Non-Choice Evaluations Predict Behavioral Responses to Changes in Economic Conditions

Appendixes

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Appendix A: Additional Analyses

1. Treatment groups

Treatment R (30 subjects): Subjects made real choices using the strategy method. Each item appeared twice, once with a price of 25 cents and once with a price of 75 cents. In each case, the subject had to decide whether to buy the item at the specified price. The subject was told that, prior to stage 2 of the experiment, one choice problem would be selected at random and implemented, with all equally likely. Any subject who opted to make a purchase in the selected choice problem paid the indicated price out of the participation fee, and was given the item as a snack during the waiting period. Any subject who opted not to make a purchase in the selected choice problem received no snack and retained the entire participation fee.

Treatments H and HD (28 subjects each): Subjects considered the same choice problems as in treatment R, but were aware that all of their decisions were hypothetical, and would not be implemented. There is no difference between these two treatments; the "D" in "HD" stands for "duplicate." Duplicating treatment H allows us to investigate whether it is better to use additional subjects to increase sample sizes or answer new questions.

Treatment M (35 subjects)*:* Subjects considered the same choice problems as in treatment R, but were told in advance that all but five decisions would be hypothetical. The five real choices were interspersed among the hypothetical choices, but clearly indicated when they were presented. For each subject, the five items were drawn at random from a larger group of fifteen, selected for their representativeness,[1] and each was offered at a price of 75 cents. The purpose of this "mixed" treatment is to investigate the concern, discussed below, that the low probability with which any given choice problem was implemented in treatment R influenced purchase frequencies (possibly by inducing subjects to treat the "real" choices as hypothetical).

Treatment HCT (28 subjects): Subjects performed that same task as in treatment H, but a "cheap talk" script (as in Cummings and Taylor, 1999) was added to the experimental instructions, with the objective of inducing subjects to take the hypothetical choices more seriously, and thereby minimize hypothetical bias.[2]

Treatment HL (28 subjects): Subjects performed the same task as in treatment H, but the questions were modified to elicit the likelihood that the subject would buy the item using a five-point scale (1="very likely," 3="uncertain," 5="very unlikely"), rather than a yes/no decision. The object of this treatment is to collect information that permits us to distinguish between

[1] Specifically, the distribution of purchase frequencies (among Group R) for the 15 items mirrors the distribution of purchase frequencies for all 189 items.

[2] We would like to thank Laura Taylor for generously reviewing and suggesting changes to the script, so that it would conform in both substance and spirit with the procedure developed in Cummings and Taylor (1999).

statements about which subjects are reasonably certain, and those about which they are uncertain, analogously to Champ et al. (1997).

Treatment HV (28 subjects): Subjects performed the same task as in treatment HL, except they were asked to indicate how they thought a typical undergraduate of their own gender would answer. The object of these "vicarious" questions is to eliminate image concerns and hence elicit more honest answers, analogously to Rothschild and Wolfers (2011).

Treatment HWTP (28 subjects): Subjects expressed a hypothetical willingness to pay (WTP) for all of the food items, each of which appeared only once. We employed this protocol because much of the literature explores the accuracy of hypothetical WTPs rather than binary choices. We used the same subjects for treatments HWTP and L (below).[3]

Treatment SWB (28 subjects): For each potential outcome, subjects indicated their anticipated subjective well-being: "How happy would you be if you received this item (and ONLY this item) to eat as a snack during the second part of this experiment, and a price of $X was deducted from your show-up payment?" (with 1="very unhappy" and 7="very happy"). Each item appeared twice, once with a price of 25 cents and once with a price of 75 cents.

Treatment N (28 subjects): Subjects indicated whether each potential outcome would elicit social approval or disapproval: "Imagine that a subject in this experiment paid X cents to eat the item as a snack during the second part of the experiment. Would the typical person approve or disapprove of this purchase?" (with 1="strong disapproval" and 7="strong approval"). These ratings are intended to capture social norms and image concerns.

Treatment L (28 subjects): Subjects provided liking ratings for each item: "How much would you like to eat this item during the second part of the experiment?" (with 1="not at all" and 7="very much"). We include this treatment because liking ratings are known to be correlated with choices. As noted above, we used the same subjects for treatments L and HWTP.

Treatment S (29-38 subjects):[4] Subjects answered some or all of the following additional questions concerning the food items (answers scaled 1-5): 1) "How much would you later regret eating this snack?" 2) "How tempting is this item?" 3) "If you had no concerns about diet or

[3] We combined treatments HWTP and L because each required subjects to make fewer responses (i.e., one response for each item, rather than two as in treatment R and other hypothetical choice treatments).

