***
	(0.001)	(0.001)	(0.001)
politic	0.001	0.001	0.002
	(0.002)	(0.002)	(0.002)
envinf	−0.003	−0.001	−0.005***
	(0.001)	(0.002)	(0.002)
loc1	−0.003**	−0.003*	−0.004**
	(0.002)	(0.001)	(0.002)
loc2	−0.003**	−0.003*	−0.003**
	(0.001)	(0.001)	(0.002)
loc3	−0.006***	−0.006***	−0.006***
	(0.002)	(0.002)	(0.002)
Number of Observations[c]	465	465	465
R^2	0.56	0.58	0.49
$F(14,450)$	35.64***	39.59***	26.77***

***Significant at 1% level, **significant at 5% level, *significant at 10% level.
[a] Standard errors are robust for heteroscedasticity using White's (1980) method.
[b] Standard errors are bootstrapped (5000 replications).
[c] Number of observations dropped from 521 to 465 due to missing data points.

where, *LogL* is estimated using an interval regression model (Woolridge, 2002). Results for the estimation of Eq. (4) are provided in Appendix B.[26]

Table 2 presents our results for the estimation of Eq. (1). Of primary interest is the set of coefficient estimates for *hyp1–hyp3*, each of which is positive and statistically significant at the 1% level of significance. These estimates indicate that as the average individual's hypocrisy score increases by 1% he contributes roughly $0.0002 in additional global carbon costs, all else equal. To put this result in context, if the average coffee drinker in our sample reduces his hypocrisy score by 1% (e.g., from 0.56 to 0.55 for *hyp1*, see Table 1), then, using the formula for *envcost* in Table 1, this change is estimated to result in a reduction of roughly (3/100)ths of a non-reusable cup per week ((0.01 reduction in *hyp1* × 0.015) / (0.000134 t of CO_2 per cup × $35 per ton of CO_2),

[24] We use STATA IC/11.0 for Windows (64 bit).
[25] In this study, $t_i \in (0.05,0.1,0.15,0.2,0.25)$.
[26] See McFadden (1974), Cameron (1988), Haab and McConnell (2003), and Greene (2011) for further discussion on the interval, or censored-logistic, regression model, particularly its strengths and weaknesses as an estimator of mean welfare measures such as WTP.

Table 3
Correlation coefficients (between *envcost* and other variables).

Explanatory variable	Correlation coefficient
hyp1	0.57***
hyp2	0.62***
hyp3	0.44***
% cups	0.65***
envcon	−0.22***
$WTP_p{}^{*b}$	0.45***
male	0.08*
young	0.09*
middle	−0.05
lowinc	−0.02
midinc	−0.01
lowed	0.13***
mided	−0.04
politic	0.11**
envinf	−0.10**
loc1	0.12***
loc2	−0.01
loc3	0.06

***Significant at 1% level, **significant at 5% level, *significant at 10% level.

Table 4
Regression results for interaction terms.[a]

Interaction term	Interacted with *hyp1*	Interacted with *hyp2*	Interacted with *hyp3*
	(Standard error[b])	(Standard error[b])	(Standard error[b])
male	0.004**	0.004**	0.004**
	(0.002)	(0.002)	(0.002)
young	0.000	−0.000	0.001
	(0.002)	(0.002)	(0.002)
middle	−0.000	0.000	−0.001
	(0.002)	(0.002)	(0.002)
lowinc	0.000	−0.000	0.000
	(0.002)	(0.002)	(0.002)
midinc	−0.002	−0.001	−0.001
	(0.002)	(0.002)	(0.002)
lowed	0.002	0.002	0.003*
	(0.002)	(0.002)	(0.002)
mided	−0.000	−0.000	−0.000
	(0.002)	(0.002)	(0.002)
liberal	−0.002	−0.002	−0.003*
	(0.002)	(0.002)	(0.002)
hinfo	−0.000	0.001	−0.002
	(0.002)	(0.002)	(0.002)

***Significant at 1% level, **Significant at 5% level, *Significant at 10% level.
[a] Separate regressions were run for each interaction term, which included only a constant and *hyp*[#], along with the interaction term itself.
[b] Standard errors are robust for heteroscedasticity using White's (1980) method.

where 0.015 is the coefficient estimate for *hyp1* from Table 2). Thus, inducing the average coffee drinker to halve his use of 2.31 non-reusable cups per week would require a reduction in his hypocrisy score of roughly 0.39 (i.e., from 0.56 down to 0.17), all else equal.

