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# The “more is less” phenomenon in Contingent and Inferred valuation

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## Abstract

We examine inconsistencies in preference orderings of the “more is less” kind (Alevy et al. 2011) using the Contingent valuation (CV) as well as the Inferred valuation (IV) method (Lusk and Norwood 2009b). We find that when moving in the context of a familiar market for consumers (i.e., the food market) we only observe weak effects of inconsistencies. In addition, we find that the IV method is no better (and no worse) than the CV method in generating more consistent preference orderings. Surprisingly, we also find that the IV method generates higher valuations than CV, rendering one of its advantages of mitigating social desirability bias questionable.

**Key words:** willingness-to-pay (WTP), Contingent Valuation (CV), Inferred Valuation(IV), preference reversals

**JEL codes:** C9, C93, D12, Q51

## I. Introduction

Eliciting people’s valuation for non-market goods has been central in the economics literature. The Contingent Valuation method (CV) is by far the most popular valuation method and a big bulk of literature deals with refinements that (attempt to) address a number of documented biases. Recently, in an article in this journal, Lusk and Norwood (2009b) developed a new method for addressing the so-called social desirability bias, that is, the utility that people derive from stating a value to please the researcher or themselves. Respondents, in the presence of an interviewer may report socially desirable preferences, and thus misrepresent their “true” preferences, in order to either please the interviewer or to be consistent with social norms (Crowne and Marlowe 1960;Fisher 1993;Leggett et al. 2003;List et al. 2004;Plant et al. 2003). The respondent wishes to provide the answer that is most "socially acceptable" rather than speak his/her true feelings. Social desirability bias is intrinsic in CV studies.

Lusk and Norwood (2009b) thought that instead of asking people what *they* are willing to pay, to ask them what *they think another (average) person would pay*<sup>1</sup>. This simple twist in the wording of the valuation question generated (inferred) valuations that were close to real valuations (as compared to an experiment) but not hypothetical valuations (where social desirability is prevalent). Their results were also confirmed in Lusk and Norwood (2009a). They coined the term Inferred Valuation (IV) to describe this type of questioning in valuation studies. The aim of the IV method is not only to alleviate social desirability but also to moderate hypothetical bias. With the CV method people uncover preferences possibly including normative or moral considerations. On the contrary, with the IV method individuals are asked to predict how other people would behave and thus infer other’s people preferences that are ideally free from normative or moral considerations. A natural question that follows is whether this prediction of preferences could result in more consistent and well

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<sup>1</sup> A similar concept was introduced in Cummings and Harrison’s (1992) “inference game”.

defined preference orderings as compared to standard preference elicitation methods such as CV.

The often cited strand of the literature that deals with non-consistent preference orderings is the preference reversal literature (see Seidl 2002 for a review). Broadly defined, any systematic change in preference orderings between normatively equivalent conditions can be called a preference-reversal (Slovic and Lichtenstein 1983). The preference reversals literature took off with the study of Slovic and Lichtenstein (1968) and the help of economists (Grether and Plott 1979) that demonstrated the robustness of the effect. The phenomenon is an empirical regularity such that a pricing task for lotteries reveals opposite preferences from a choice task made out of the lotteries. More recently, List (2002) (as well as Alevy et al. (2011) in this journal) demonstrated a different type of preference reversals; those that occur between joint and isolated valuation modes (as opposed to different elicitation methods e.g., the pricing and choice task mentioned above). List (2002) showed that preferences in the sports card market follow a “more is less” pattern: while in a joint evaluation mode a superior bundle of sports cards is consistently valued more highly than an inferior bundle, in an isolated mode the inferior bundle is valued more than the superior bundle of cards. Reversals of preferences have also been observed for tasks that involve different evaluation scales (Bazerman et al. 1992;Goldstein and Einhorn 1987) as well as across evaluation modes (Hsee 1996;Irwin et al. 1993).