[4] We collected 29 subject responses to questions 1, 5, and 6, and either 38 or 31 subject responses (depending on the item) to questions 2, 3, and 4.The variation in sample sizes across items for questions 2, 3, and 4, which occurred because of the manner in which the experiment evolved, is not ideal, but we doubt it has a meaningful impact on our results. Initially we collected responses to questions 1, 5, and 6 from a group of 9 subjects, and responses to questions 2, 3, and 4 from a group of 16 subjects, but concerning only 120 of the 189 items. We then collected responses to questions 1, 5, and 6 from a group of 20 subjects, and responses to questions 2, 3, and 4 from a group of 22 subjects, concerning all 189 items. We then collected responses to all six questions from a group of 9 subjects, but only for the 69 items for which we collected no data from the first two groups.

health, how much would you enjoy eating this item?" 4) "Is this item generally good or generally bad for you?" 5) "Would others form a positive or negative impression of you if they saw you eating this snack?" 6) "Are people likely to understate or overstate their inclination to pick this snack?" The responses to these questions may be useful for predicting choices because each question potentially measures factors related to the degree of hypothetical bias. Questions 1 through 4 address the degree to which immediate gratification conflicts with longer term considerations: we conjectured that hypothetical choices will be more sensitive to long-term costs, and less sensitive to immediate gratification, than real choices. Question 5 addresses concerns for social image: we conjectured that hypothetical choices will be more sensitive to image concerns than real choices. Finally, the purpose of question 6 is to determine whether subjects can provide subjective assessments of hypothetical bias that would be useful for the purpose of predicting choices, even if the sources of the bias remain unclear.

2. Analysis of variation in RPFs across items

To determine whether sampling variation could account for the observed variance of the RPF across items for a fixed price, we perform the following calculation. The reported sample variance of the RPF across items at a fixed price P_j is $s_{Rj}^2 = \frac{1}{N-1}\sum_{i=1}^{N}\left(R_{ij} - \bar{R}_j\right)^2$, where R_{ij} represents the RPF for item *i* when it sells for price P_j, $\bar{R}_j$ represents the overall average RPF at price P_j, and *N* denotes the number of items. Treating both the selection of items and the choice of subjects as random, and allowing for the possibility that the choices of a randomly selected subject may be correlated across decisions, one can show that

$$E\left[s_{Rj}^2\right] = \sigma_{Rj}^2 + \sigma_{\omega j}^2(1 - \rho_{Rj}),$$

where σ_{Rj}^2 denotes the true variance of the population RPF across items (given the distribution from which the items are selected), $\sigma_{\omega j}^2$ denotes the variance of the sampling error $\omega_{ij} = R_{ij} - R_{ij}^P$ across items, and ρ_{Rj} is the correlation between the sampling errors of two randomly selected items. For any given value of R_{ij}^P, the distribution of the sampling error is binomial, with $Var\left(\omega_{ij}\middle|R_{ij}^P\right) = R_{ij}^P(1 - R_{ij}^P)/N$, where *N* is the group size. Noting that the preceding formula is concave in R_{ij}^P, we have $\sigma_{\omega j}^2 < \bar{R}_j^P(1 - \bar{R}_j^P)/N$ (where $\bar{R}_j^P$ is the mean of R_{ij}^P for all of the items). Using $\bar{R}_j$ as an estimate of $\bar{R}_j^P$, we conclude that $\sigma_{\omega,0.25}^2 < \frac{27.76(100-27.76)}{30} = 66.8$ and $\sigma_{\omega,0.75}^2 <$

$\frac{20.26(100-20.26)}{30} = 53.9$. In addition, the correlation between sampling errors across item-price pairs is likely positive (e.g., because hungry subjects are more inclined to buy all items). Therefore, it is reasonable to infer that $\sigma_{\omega j}^2(1-\rho_j)$ is even smaller. In contrast, $s_{R,0.25}^2 = 120.7$ and $s_{R,0.75}^2 = 83.2$. We conclude that at least 40% of the variance in the measured RPFs at either price – and likely much more – reflects real variation in the appeal of the items pairs.

3. Details concerning the structural model

With a little algebra, one can reformulate the structural model in latent variable form. Specifically, we define

$$Y_{is}^* \equiv \delta + Z_i\gamma + \eta_{is} \,, \qquad (1)$$

where $\delta = -\frac{P_1}{\sigma}$, $Z_i = X_i q_i$, and $\gamma = \frac{\beta}{\sigma}$. Notice that if X_i includes a constant, then Z_i includes grams per serving; if X_i includes nutrients per gram, then Z_i includes nutrients per serving; if X_i includes other characteristics, then Z_i includes those characteristics interacted with grams per serving. The condition $V_i + \varepsilon_{is} \geq P_1$, which governs the purchase decision, is then equivalent to $Y_{is}^* \geq 0$. Thus, we can estimate (1) as a logistic regression.