The usual caveat applies with respect to definitively answering the questions of (1) what might motivate the average coffee drinker to reduce his hypocrisy score in the first place, and (2) how he might generate the reduction. All we are permitted to say in this study is that, all else equal, our data suggests that a relatively large reduction in his hypocrisy score is required to induce the average coffee drinker to substantially cut his dependence on non-reusable cups. With respect to question 1, the reduction may be a consequence of value formation (e.g., Hoehn and Randall, 1987) or preference learning (e.g., Crocker and Shogren, 1991), either of which seems plausible. It might also come about through guilt feelings that arise from a mental state of cognitive dissonance, a possibility we explore at length in Section 4. With respect to question 2, we know only that the average individual's reduction does not come about strictly through a decrease in his *envcon* value (i.e., the "professing standards, beliefs, etc." portion of hypocrisy's definition). If this were the case, then on average no concomitant change would occur in *envcost*. Thus, all we can say is that what would ultimately drive the average individual to reduce his hypocrisy score is either purely a reduction in his *% cups* value (i.e., the revealed-preference portion of hypocrisy's definition) or, most likely, some combination of reductions in his *envcon* and *% cups* values.[27]

As indicated in Table 2, a positive contribution to carbon cost is also linked to the need for convenience (the marginal effect of a one-cent increase in an individual's $WTP_p{}^*$ is roughly $0.0008 in weekly carbon costs), suggesting that a coffee drinker's hypocritical behavior and need for convenience do indeed take an environmental toll. Similar tolls on the environment can be attributed to an individual's (1) being relatively uninformed about environmental issues, (2) being female, (3) being low or middle income, and (4) not having attained a relatively high formal education level.[28] These marginal effects are, for the most part, robust across the three models. Further, the F and R^2 statistics for each model indicate relatively good overall statistical fits of the data, with more than half of the total variation in *envcost* explained by the models' respective covariates.

As mentioned in Section 2, a potential concern about the validity of our hypocrisy measure arises due to the possibility of a predetermined relationship between *hyp1–hyp3* and *envcost*. Non-parametric, Pearson correlation coefficients are reported in Table 3 (point biserial correlation coefficients are reported for the dummy variables, which include all variables except *hyp1–hyp3* and $WTP_p{}^*$). These coefficients are estimates of the linear relationship between the given explanatory variable and *envcost*. Among the set of explanatory variables included in Table 2, the *hyp1*, *hyp2*, and $WTP_p{}^*$ variables have the strongest correlations with *envcost*, followed by *hyp3*, and *lowed*. Variables *politic*, *envinf*, *loc1*, *male* and *young* also exhibit statistically significant correlations with *envcost*.

Comparing these (unconditional) non-parametric results with the (conditional) regression results reported in Table 2, we see that several of the variables associated with statistically significant regressors in Table 2 obtain insignificant correlation coefficients in Table 3, and vice-versa. For example, *lowinc*, *midinc*, *mided*, *loc2*, and *loc3* all have statistically significant regression coefficients, but insignificant correlation coefficients. Variables *young* and *politic* have statistically insignificant regression coefficients, but significant correlation coefficients, and *loc1*'s correlation coefficient obtains a noticeably higher level of significance than its regression coefficient. Thus, in the final analysis, correlation coefficients alone do not seem to adequately distinguish the statistical validity of *hyp1–hyp3* as explanatory variables.

Lastly, Table 4 presents results for the interaction of our demographic variables with *hyp1*, *hyp2*, and *hyp3*, respectively. For ease of interpreting the interactive effects of political identity and the perception of being informed about environmental issues, we have created two new dummy variables. Variable *liberal* equals one if the individual's corresponding value for *politic* is less than 0.5, i.e., the individual rates himself "left-of-center" on the political scale, and zero otherwise. Similarly, variable *hinfo* equals one if the individual's corresponding value for *envinf* is greater than 0.5, i.e., the individual rates himself "higher-than-middle" on the environmentally-informed scale, and zero otherwise.