The consequences of preference reversals are significant since they refute a basic assumption of the rational choice theory, that preferences are consistent and stable. In contrast, they back up a behavioral decision theory which states that preferences are constructed on the spot when asked to form a particular judgment or to make a specific decision (Johnson et al. 2005;Lichtenstein and Slovic 2006;Payne et al. 1999;Slovic 1995). In this sense values are not merely uncovered when elicited, they are partly constructed at that time which implies labile preferences.

We designed two market based surveys with experimental treatments that allow us to specifically test for valuation mode effects. As our valuation products, we chose private goods that have specific quality dimensions that were signaled through appropriate forms of food labeling. Most qualitative attributes of food products can be considered as “credence” characteristics since their quality cannot be recognised before the purchase of food but also sometimes neither after their purchase (Caswell and Modjuzska 1996;Darby and Karni 1973). In our experiments we use “organic” (BIO) as well as “protected designation of origin” (PDO) food products as our superior quality products. The two experiments vary the saliency of the inferior quality product. In experiment 1, the inferior quality food product is the conventional counterpart. In experiment 2 we make the distinction between the inferior and superior quality product more salient by introducing a much more inferior product than in experiment 1. In addition, since the products used in experiment 1 are sold by their weight, we introduced an additional product in experiment 2 that is sold by number of items. The purpose was to mimic List’s (2002) design that used bundles of 10-pack and 13-pack sports cards.

Thus, our experiments allow us to draw conclusions regarding: a) whether we observe inconsistent preference orderings when we move out of the unfamiliar market of sports cards into the more familiar food market b) whether or not evaluative predictions (inferred valuations) are better able to generate consistent preference orderings c) the effect of saliency of the inferiority of one of the goods on preference reversals between joint and isolated evaluation modes and d) the success of the IV method in mitigating social desirability bias.

The latter is in essence a re-examination of Lusk and Norwood's (2009b;2009a) conclusions with different products, samples and in different cultural context (given our sample of European consumers).

## II. Experimental design

The experiments we designed are extensions of List's (2002) and Alevy et al. (2011) experiments. Therefore, several of the procedures for studying the implications of preference reversals across joint and separate valuation modes were similar to these studies. However, we alters List's (2002) and Alevy et al. (2011) studies by replacing the sport cards market (which trades commodities unfamiliar to the majority of consumers; especially true for non-US residents consumers) with a common and familiar market for most consumers i.e., the food market. The joint and separate modes are evaluated across two elicitation methods namely the Contingent and Inferred valuation methods. More than one products are used for each valuation method to check for the robustness of our results.

Data were collected in supermarkets from consumers while shopping. For half of the respondents valuations were elicited with the CV method and for the other half with the IV method. All valuation products were exhibited in photo stimuli (available in an online appendix at <https://sites.google.com/site/continfer/>). Subjects were asked to report their willingness to pay for the good in the photo which was also described orally. In Field Experiment (FE) 1, the superior quality products were selected to be an "organic" (BIO) and a "protected designation of origin" (PDO) product. The inferior quality products were the conventional counterparts. In FE 2, we made the inferiority of the low quality products more salient by selecting products that we presumed would be even less desirable as compared to conventional products. For this reason we selected a seed-oil as the lower quality counterpart of the organic olive oil. Moreover, in order to more closely mimic List's "sell-by-items" products (remember that *10-pack* and *13-pack* card bundles were offered for sale in List (2002) and Alevy et al. (2011)), we used eggs as our second valuation product. Eggs can be sold in packs of 4, 6, 8 and 12 eggs in super-markets or in customized packs in open-air food markets.