Once we estimate this model with choices made at the price P_1, we can use it to forecast choices at some alternative price, P_2 . At the new price, the value of the latent variable becomes

$$\hat{Y}_{is}^* = \delta\left(\frac{P_2}{P_1}\right) + Z_i\gamma + \eta_{is} \,.$$

So, for example, if P_1 is \$0.25 and P_2 is \$0.75, we simply multiply the constant in the estimated equation by 3 (which should reduce $\hat{Y}_{is}^*$ because we expect δ to be negative), compute the implied probability that subject s will purchase item i based on the estimated distribution of η_{is}, and then average those probabilities over subjects to obtain the predicted RPF for item i .

We implemented multiple versions of the preceding model, which include different variables in the vector Z_i . For the simplest, Z_i includes only grams per serving. Additional variants add variables measuring nutrients per serving, category dummies interacted with grams per serving, or both. In the text, we report results based on the model for which Z_i includes grams per serving interacted with category dummies Though that model performed poorly, it outperformed all of the other structural models we examined.

4. Quantifying "hypothetical noise"

Performing the same decomposition as for the RPFs, we have:

$$E\left[s_{Hj}^2\right] = \sigma_{Hj}^2 + \sigma_{\mu j}^2(1-\rho_{Hj}),$$

where all the terms are analogous to those defined for the RPFs, and μ (rather than ω) denotes the sampling error. Greater "randomness" in choice can show up as HPFs that are closer to 50 percent than the RPFs (which increases $\sigma_{\mu j}^2$), and/or less correlation between the sampling error for distinct item-price pairs ($\rho_{Hj} < \rho_{Rj}$). Still, by the same reasoning as for the RPFs, $\bar{R}_j^P(1-\bar{R}_j^P)/N$ provides an upper bound on $\sigma_{\mu j}^2(1-\rho_{Hj})$. Thus, $\sigma_{\mu,0.25}^2(1-\rho_{Hj}) < \frac{38.33(100-38.33)}{28} = 84.4$, and $\sigma_{\mu,0.75}^2(1-\rho_{Hj}) < \frac{23.44(100-23.44)}{28} = 64.1$. But then, because $s_{H,0.25}^2 = 222.8$, we infer that $\sigma_{H,0.25}^2 > 138.4$; likewise, because $s_{H,0.75}^2 = 158.8$, we infer that $\sigma_{H,0.75}^2 > 94.7$. Those lower bounds exceed, respectively, $s_{R,0.25}^2 = 120.7$ and $s_{R,0.75}^2 = 83.2$. Because $\sigma_{R,0.25}^2$ and $\sigma_{R,0.75}^2$ are likely considerably smaller than the latter figures (which include sampling error), we conclude that σ_{Hj}^2 likely exceeds σ_{Rj}^2 by a wide margin.

5. Detailed analysis of hypothetical choice protocols

Here we examine the accuracy of hypothetical purchase frequencies elicited through other protocols. Two of those protocols elicit purchase likelihoods, either for the respondent (treatment HL) or for a typical undergraduate of the same gender (treatment HV). In each case, we create two HPF measures, classifying a response as a purchase if it indicates, respectively, certainty (i.e., a "1") or high likelihood (i.e., either a "1" or a "2"). We label these alternatives "likely (1)," "3rd party (1)," "likely (≤2)," and "3rd party (≤2)." We also create two alternative HPFs using the hypothetical WTPs. For one, we treat a response as indicating a purchase if the WTP exceeds the price. For the other, we follow the spirit of the procedure NOAA considered: we multiply the stated WTP by an adjustment factor, and then compare the adjusted WTP to price. We choose the adjustment factor so that the implied HPF coincides as close as possible with the RPF for the calibration sample.[5] For the summary statistics reported in Table 2, we use all of our data to calibrate the adjustment factor. However, when predicting from choices at price P_1 to choices at price P_2, we use only the choices at price P_1 as the calibration sample (because the exercise assume that data on real choices at the price P_2 are unavailable). Results appear in Tables A.1 and A.2. Based on these results, we reach the following conclusions.

[5] Because the distribution of WTPs is "lumpy," it is usually impossible to find an adjustment for which the actual and implied purchase frequencies match exactly.