[27] Note that the limitations we face in answering questions 1 and 2 with respect to *hyp*[#]'s marginal effect on *envcost* are no different than those faced by any empirical study of socio-economic phenomena when it comes to explaining how and why a specific relationship in the data exists, e.g., for the marginal effects of other socio-demographic variables such as age and education level.

[28] As with the variable *envcon*, our measure of how well-informed an individual perceives him- or herself to be about the environment (*envinf*) is purposely as general as possible (refer to Table 1). The reasons for adhering to this level of generality with *envinf* are precisely the same as those for *envcon* (refer to footnote 17).

As the table indicates, with respect to *hyp1* and *hyp2* the hypocrisy effect is larger solely for males. Based on *hyp3*, the hypocrisy effect is larger for lower-educated and more-conservative individuals in addition to males. We therefore have some evidence to suggest that different types of coffee-drinking hypocrites affect the environment to varying extents.

4. Summary and Conclusions

As this study suggests, economists likely have something to add to the musings of philosophers and psychologists on the subject of hypocrisy. That something is a quantitative assessment of hypocrisy's environmental costs. In studying the choices coffee drinkers make with respect to the type of cup in which their drink is taken – reusable vs. non-reusable – we find that each percentage increase in an individual's "hypocrisy score" results in roughly $0.0002 in additional costs associated with carbon emissions per week. We find evidence to suggest that this hypocrisy effect is larger for male, lower-educated, and more-conservative coffee drinkers.

Although the magnitude of the estimated cost associated with this human foible is admittedly small for coffee drinkers, the problem of hypocrisy merits attention. Our empirical results suggest that the social net benefit associated with reducing hypocrisy scores among coffee drinkers may in fact be positive. To see this, note from Table 1 that the average drinker adds roughly $0.01 per week in global carbon costs due to his use of non-reusable cups. We estimate the (private) benefit obtained from using non-reusable cups (in the form of *WTP* for their convenience) to be as low as −$0.19 and as high as $0.04 per cup. To the extent that his *WTP* for convenience is therefore less than $0.01 on a weekly basis, a net social gain from reducing the typical drinker's use of non-reusable cups is indeed attainable. Although our coefficient estimates for *hyp[#]* in Table 2 suggest that, all else equal, a relatively large reduction in a coffee drinker's hypocrisy score is needed to induce the requisite reduction in carbon cost (recall our discussion in Section 3), there appears to be plenty of scope for such a reduction, as the average drinker scores in a range of 54% to 56% on the hypocrisy scale (Table 1). Granted, wrestling with one's hypocrisy when it comes to choosing which type of cup to take coffee or tea in is one thing. When it comes to making other choices that have far greater environmental impacts, such as which mode of transportation to choose for day-to-day travel, or where and how to travel for vacation, the payoffs associated with reducing one's corresponding hypocrisy scores may be far more profound. Through deeper introspection, of the kind Rochefoucauld, Heschel, and Jung surely strove to provoke in us, we would be taking personal ownership of the externalities to which we contribute, perhaps with a longer-lasting effect on our consumptive behaviors.

The question naturally arises, why attempt to reduce people's hypocrisy through "deep regulation", e.g., through a cognitive-dissonance campaign geared toward instilling guilt and introspection in individuals, when taxation, subsidization, or the provision of technical information could potentially serve the same purpose (perhaps at a relatively lower cost per cup)?[29] Our answer is twofold. First, creating cognitive dissonance in an individual's mind – specifically via pointing out an individual's hypocrisy – has been shown to induce behavioral changes in a variety of social contexts, e.g., systematic use of condoms by young adults (Aronson et al., 1991; Stone et al., 1994), water conservation (Dickerson et al., 1992), road safety (Fointiat, 2004; Fointiat et al., 2008), and fighting racism (Son Hing et al., 2002).[30] Hence, we have a reason to believe that instilling cognitive dissonance (as a possible public policy) with respect to coffee drinkers' hypocritical behavior could also effectively mitigate their environmentally wasteful behavior.