### *Field Experiment 1: Design issues*

FE 1 was carried out in super markets located in city AAA (removed for peer review; to be adjusted upon publication). The experimenter approached each participant and invited him/her to participate voluntarily in an interview. If the respondent accepted the invitation, then s/he was randomly allocated to one of the three evaluation modes ("less", "more" or "joint") following the methodology of List (2002) and to one of the two elicitation methods (Contingent or Inferred valuation). This design results in six treatments exhibited in the online appendix at <https://sites.google.com/site/continfer/>. Each subject was only exposed to one of the treatments. In each treatment, subjects were asked to evaluate two product categories (olive oil and apples) in randomized order. The specific products used are listed in the online appendix. In the "more" evaluation mode the inferior and superior quality products were tied together and presented as a single product. In the "Joint" evaluation mode subjects evaluated two products per product category side by side (the "less" and the "more" products) for a total of four products. Standard socio-demographic data were also collected. In all, it took twelve subjects to complete the full factorial design one time. An example is given in the online appendix.

To sum up, in the “Less” treatments (*LI* for Less-Isolated) subjects report their valuation for a quality food product. In the “More” treatments (*MI* for More-Isolated) subjects report their valuation for a quality food product *tied with* a smaller quantity of a conventional product. In the “Joint” treatments subjects report their valuation for both the quality food product (*LJ* for Less-Joint) as well as the quality product *tied together with* a conventional (*MJ* for More-Joint). This design is applied for two quality products (BIO and PDO) and two elicitation methods (CV and IV). We should note that while the additional conventional food product is of lower quality than the PDO or BIO counterparts, in aggregate, the superior food quality product *tied with* the lower quality product have a greater market value than the superior food quality product itself. In the “Joint” treatment, subjects evaluate the exact same products as in treatments *LI* and *MI* but this time side by side. We emphasize that no subject participated in more than one treatments, which means that each subject was exposed to either one of the valuation modes (i.e., Less, More or Joint). In addition, subjects evaluated the products using either CV or IV methods; that is, no subject reported valuations with both methods. Third, each subject reported his/her valuation for one quality product, either a PDO product or a BIO product but not both. However, each subject reported valuations for two product categories i.e., olive oil and apples. Lastly, order of appearance of valuation questions (and products) was completely randomized.

### *Field Experiment 1: The Survey*

A hypothetical market was established and WTP was elicited in an actual market place just before subjects enter a super-market. Interviews took place at various locations throughout the city, at stores of the three of the biggest food retailers in the country. The interviews were conducted by a single proctor (one of the authors) from Monday to Saturday, during morning and afternoon hours. In total, 588 completed questionnaires were collected. Table 4 depicts socio-demographic information from this sample.

WTP was elicited using a payment card format in which subjects selected their most preferred choice among a series of sixteen price intervals. More specifically we designed two payment cards, one for each product i.e., olive oil and apples (exhibited in the online appendix). The payment card intervals were constructed using an exponential response scale (Rowe et al. 1996). As Rowe, Schulze and Breffle (1996) discuss, psychologists experimenting with the brightness of a source of light define the difference between two sources of light as ‘just noticeable’ if the difference can be detected 75% of the time by a subject. If one has a sequence of sources arranged in order of increasing brightness,  $B_1, B_2, B_3, \dots, B_n$ , so that each source is just noticeably brighter than the preceding one, the relationship between the sources is given by Weber’s law:  $B_n - B_{n-1} = k \times B_{n-1}$  (1)

and the sequence of sources can be described by:  $B_n = B_1 \times (1 + k)^{n-1}$  (2)

Weber’s law has been found to apply broadly when individuals are asked to discriminate between stimuli or in our case between “just noticeable” differences of values. The payment card intervals can be calculated by selecting the number of cells  $n$  and  $B_n$ . Drichoutis et al. (2009) describe this procedure in detail. The prices were selected so as to cover a wide range of market prices for conventional and BIO/PDO olive oil and apples, respectively.