First, consistent with findings in the literature, several alternative protocols reduce the overall degree of hypothetical bias (shown in the second column of Table A.1). Ignoring the adjusted WTP (for which low bias is guaranteed by construction), the cheap-talk protocol performs best according to this metric, followed closely by "3rd party (1)." For the cheap-talk protocol, the gap between the average RPF and the average HPF falls from 6.86 to 2.45 percentage points (though it remains statistically significant, $p < 0.01$).

There are, however, two possible explanations for results such as these: one is that the protocol mitigates the cause of the bias; the other is that it introduces an offsetting bias. If the second explanation is correct, then the putative benefit of the protocol may reflect a fortunate coincidence rather than a legitimate solution. Significantly, that explanation would account for the observation that the performance of the cheap-talk protocol has proven somewhat sensitive to its details and to the context. Additional results described below provide several reasons to credit the second explanation rather than the first, and hence to question the value of alternative protocols that appear to reduce hypothetical bias.

Second, of the approaches we consider, the one that arguably performs best overall is "3rd party (1)."[6] By almost all of the metrics, it is either the best or one of the best alternatives. It performs especially well when used in conjunction with the difference method (Table A.1): in that case, the overall bias in predicting the change in the RPF is +22%, less than one-quarter of the bias for the standard protocol; the MSPE, 68.2, is roughly half as large for the standard method; and the calibration coefficients for levels, 0.681 (predicting \$0.25 choices) and 0.566 (predicting \$0.75 choices), are higher than for all other alternatives. Only the calibration coefficient for changes (0.217) is inferior to those associated with some of the other methods. The superior performance of this approach does not surprise us, in that questions about third parties do not trigger motives pertaining to social image that can create divergences between responses to hypothetical and real choice questions. These findings are notable in that, to our knowledge, vicarious hypothetical choice questions have not been used in the SP literature.

While the "3rd party (1)" approach performs well relative to other alternatives involving hypothetical choices, its performance may not be "good enough" for economic applications. Accuracy is even lower with the levels method: when predicting from \$0.25 to \$0.75 choices, the overall bias is +44.4% (see Table A.2).

Third, aside from the "3rd party (1)" approach, none of the alternatives considered yields a clear improvement over the standard hypothetical choice protocol. Strikingly, the overall

[6] We say "arguably" because the comparison hinges on how one weights the various performance metrics.

correlation between the RPF and the standard-protocol HPF is higher than for any alternative HPF, which casts doubt on the hypothesis that the alternative protocols improve the informational content of the hypothetical choice measures.

In other respects, comparisons between the standard protocol and the other alternatives (aside from "3rd party (1)") are decidedly mixed. Take the cheap-talk protocol. The summary statistics in Table A.1 show that, despite achieving the lowest overall hypothetical bias, it slightly reduces the correlation between the RPF and the HPF, and slightly increases variance (an indicator of hypothetical noise). When using the difference method to make predictions (also Table A.1), the cheap-talk protocol *amplifies* hypothetical bias: on average, the predicted price response is roughly two-and-a-half times as large as the actual response (versus two times for the standard protocol). It also noticeably underperforms the standard protocol with respect to MSPE, but performs modestly better with respect to calibration. Using the levels method, the two approaches are almost identical with respect to all metrics when predicting choices at \$0.75, but the cheap-talk approach performs somewhat better when predicting choices at \$0.25.

The story is similar for the other alternatives. In most cases, whether a given alternative is better or worse than the standard protocol depends on the method used to make predictions (differences or levels), and how one weights the various performance metrics. Aside from "3rd party (1)," no other approach yields a clear improvement. Accordingly, these results suggest that the other protocols reduce hypothetical bias mainly by inducing offsetting biases, rather than by curing the causes of the bias. Whether they improve or degrade the informational content of hypothetical choices remains somewhat unclear; we return to that question in the next section of this appendix.

Fourth, all of the alternative protocols perform poorly relative to appropriate benchmarks. First consider comparisons to the myopic benchmark; for convenience, we reproduce its performance statistics in Tables A.1 and A.2. We reiterate that this is a very low standard – any method that underperforms myopia merits no further consideration. The various alternative HPFs outperform this benchmark in some cases, depending on the method used (differences or levels) and whether one is forecasting choices at \$0.25 or \$0.75. However, the only method that consistently improves upon it (regardless of method or direction of the forecast) is "3rd party (1)." With respect to MSPE, improvements are uncommon (only three of the 25 cases shown in the tables), and in most cases performance deteriorates considerably. The "3rd party (1)" approach accounts for two of the three instances of improvement: it performs quite a bit better when using the differences method, a bit better when using the levels method to predict choices at \$0.75, and

a bit worse when using the levels method to predict choices at $0.25 (averaging about the same across the two directions). The only other improvement with respect to MSPE is for "likely (2)" which, given the other performance statistics, appears unrepresentative. With respect to calibration for levels, all of the methods significantly underperform the myopic benchmark. The only exception involves the use of adjusted WTP to predict choices at $0.75. That result is plainly an outlier for the adjusted WTP method, which generally falls far short of the myopic benchmark. Calibration for differences is not defined for this benchmark.