Second, the possible spillover effects associated with confronting people about their hypocritical choices in life may outweigh those that would be obtained through standard price incentives, particularly when the cognitive-dissonance campaign is coupled with provision of information targeting a specific environmental problem — in our case the carbon cost associated with the use of non-reusable coffee cups. Similar to how rational behavior induced in market settings can spillover to non-market valuation settings (Cherry et al., 2003) and how an induced state of pessimism can induce individuals to accept significantly lower minimum acceptable offers in an ultimatum game (Dickenson and Oxoby, 2011), pointing out hypocrisy in one market setting may encourage less hypocritical behavior in other market settings. Here, unfortunately, we have only these two studies upon which to conjecture about the possibility of behavioral spillover effects associated with instilled cognitive dissonance on an individual, micro-economic level. To our knowledge, there are no known studies of micro-level, behavioral spillover effects associated with taxation and subsidization.[31]

Lastly, in addition to helping evince gaps in the cognitive-dissonance and behavioral-spillover literatures, this study's results also have an important methodological implication, as pointed out in Section 1. The long-held presumption among stated-preference researchers that (in well-designed surveys) hypothetical bias alone distinguishes revealed from stated values or behavior is incorrect. Part of this difference could in fact be explained by an individual's hypocritical behavior. Controlling for hypocritical bias would therefore refine our measurements of the bias we heretofore have attributed solely to the hypothetical nature of the survey instrument.

Appendix A. The Coffee Shop Survey

Thank you for agreeing to complete this survey. Your responses will help inform research being conducted by [NAMES REMOVED FOR SAKE OF ANONYMITY]. Once you have completed the survey, please fold it and slip it into the cardboard box marked "coffee shop survey" located near the cash register. The USU Institutional Review Board for the protection of human participants (IRB) has approved this study. If you have any questions or concerns you may contact [NAME REMOVED FOR SAKE OF ANONYMITY] at [NUMBER REMOVED FOR SAKE OF ANONYMITY] or email [ADDRESS REMOVED FOR SAKE OF ANONYMITY]. If you would like to contact someone other than the research team, you may contact the IRB Administrator at (435) 797-0567 or email irb@usu.edu.

[29] Festinger (1957) is generally credited with coining the term "cognitive dissonance", which is an aversive state of psychological tension aroused when an individual faces two inconsistent cognitions (Rubens et al., 2013). According to Rubens et al. (2013), Festinger (1957) believed that people are motivated to reduce this dissonance by changing one or both of the inconsistent cognitions. It is important to note the distinction between Festinger's notion of cognitive dissonance and that of hypocrisy. Hypocrisy is an anomaly (i.e., foible) in an individual's behavior that is not necessarily driven by confusion or mental stress, and whose occurrence requires no external (i.e., context-specific) or internal (non-context-specific) stimulus. In contrast, cognitive dissonance refers to a state of confusion in an individual's mind caused by mental stress that is in turn induced by some internal or external stimulus.

[30] Rubens et al. (2013) find that these behavioral changes are not robust to delays between pointing out the individual's hypocritical behavior and providing him or her with the opportunity to change that behavior.

[31] There are a handful of empirical studies that consider the spillovers associated with taxes/subsidies, but these are confined to either macroeconomic spillover effects, e.g., in the vein of Parry (1995), or the spillover effects on prices of commodities in related markets, e.g., in the vein of Heckman et al. (1998), not spillover effects on micro-level, individual behavior per se.

1. On average, approximately how many times per week do you visit a coffee shop to get a cup of coffee or tea?

_____ times per week.

2. On average, approximately what percentage of the time during a typical week do you take your coffee or tea in a cardboard cup or plastic cup provided by the coffee shop(s)? (*Please provide answers for both Cardboard Cup and Plastic Cup*).

Cardboard Cup _____ % Plastic Cup _____ %

If you answered anything greater than 0% to Cardboard Cup or Plastic Cup in Question 2, please answer the next two questions (Questions 3 and 4). Otherwise, you can skip to Question 5.