### *Field Experiment 2: Design issues*

In FE 2 we followed the same experimental design of FE 1 (exhibited in the online appendix) with some modifications for the valuation products. First, in order to make the “inferiority” of the low quality product more salient we tied the organic olive oil with seed oil (instead of conventional oil). Seed oils are widely considered inferior quality products in the country as compared to olive oil. In addition, since the products used up to now are sold by their weight, we introduced eggs (instead of apples) as the second valuation product. Eggs are sold by number of items. This allows us to more closely mimic List (2002) and Alevy et al. (2011) itemized-products (10-pack and 13-pack card bundles). Therefore, in each treatment subjects were asked to evaluate two product categories (olive oil and eggs) in randomized order. The specific products used are exhibited in the online appendix. As in FE 1, in the “More” evaluation mode the inferior and superior quality products were tied together and presented as a single product. In the “Joint” evaluation mode subjects evaluated two products per product category side by side (the “less” and “more” products) for a total of four products. In all, it took six subjects to complete the full factorial design one time.

To sum up, in the “Less” treatments (*LI*) subjects report their valuation for an organic food product. In the “More” treatments (*MI*) subjects report their valuation for an organic food product *tied with* a smaller quantity (less items) of seed oil (conventional eggs) (see Table 5). In the “Joint” treatments subjects report their valuation for both the quality food product (*LJ*) as well as the quality product *tied together with* an inferior product (*MJ*). This design is repeated for two elicitation methods (CV and IV).

We should note that while the additional inferior food products are of lower quality than the BIO counterparts, in aggregate, the superior food quality product *tied with* the lower quality product have a greater market value than the superior food quality product itself. In the “Joint” treatment, subjects evaluate the exact same products as in treatments *LI* and *MI* but this time side by side. No subject participated in more than one treatments, which means that each subject was exposed to either one of the valuation modes (i.e., Less, More or Joint). In addition, subjects evaluated the products using either CV or IV methods; that is, no subject reported valuations with both methods. Third, each subject reported valuations for two product categories i.e., olive oil and eggs. Lastly, order of appearance of valuation questions (and products) was completely randomized.

### *Field Experiment 2: The Survey*

WTP was elicited in an actual market place just before subjects enter a super-market. Interviews were conducted by the same proctor as in FE 1. In total, 192 completed questionnaires were collected. WTP was elicited using a similar payment card format to FE 1 (see the online appendix); payment card intervals were constructed using an exponential response scale. For olive oil the payment card was the same as in FE 1. The prices were selected so as to cover a wide range of market prices for conventional and organic olive oil and eggs, respectively.

## **III. Hypotheses and Results**

To test our hypothesis for “more is less” reversals we adopt the definitions in Alevy et al. (2011).

Definition 1: A strong evaluation mode effect is observed when, in aggregate, preferences over the goods are:  $LI$  (Less, Isolated)  $\succ$   $MI$  (More, Isolated) and  $MJ$  (More, Joint)  $\succ$   $LJ$  (Less, Joint).

Definition 2: A weak evaluation mode effect is observed when, in aggregate, preferences over the bundles are:  $LI \sim MI$  and  $MJ \succ LJ$ .

To test whether the elicitation method (Contingent or Inferred valuation) mitigates mode effects (in case we do observe mode effects) we can test for  $(LI - MI)_{CV} > (LI - MI)_{IV}$ . That is, we test whether the gap between the “Less” and “More” isolated treatments becomes smaller in the IV elicitation method. Finally, to test the effect of Inferred valuation on elicited valuations we can directly test whether  $Inferred < Contingent$ .

Table E7 in the online appendix summarizes the test forms that we adopt to test each one of our hypothesis. We can directly test these hypotheses by estimating an interval regression model with robust clustered standard errors (to account for multiple responses by the same person in the *Joint* treatments). The empirical specification for FE 1 follows closely Alevy et al.’s (2011) specification:

$$\begin{aligned}
 WTP_i = & a_0 + a_1 More_i + a_2 Joint_i + a_3 Infer_i + a_4 BIO_i + a_5 More_i \times Infer_i + a_6 Joint_i \times Infer_i \\
 & + a_7 More_i \times Joint_i + a_8 More_i \times BIO_i + a_9 Joint_i \times BIO_i + a_{10} BIO_i \times Infer_i \\
 & + a_{11} BIO_i \times More_i \times Joint_i + a_{12} BIO_i \times Infer_i \times More_i + a_{13} BIO_i \times Infer_i \times Joint_i \\
 & + a_{14} Infer_i \times More_i \times Joint_i + a_{15} Infer_i \times More_i \times Joint_i \times BIO_i + \mathbf{b}'\mathbf{DEM} + u_i
 \end{aligned} \tag{3}$$