Thus, the only alternative that arguably yields a significant and consistent improvement over the myopic benchmark couples the "3rd party (1)" approach with the difference method. That alternative achieves significant reductions in bias and MSPE at the cost of somewhat poorer calibration. However, as noted above, even that alternative yields an average prediction error exceeding 20% for price sensitivity. Furthermore, its performance falls far short of the most demanding benchmark shown in Table 1, which provides an indication of what more standard methods achieve when better choice data are available. Consequently, even the best alternative considered in Tables A.1 and A.2 may not merit serious consideration as a tool for predicting behavioral responses to changes in economic parameters.

Fifth, good performance with respect to calibration for differences is particularly hard to achieve. Using the difference method, the largest calibration parameter for differences is 0.272; for the levels method, it is 0.251 when predicting $0.25 choices, and 0.316 when predicting $0.75 choices. Thus, the variation in actual price sensitivity across items is only weakly related to the variation in predicted price sensitivity, regardless of the protocol and method used. Sampling error in the HPFs is part of the explanation, but as discussed in section 5.C, increases in group size improve calibration only to a limited degree.

Sixth, predictions based on hypothetical WTPs are particularly poor. Though a NOAA-style adjustment minimizes hypothetical bias within sample by construction, it is of practically no value when predicting out of sample using the difference method. Though it improves performance somewhat when predicting out of sample using the levels method, the overall bias and MSPE remain sizeable. Thus, whether or not one makes a NOAA-style adjustment, the use of stated WTPs leads to remarkably poor out-of-sample predictions.

6. Detailed analysis of simple prediction models

We begin by examining the predictive performances of simple univariate OLS regressions of the RPF on the various HPF, one at a time. Because the RPF aggregates binary

choices over subjects, there are potential justifications for employing other specifications. However, a look at the scatterplot shown in Figure 1 suggests that a linear function will likely fit the data well. That impression is confirmed by non-parametric estimates (see Figure A.2). It is also important to bear in mind that our objective here is to estimate predictive relationships rather than causal relationships. As White (1980) has shown, predictions based on OLS estimates always yield the lowest expected MSPE conditional on using the adopted specification, even when that specification deviates from the true functional form.

Table A.3 reports model selection criteria for these univariate models. When predicting from $0.75 choices, both the AIC and the CV-MSPE favor using a model that incorporates the standard HPF over all other alternatives. When predicting from $0.25 choices, both the AIC and the CV-MSPE favor the cheap-talk HPF followed by the standard HPF.

Table A.4 reports our various metrics of out-of-sample predictive accuracy for the univariate models. At the top of the table, we also reproduce some benchmark results.

The first lesson from Table A.4 is that a simple regression of the RPF on the standard HPF yields an equation that performs admirably with respect to predicting the purchase frequencies that would be observed after a large price change. The average biases are quite small: −7.3% when predicting from $0.75 choices, and -5.9% when predicting from $0.25 choices – in each case, well within the tolerances to which economists are accustomed. In terms of MSPE, this specification outperforms the myopic benchmark by a wide margin; more impressively, it matches the more challenging benchmarks (which use data on real choices at both prices) when predicting from $0.75 choices, and is at least in the same ballpark when predicting from $0.25 choices. Calibration is much improved compared with the results in Tables 2 and 3. For levels, the calibration parameter is 0.919 when predicting from $0.75 choices, which falls a bit short of the benchmarks but nevertheless is nearly ideal; when predicting from $0.25 choices, it is 0.692, which at least surpasses the myopic benchmark. Given the difficulty of achieving good calibration for changes (see the results for the RPE predictor benchmark), the associated parameters (0.531 and 0.523) are respectable, although clearly there is room for improvement.