3. Before you answer this question, please think about 1) your income level, 2) your monthly expenses, and 3) how many times you visit a coffee shop during an average week. If the coffee shop(s) you visit on a regular basis begin charging you an extra $*xx* per cardboard cup and per plastic cup, would you switch to using a reusable cup for every visit to the coffee shop(s)? (*By "reusable cup" we mean any metal or plastic container that you bring with you to the coffee shop, or ceramic cup provided by the coffee shop, that can be reused multiple times, year after year.*)

_____ Yes, I would switch to using a reusable cup for each trip to the coffee shop.

_____ No, I would not switch to using a reusable cup for each trip to the coffee shop.

_____ Unsure

If you answered "Unsure" to Question 3, please skip to Question 5. Otherwise, answer Question 4 first.

4. Using the scale (1,2,3,4,5), with 1 meaning completely "uncertain" up to 5 meaning completely "certain" how certain are you of your answer to the previous question (Question 3)? _____

5. What is your gender? _____ Male _____ Female

6. What is your age? _____ years.

7. What is your current marital status?

_____ Single

_____ Living as domestic partners

_____ Married

_____ Divorced

_____ Widowed

8. What is your approximate average annual income from both earned (i.e., your salary) and unearned (i.e., mom and dad, inheritance, etc.) sources? (*Please check one category.*)

_____ Less than or equal to $25,000 per year.

_____ $25,001 - $50,000 per year.

_____ $50,001 - $75,000 per year.

_____ $75,001 - $100,000 per year.

_____ $100,001 - $150,000 per year.

_____ Greater than $150,000 per year.

9. What is the highest level of education you have completed at this point in time? (*Please check one category.*)

_____ 0 - 8 years, no high school diploma or GED

_____ 9 - 12 years, no high school diploma or GED

_____ High school diploma or GED

_____ Some college, no degree yet obtained

_____ Associates degree

_____ Bachelors degree

_____ Masters degree

_____ Doctorate or professional degree

10. Using the scale (1,2,3,4,5), with 1 meaning "very liberal" to 5 meaning "very conservative," how would you rate your political views? _____

11. Using the scale (1,2,3,4,5), with 1 meaning completely "uninformed" to 5 meaning "very informed," how would you rate the degree to which you are informed about political issues in general? _____

12. Using the scale (1,2,3,4,5), with 1 meaning completely "unconcerned" to 5 meaning "very concerned," how would you rate your concern for the environment in general? _____

13. Using the scale (1,2,3,4,5), with 1 meaning completely "uninformed" to 5 meaning "very informed," how would you rate the degree to which you are informed about environmental issues in general? _____

The End. Thanks again for completing this survey. You may now put it in the cardboard box near the cash register. If you borrowed one of our little pencils, we would appreciate it if you would also return it to the pencil box.

Appendix A (*continued*).

The End. Thanks again for completing this survey. You may now put it in the cardboard box near the cash register. If you borrowed one of our little pencils, we would appreciate it if you would also return it to the pencil box.

Appendix B. Empirical Results for Willingness to Pay

Explanatory variable	Regression coefficients	Marginal effects
	(Standard error)	(Standard error)
constant	−0.079	–
	(0.394)	
t_i	−1.656*	−0.571*
	(0.993)	(0.342)
cups	0.065**	0.022**
	(0.028)	(0.009)
male	0.225	0.078
	(0.149)	(0.052)
young	0.053	0.018
	(0.293)	(0.102)
middle	0.183	0.063
	(0.244)	(0.083)
lowinc	−0.346	−0.122
	(0.239)	(0.086)
midinc	−0.312	−0.102
	(0.245)	(0.076)
lowed	−0.415*	−0.139*
	(0.214)	(0.069)
mided	−0.212	−0.071
	(0.205)	(0.067)
loc1	−0.735**	−0.212**
	(0.312)	(0.070)

(*continued on next page*)

Appendix B (continued)