The **DEM** vector is a vector of demographic variables. The *More*, *Joint*, *Infer* and *BIO* variables are dummies indicating conditions consistent with the variable name i.e., evaluation of the “More” product, evaluation in the “Joint” mode, evaluation using the inferred elicitation method and evaluation of the organic product respectively. A similar specification was adopted for FE 2 without the *BIO* dummy and its interactions (only organic products were evaluated in FE 2). To test our hypothesis, we use specification (3) to derive linear combinations of coefficients for hypothesis testing. These are exhibited in Table E7. Detailed derivations are shown in the online Appendix D. Results from estimating equation (3) are shown in the online Appendix A.

#### *Does CV and IV generate consistent preference orderings?*

To answer this question we test the “more is less” hypothesis. Notice that this test requires checking two hypotheses; a confirmation of inconsistent preference orderings requires that  $MI < LI$  and  $MJ > LJ$ , in aggregate. Table 1a shows the results of these tests from Field Experiment 1. For each product (olive oil and apples), product category (organic, PDO) and method (contingent and inferred valuation) we first test whether the respective linear combination of coefficients from Table E7 is  $\geq 0$  ( $H_0: Linear Comb. \geq 0$ ). The alternative hypothesis ( $H_1: Linear Comb. < 0$ ) is consistent with  $MI < LI$ . We then test whether the respective linear combination of coefficients is  $\leq 0$  ( $H_0: Linear Comb. \leq 0$ ). The alternative hypothesis ( $H_1: Linear Comb. > 0$ ) is consistent with  $MJ > LJ$ . Note that any p-value exhibited in the table implies  $(1 - pvalue)$  for the alternative hypothesis.

First notice that all linear combinations of coefficients are evaluated as positive which implies that  $MI > LI$  and  $MJ > LJ$ . More specifically, all hypothesis involving  $H_0: Linear Comb. \geq 0$  cannot be rejected which suggests that average WTP in the *MI* mode



is statistically significantly higher than average WTP in the *LI* mode<sup>2</sup>. On the other hand,  $H_0 : \text{Linear Comb.} \leq 0$  is highly rejected in all cases implying that average WTP in the *MJ* mode is statistically significantly higher than average WTP in the *LJ* mode.

Therefore, our Field Experiment 1 shows no evidence of preference reversals of the “more is less” type. Data from Field Experiment 2 can help test the robustness of this result. In FE 2 we made two significant changes: (a) the inferiority of the lower quality product was made more salient for olive oil by using seed oil instead of conventional olive oil and (b) eggs were used instead of apples to test whether the sell-by-items nature of the product (similar to List (2002) and Alevy et al. (2011) itemized card bundles) would make a difference.

Results are exhibited in Table 1b. The pattern is similar to FE 1. However, p-values for  $H_0 : \text{Linear Comb.} \geq 0$  are much lower than FE 1 and further away from conventional significance levels. In essence, p-values lower than 90% (which is equivalent to a 10% significance level) are equivalent to not rejecting  $H_0 : \text{Linear Comb.} = 0$  which implies that average WTP in the *MI* mode is not statistically different than WTP in the *LI* mode. This in turn implies that  $LI \sim MI$ . On the other hand, the hypothesis  $H_0 : \text{Linear Comb.} \leq 0$  is rejected in all cases implying that  $MJ \succ LJ$ . Therefore, in FE 2 we observe weak evaluation mode effects. Note that we didn’t observe differences between inferred and contingent valuation in neither field experiment.