The second lesson to be drawn from Table A.4 is that, when HPFs are used as predictors rather than predictions, the standard protocol is generally superior to the alternatives. We find this result surprising in light of the literature on methods for improving hypothetical questions, though obviously less so given Tables A.1, A.2, and A.3. Specifications using the cheap-talk HPF yield some improvement in the MSPE when predicting from $0.75 choices, as well as in two of the calibration parameters. However, these gains come at the cost of substantially greater

overall bias, which reflects the fact that the Chow test rejects equality of the coefficients across the \$0.25 and \$0.75 samples (p = 0.042). Specifications using the "likely (1)" variable achieve very low overall bias; not surprisingly, the Chow test statistic fails to reject equality of the coefficients (p = 0.724). However, the MSPEs are significantly higher and the calibration parameters lower. Specifications using the "likely (2)" variable achieve a small reduction in overall bias when predicting from \$0.25 choices, but no other gains. Surprisingly, specifications using the "3rd party (1)" variable yield no improvements, and those using the "3rd party (≤2)" variable only improve one of the calibration parameters. Finally, when predicting from \$0.75 choices, the specification that uses the WTP variable improves one of the calibration parameters and generates predictions with virtually no overall bias. However, when predicting in the opposite direction, the overall bias is quite large, MSPE rises, and the other calibration parameters decline.

The third lesson to take from Table A.4 is that the univariate prediction approach works tolerably well for *all* of the protocols. Relative to the myopic benchmark, the overall bias falls by more than 50% in all cases but one (for which it also declines), MSPE falls by more than 40% in all cases but one (for which it rises), and calibration in levels is generally comparable (though a bit lower when predicting from \$0.75 choices). Though in many instances predictive performance falls short of the more demanding benchmarks (that make use of additional choice data), it is generally closer to those standards than to myopia.

Next we ask whether it is possible to improve out-of-sample predictive accuracy by using more than one HPF and other non-choice ratings in combination. We would expect specifications that include multiple HPFs to yield more accurate predictions if the alternative protocols elicit different types of predictively useful information (as opposed to measuring the same information with different noise). In addition, if (as intended) the questions posed to subjects participating in treatment S address the likely causes of divergences between RPFs and HPFs, we would expect to achieve further improvements by including measures of the associated responses.

To determine whether the treatment S data capture some of the causes of hypothetical bias, we estimate a collection of bivariate regressions, each of which relates the RPF to the standard HPF and the mean response for one of the treatment S questions, pooling all of our data.[7] Regression results appear in Table A.5. The coefficients of the additional non-choice

[7] A seemingly natural alternative would have been to regress the difference between the RPF and the HPF on the same variables. However, we know from Figure 1 that the magnitude of hypothetical bias increases (both absolutely and proportionately) with the purchase frequency. As a result, any variable that is correlated with the desirability of the item will appear to account for the gap. Moving the HPF to the right-hand side of the equation is more appropriate for

rating variables are all highly statistically significant, with the exception of the temptation variable. Accordingly, it appears likely that, by exploiting the information contained in the additional rating variables, we should be able to improve upon predictions that use only hypothetical choice variables.

Rather than consider all possible permutations of predictors, for the remainder of this section we will include the standard HPF in all specifications (on the grounds that it is arguably the best single predictor), and examine the effect of adding each of the other HPFs and non-choice rating variables, one at a time. Table A.6 reports model selection criteria for these bivariate models (and reproduces corresponding statistics for the best univariate specification).

The inclusion of a second HPF improves the AIC in all cases; it improves the CV-MSPE in all cases when predicting from \$0.75, and in half the cases when predicting from \$0.25. When predicting from the \$0.75 choices, the "3rd party (1)" HPF is the preferred co-predictor among the HPFs according to the AIC; it is slightly bested by "Likely (<2)" according to the CV-MSPE. When predicting from the \$0.25 choices, the cheap talk HPF is preferred according to both the AIC and the CV-MSPE. The inclusion of rating variables yields improvements in some but not all cases. The liking variable is the preferred co-predictor among the ratings according to the AIC when predicting in either direction, and according to the CV-MSPE when predicting from \$0.75 choices; it is slightly bested by "Over/understate" according to the CV-MSPE when predicting from \$0.25 choices. Overall, when predicting from \$0.25 choices, the preferred co-predictor is the "3rd party (1)" HPF according to AIC and the "Likely (<2)" HPF according to CV-MSPE; when predicting from \$0.75 choices, the preferred co-predictor is the liking variable according to the AIC and the cheap talk HPF according to CV-MSPE.

There is, however, an important caveat with respect to the apparent implication of Table A.6 that one can improve predictive performance by using the standard HPF in combination with other hypothetical choice and non-choice rating variables. As we have noted, our HPFs are measured with sampling error. Thus, we would not be surprised to see improvements like those in Table A.6 even if the additional variables were nothing more than noisy proxies for standard-protocol HPFs elicited with new groups of subjects. If one has the opportunity to gather data

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our purposes, because our object is to determine whether the non-choice ratings can be used to improve the *best* prediction one can make based on the HPF.