Explanatory variable	Regression coefficients (Standard error)	Marginal effects (Standard error)
loc2	−0.047	−0.016
	(0.228)	(0.079)
loc3	0.256	0.092
	(0.253)	(0.093)
Mean WTP[a]	−0.19 (−2.12, 2.03)	
Adjusted Mean WTP[b]	−0.25 (−2.41, 1.87)	
Log likelihood	−200.48	
χ^2 (LR)	41.68***	
Pseudo R^2	0.09	
Number of Observations[c]	355	
$\Omega_1 = \frac{\text{Predicted accept=1}}{\text{Observed accept=1}}$	0.04	
$\Omega_2 = \frac{\text{Predicted accept=0}}{\text{Observed accept=0}}$	0.99	

***Significant at 1% level, **significant at 5% level, *significant at 10% level.
[a]Krinsky and Robb (1986) 95% confidence interval in parentheses.
[b]Adjusted according to Champ et al.'s (1997) recoding method.
[c]Number of observations dropped from 521 to 355 due to missing data points.

Appendix C. The Social Net Benefit of Eliminating Hypocrisy

Let $u_i = u_i(\mathbf{a}_i, e_i; \beta_i, \gamma_i)$ represent individual i's continuously differentiable, quasi-concave utility function, where (1) $\mathbf{a}_i = (a_{i1},\ldots,a_{ij})$ is i's vector of activity levels for activities $j = 1,\ldots,J$, (2) e_i is i's perception of the environment's overall health, and (3) associated vector β_i and scalar γ_i parameterize u_i with respect to $\mathbf{a}_i$ and e_i, respectively, such that $\partial u_i(\cdot)/\partial a_{ij} > 0, \forall\ a_{ij}$, and $\partial u_i(\cdot)/\partial e_i > 0$. Further, let $e_i = f_i(\mathbf{a}_i; \mathbf{a}_{-i}, \boldsymbol{\theta}_i, \boldsymbol{\theta}_{-i})$ represent the mapping function for i's activity levels to his perception of the environment's health, where associated vector $\boldsymbol{\theta}_i$ and matrix $\boldsymbol{\theta}_{-i}$ parameterize f_i with respect to $\mathbf{a}_i$ and $\mathbf{a}_{-i}$, respectively, and subscript $-i$ denotes all individuals other than individual i.[32] For future reference we assume $\boldsymbol{\theta}_i$ ensures $\partial f_i(\cdot)/\partial a_{ij} < 0, \forall\ a_{ij}$, i.e., each of the individual's activities harms the environment.

If the individual behaves as if $\boldsymbol{\theta}_i = \boldsymbol{\theta}_i{}^T$ has been inserted in $f(\cdot)$, where $\theta_i{}^T = \left(\theta_{i1}{}^T, \ldots, \theta_{iJ}{}^T\right)$ represents i's 'professed' parameter vector, then i exhibits no hypocrisy. In this case, individual i parameterizes his environmental mapping function (and thus the perceived environmental-health portion of his utility function) strictly according to his professed beliefs, and then behaves accordingly in choosing his activity levels to maximize his welfare. It naturally follows that the number of θ_{ij} parameters not set equal to their corresponding $\theta_{ij}{}^T$ values defines the individual's degree of hypocrisy. For example, insertion of vector $\boldsymbol{\theta}_i = \left(\theta_{i1} \neq \theta_{i1}{}^T, \theta_{i2}{}^T, \ldots, \theta_{iJ}{}^T\right)$ denotes individual i as a first-degree hypocrite, insertion of $\boldsymbol{\theta}_i = \left(\theta_{i1} \neq \theta_{i1}{}^T, \theta_{i1} \neq \theta_{i2}{}^T, \theta_{i3}{}^T, \ldots, \theta_{iJ}{}^T\right)$ denotes second-degree hypocrisy, and so on. We assume that $f_i(\mathbf{a}_i, \mathbf{a}_{-i}; \boldsymbol{\theta}_i, \boldsymbol{\theta}_{-i}) > f_i\left(\mathbf{a}_i, \mathbf{a}_{-i}; \boldsymbol{\theta}_i{}^T, \boldsymbol{\theta}_{-i}\right), \forall \boldsymbol{\theta}_i \neq \boldsymbol{\theta}_i{}^T$, i.e., the perceived environmental effect of hypocrisy is always negative in the sense that by not parameterizing his environmental mapping function strictly according to his professed beliefs, the individual perceives his contribution to environmental damage (or, reduced environmental health) as being less than it actually is.