#### *Does IV mitigate mode effects?*

Since we didn’t observe mode effects in FE 1 we can only test whether IV mitigates mode effects in FE 2. Table E7 shows the test form we adopt for this hypothesis testing as well as the respective linear combination of coefficients. Table 2 exhibits results from this test (only for FE 2). Notice, that estimated linear combinations of coefficients are negative, which indicates that  $(LI - MI)_{CV} < (LI - MI)_{IV}$  i.e., a larger gap between the “Less” and “More” modes in IV rather than CV<sup>3</sup>. However, the relative medium sized p-values are equivalent to not being able to reject  $(LI - MI)_{CV} - (LI - MI)_{IV} = 0$ . Given that we found that in FE 2 there are weak mode effects, our results suggest that Inferred valuation is not able to mitigate these effects since  $(LI - MI)_{CV} = (LI - MI)_{IV}$ .

#### *Does IV generate lower valuations than CV?*

The aim of the inferred valuation method, as originally used, was to mitigate social desirability bias that is encompassed in hypothetical bias. Lusk and Norwood (2009a;2009b) found that IV generated lower valuations than hypothetical valuations and was more close to real valuations. Therefore, we would expect that average WTP from IV to be lower than average WTP from CV:  $\text{Inferred} < \text{Contingent}$ . Table E7 indicates linear combinations of coefficients that are required to test our hypothesis, by treatment and product.

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<sup>2</sup> Note that a high pvalue for  $H_0 : \text{Linear Comb.} \geq 0$ , implies a low pvalue for  $H_1 : \text{Linear Comb.} < 0$ . Therefore, a pvalue  $> 90\%$  or  $> 95\%$  for  $H_0$  would be equivalent to a rejection for  $H_1$  at the 10% or 5% level respectively.

<sup>3</sup> This formulation of the test requires that  $LI > MI$  which is always the case with our data.

Table 3 exhibits results when testing the respective hypothesis appearing in Table E7. First notice that all linear combinations of coefficient estimates are positive indicating *Inferred > Contingent*. Significance tests are uniform across products, treatments and experiments: Inferred valuation generates statistically significant higher valuations than Contingent valuation. There are some minor exceptions for FE 1 in the Joint evaluation mode where the conclusion is that IV does not generate statistically significant different estimates, in aggregate, than CV (MJ and LJ treatments for PDO apples; LJ treatment for organic olive oil). Results are even stronger when considering the isolated evaluation modes in FE 2. In all, there is no single case where we can claim that Inferred valuation mitigates hypothetical or social desirability bias, given that Contingent valuation estimates are, in aggregate, always lower than estimates obtained from IV.

#### **IV. Discussion and Conclusions**

We started this article with a series of questions which we are now ready to answer. List's (2002) paper has been seminal in using data from the sports cards market to explore the preference reversal phenomenon. Our study showed that inconsistent preference orderings are harder to observe in the more familiar for consumers food market. In our first Field Experiment we found no evidence of preference reversals of the "more is less" kind. At best we observed some weak mode effects in Field Experiment 2 when we made the lower quality product more salient and "itemized" the product under valuation. This may be an indication that preference reversals of a "more is less" kind in the food market are only present under very special conditions.

In one sense, our results are consistent with Alevy et al.'s (2011) results that find that market experience alleviates mode effects. The food market can be considered a market in which consumers are more experienced (as compared to the sports cards market) and we would therefore expect the "more is less" phenomenon to be less prevalent. However, other studies have observed inconsistent preference orderings in the food market (Boothe et al. 2007)

Since we did observe some weak mode effects in FE 2, our second purpose was to scrutinize the ability of the Inferred valuation method in mitigating mode effects. However, we found no evidence in favor of IV. The gap in valuations from different modes ("More" or "Less") was not statistically significantly different between CV and IV. Therefore, we cannot advocate in favor (or against) of IV for generating consistent preference orderings.