Yet another alternative would have been to estimate a single regression with the HPF and all the non-choice ratings on the right-hand side. That strategy would certainly be more appropriate were we primarily interested in causal interpretations of the coefficients. However, our main objective is to assess incremental contributions to predictive power. While we will eventually search for the best combination of predictors, it is useful to start by examining their performances one at a time.

from additional subjects, it is therefore unclear whether one should enlarge the standard-protocol sample, or collect different types of non-choice data from a new sample.

To shed light on this issue, we also evaluate a bivariate specification containing the HPFs for treatments H and HD (both of which use the standard protocol). Results appear in last line of Table A.6 (labeled "Hypothetical – duplicate"). Notice that this specification is preferred to all others according to both criteria when predicting from \$0.75 choices, and according to the CV-MSPE when predicting from \$0.25 choices (in which case it is also a close second according to the AIC). Thus, our within-sample criteria favor enlarging treatment group H over the alternatives. One should bear in mind, however, that the benefits of gathering more data using the same protocol decline with the size of the treatment group, because the sampling error shrinks. Thus, with larger treatment samples, the benefits of adding hypothetical and non-choice rating variables would likely be even more apparent according to our within-sample criteria.

Table A.7 reports our various metrics of out-of-sample predictive accuracy for the bivariate models that include two HPFs. For convenience, at the top of the table, we also reproduce results for some key benchmarks and the for the preferred univariate model (which includes only the standard HPF). The model that includes the standard HPF plus the "3rd party (1)" HPF, which our within-sample model selection criteria often favor over specifications that add other alternative HPFs, outperforms the preferred univariate model across the board. The NAEs imply that the average biases are tiny: +2.2% when predicting from \$0.75 choices, and −2.5% when predicting from \$0.25 choices – acceptable margins of error even by the most exacting standards; not surprisingly, a Chow test fails to reject equality of the coefficients, which are virtually the same for the two subsamples (p = 0.937). This specification also achieves a lower MSPE than even the most demanding benchmarks (those that use additional choice data) when predicting from \$0.75 choices, and underperforms them by only a slightly larger margin when predicting from \$0.25 choices. Finally, the calibration parameters are all respectable (0.924 and 0.728 for levels, and 0.645 and 0.674 for differences), if still somewhat lower than for the best-performing benchmark. Thus, this simple specification yields remarkably accurate predictions of the purchase frequencies that would be observed after a large price change.

Other specifications in Table A.7 yield predictions that improve upon those obtained from the preferred univariate regression by one or more criteria, particularly MSPE and calibration.[8] However, these gains often come at the cost of overall greater bias. Significantly, with respect to bias and MSPE, *all* of these specifications – including the one that adds a second

[8] It bears emphasis that adding variables to a prediction model does not necessarily improve out-of-sample performance.

standard HPF based on treatment HD – uniformly underperform the one that includes the standard HPF and the "3rd party (1)" HPF; moreover, none performs much better with respect to any aspect of calibration.

Table A.8, which is configured identically to Table A.7, reports our metrics of out-of-sample predictive accuracy for bivariate models that include the standard HPF along with one of our non-choice ratings variables. The model that includes both the standard HPF and the liking variable, which our within-sample model selection criteria favor within this group, delivers excellent calibration parameters (0.987 and 0.722 for levels, and 0.783 and 1.064 for differences), but also produces substantial overall biases, which drive up MSPE. As indicated by the Chow test statistic, the coefficients of the estimated relationship differ significantly between the two subsamples, and in this instance those differences are consequential.

Significantly, every bivariate model in Table A.8 improves every measure of calibration relative to the preferred univariate model. Thus, including non-choice ratings in the set of predictors may be the key to achieving high-quality calibration. MSPE also falls for a number of the specifications, with the largest declines occurring for the ones that add the "approve/disapprove" and "happiness" variables; indeed, both of those specifications arguably perform better overall than the one that includes a second standard HPF based on the HD sample. Notably, among the specifications that add a non-choice ratings variable, those rank second and third according to our within-sample model selection criteria in three of four cases, and one ranks second in the fourth case (see Table A.6). All of the bivariate specifications in Table A.8 yield larger overall biases than the preferred univariate specification, though the difference is modest in several cases.

7. Variables included in optimized models

As explained in the text, LASSO performs variable selection. Table A.9 indicates which variables LASSO retained for each of the models reported in Tables 1 and 2. We further refined variable selection by maximizing measures of cross-validated predictive performance. Table A.10 indicates which variables those procedures retained for the models reported in Table 2.