Without loss of generality (for the purpose at hand) consider the simple case of quasi-linear preferences defined over single-valued a_i and a_{-i} (e.g., taking coffee in a cardboard cup), and thus for single-valued parameters β_i, θ_i, and θ_{-i}.[33] Let the numeraire be defined as y_i.[34] Given local non-satiation of preferences, the individual's budget constraint holds with strict equality, i.e., $w_i = y_i + pa_i$, where w_i is i's wealth level and p is the (given) per-unit cost of activity a_i. Individual i's corresponding indirect utility can then be defined for the cases of $\theta_i = \theta_i{}^T$ and $\theta_i \neq \theta_i{}^T$, respectively, as,

$$v_i{}^T = v_i\left(p, w_i, \beta_i, \gamma_i, \theta_i{}^T, \theta_{-i}, a_{-i}\right) \tag{5}$$

$$\tilde{v}_i = v_i(p, w_i, \beta_i, \gamma_i, \theta_i, \theta_{-i}, a_{-i}). \tag{6}$$

where, given the earlier assumptions $\partial f_i(\cdot)/\partial a_{ij} < 0, \forall\ a_{ij}$, and $f_i(\mathbf{a}_i, \mathbf{a}_{-i}; \boldsymbol{\theta}_i, \boldsymbol{\theta}_{-i}) > f_i\left(\mathbf{a}_i, \mathbf{a}_{-i}; \boldsymbol{\theta}_i{}^T, \boldsymbol{\theta}_{-i}\right), \forall \boldsymbol{\theta}_i \neq \boldsymbol{\theta}_i{}^T$, we know that in a Nash equilibrium (where individual i takes $\mathbf{a}_{-i}$ as given), (1) $\tilde{v}_i > v_i{}^T$, (2) $\tilde{a}_i > a_i{}^T$, and (3) $\tilde{e}_i > e_i{}^T$, where $(\tilde{a}_i, _i)$ and $\left(a_i{}^T, e_i{}^T\right)$ are the optimal activity and perceived environmental-health values associated with $\tilde{v}_i$ and $v_i{}^T$, respectively. In other words, in the process of eliminating his hypocrisy individual i both reduces his activity level *and* perceives environmental health to be worse, which in turn reduces his maximum utility level.

Inverting Eq. (6) to obtain its associated expenditure function, $\tilde{m}_i$, and using the result $\tilde{v}_i > v_i{}^T$, leads to,

$$w_i = \tilde{m}_i = m_i(p, \beta_i, \gamma_i, \theta_i, \theta_{-i}, a_{-i}, \tilde{v}_i) > m_i\left(p, \beta_i, \gamma_i, \theta_i, \theta_{-i}, a_{-i}, v_i{}^T\right). \tag{7}$$

Willingness to pay to avoid having to correct for one's hypocrisy, $WTP_i{}^H$, is then defined as,

$$WTP_i{}^H = w_i - m_i\left(p, \beta_i, \gamma_i, \theta_i, \theta_{-i}, a_{-i}, v_i{}^T\right) > 0. \tag{8}$$

$WTP_i{}^H$ is a measure of the cost individual i incurs (i.e., the welfare individual i loses) as a result of eliminating his hypocrisy. This measure has been approximated (on a weekly basis) by WTP_p and $WTP_p{}^*$ in our study. The corresponding (social) benefit has been approximated by *envcost*. Thus, social net benefit is calculated as $envcost - WTP_i{}^H$.

[32] We acknowledge that a personal information set also determines i's perception of his contribution to environmental damage, but, for ease of exposition, do not explicitly include it as an additional parameter in $f(\cdot)$.
[33] Recall that e_i and associated parameter γ_i are single-valued by definition.
[34] For example, we can think of i's utility function looking something like $u_i(\cdot) = y_i + g_i(a_i, e_i(\cdot); a_{-i})$, where function $g_i(\cdot)$ satisfies strict concavity in a_i and e_i.

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