Our last aim was to reexamine the effectiveness of the IV method in mitigating social desirability bias. In contrast to the results reported in Lusk and Norwood (2009a;2009b), our results show that Inferred valuation consistently generated higher valuations than Contingent valuation. To the extent that hypothetical bias and social desirability bias was present in our study (and we have no reason to believe that our study would differ from other hypothetical studies) this is a sign that IV failed to mitigate social desirability bias. Given that our study was conducted with a sample from a different cultural context than Lusk and Norwood's (2009a;2009b) US based studies, more studies from international samples are indeed warranted. It will take time and more studies of this kind to answer the question whether the inferred valuation method remains a promising method for mitigating biases in other contexts than the ones explored in the original studies. All in all, we believe that this topic could indeed be a prime area for future economic research.

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**Table 1a. Hypothesis for “more is less” in Field Experiment 1**

		Olive oil		Apples	
		Organic	PDO	Organic	PDO
		Linear combination (p-value)			
Contingent	$H_0 : \text{Linear Comb.} \geq 0$	1.293 (0.986)	1.558 (0.998)	0.376 (0.977)	0.509 (0.999)
	$H_0 : \text{Linear Comb.} \leq 0$	0.876 (0.00)	0.969 (0.00)	0.277 (0.00)	0.387 (0.00)
Inferred	$H_0 : \text{Linear Comb.} \geq 0$	1.300 (0.996)	1.355 (0.995)	0.288 (0.937)	0.651 (1.00)
	$H_0 : \text{Linear Comb.} \leq 0$	1.444 (0.00)	1.442 (0.00)	0.398 (0.00)	0.464 (0.00)

**Table 1b. Hypothesis for “more is less” in Field Experiment 2**

		Olive oil	Eggs
		Organic	Organic
		Linear combination estimates (p-value)	
Contingent	$H_0 : \text{Linear Comb.} \geq 0$	0.988 (0.855)	0.652 (0.902)
	$H_0 : \text{Linear Comb.} \leq 0$	0.571 (0.00)	0.328 (0.00)
Inferred	$H_0 : \text{Linear Comb.} \geq 0$	0.688 (0.819)	0.159 (0.632)
	$H_0 : \text{Linear Comb.} \leq 0$	1.077	0.747

(0.00) (0.00)

**Table 2.** Hypothesis testing whether IV mitigates mode effects

		Organic Olive oil	Organic Eggs
		Linear combination estimates (p-value)	
Field experiment 2	$H_0 : \text{Linear Comb.} \leq 0$	-0.300 (0.600)	-0.493 (0.764)

**Table 3.** Hypothesis testing whether IV generates lower valuations than CV<sup>a</sup>

		Olive oil		Apples		
		Organic	PDO	Organic	PDO	
		Linear combination estimates (p-value)				
Field experiment 1	Joint	More	1.094 (0.955)	1.795 (0.997)	0.457 (0.977)	-0.033 (0.432)
		Less	0.527 (0.824)	1.322 (0.990)	0.336 (0.950)	-0.109 (0.260)
	Isolated	More	0.782 (0.915)	1.430 (0.998)	0.252 (0.900)	0.401 (0.988)
		Less	0.775 (0.940)	1.633 (0.998)	0.340 (0.970)	0.259 (0.942)
		Olive oil	Eggs			
		Organic				
Field experiment 2	Joint	More	4.105 (0.999)	-	0.959 (0.965)	-
		Less	3.597 (0.999)	-	0.540 (0.858)	-
	Isolated	More	1.268 (0.914)	-	0.606 (0.898)	-
		Less	1.568 (0.984)	-	1.099 (0.986)	-

<sup>a</sup> The hypothesis tested is  $H_0 : \text{Linear Comb.} \geq 0$ . Table 7 requires that the Linear Combination of coefficients is  $< 0$ .