Table A.1: Measures of hypothetical demand: summary statistics and predictive accuracy of the difference method

Demand Variable	Summary statistics				Predictive accuracy, difference method				
	Mean (%)	Overall hyp. bias	Variance	Correlation with RPF	NAE	MSPE	Calibration (level, to $0.25)	Calibration (level, to $0.75)	Calibration (Δ)
Real	24.01	0	115.7	1	NA	NA	NA	NA	NA
Myopic benchmark	NA	NA	NA	NA	0.000	93.3	1.001	0.690	NA
Hypothetical	30.88	6.86	245.8	0.697	1.987	137.4	0.610	0.500	0.248
Hyp - cheap talk	26.46	2.45	254.0	0.693	2.513	206.2	0.612	0.518	0.272
Hyp – likely (1)	17.89	-6.13	147.5	0.635	1.717	108.9	0.605	0.512	0.140
Hyp – likely (≤2)	29.97	5.96	276.7	0.666	2.481	218.0	0.566	0.463	0.194
Hyp – 3rd party (1)	21.50	-2.51	145.4	0.643	1.220	68.2	0.681	0.566	0.217
Hyp – 3rd party (≤2)	43.47	19.46	264.1	0.582	1.611	119.1	0.582	0.460	0.010
Hyp – WTP	64.20	40.18	358.7	0.594	3.456	494.1	0.402	0.369	0.062
Adjusted hyp – WTP	23.27	-0.74	495.5	0.511					
From $0.75 to $0.25					6.400	1776.2	0.465		0.135
From $0.25 to $0.75					2.886	406.2		0.152	0.023

Table A.2: Measures of hypothetical demand: predictive accuracy of the levels method

Demand Variable	Predicting from $0.75 to $0.25				Predicting from $0.25 to $0.75			
	NAE	MSPE	Calibration (level)	Calibration (change)	NAE	MSPE	Calibration (level)	Calibration (Δ)
Myopic benchmark	0.000	93.3	1.001	NA	0.000	93.3	0.690	NA
Hypothetical	2.409	243.1	0.474	0.207	0.577	103.4	0.466	0.240
Hyp - cheap talk	2.084	171.3	0.538	0.251	1.430	104.5	0.458	0.242
Hyp – likely (1)	0.541	120.5	0.538	0.169	2.176	148.7	0.593	0.308
Hyp – likely (≤2)	2.535	292.2	0.419	0.171	0.946	85.9	0.489	0.246
Hyp – 3rd party (1)	0.775	115.3	0.525	0.148	1.445	85.6	0.542	0.316
Hyp – 3rd party (≤2)	3.902	670.0	0.345	0.095	-1.291	438.9	0.351	0.131
Hyp – WTP	7.589	2546	0.551	0.177	-3.133	1147.2	0.29	0.13
Adjusted hyp – WTP	6.128	1620.3	0.445	0.151	3.509	427.9	0.943	0.33

Table A.3: Model selection, specifications employing a single hypothetical choice variable

Hypothetical Choice Variable	Predicting from $0.75 to $0.25		Predicting from $0.25 to $0.75	
	AIC	CV-MSPE	AIC	CV-MSPE
Hypothetical	-465.2	56.8	-394.8	61.8
Hyp - cheap talk	-442.3	65.6	-413.3	58.6
Hyp – likely (1)	-422.6	62.7	-377.6	66.7
Hyp – likely (≤2)	-454.9	59.8	-378.2	67.2
Hyp – 3rd party (1)	-445.3	61.0	-373.1	77.9
Hyp – 3rd party (≤2)	-433.2	61.8	-346.7	86.3
Hyp – WTP	-418.9	67.8	-369.3	92.5

Table A.4: Predictive accuracy of specifications employing a single hypothetical choice variable

Model	Predicting from $0.75 to $0.25				Predicting from $0.25 to $0.75				Chow Test
	NAE	MSPE	Calibration (level)	Calibration (change)	NAE	MSPE	Calibration (level)	Calibration (Δ)	
Benchmarks									
Myopia	0.000	93.3	1.001	NA	0.000	93.3	0.690	NA	NA
RPF predictor	0.999	37.9	0.996	-3.984	0.999	26.2	0.992	0.993	NA
Augmented predictors: LASSO	0.999	36.9	1.023	0.558	0.997	25.5	1.042	0.903	NA
Hypothetical	0.927	36.2	0.919	0.531	0.942	36.4	0.692	0.523	0.593
Hyp - cheap talk	1.150	34.8	0.895	0.595	1.352	43.7	0.708	0.507	0.042
Hyp – likely (1)	1.019	48.2	0.771	0.236	0.924	45.7	0.683	0.260	0.724
Hyp – likely (≤2)	1.212	44.3	0.850	0.398	1.040	38.4	0.692	0.463	0.451
Hyp – 3rd party (1)	0.661	46.5	0.873	0.401	0.641	46.8	0.692	0.413	0.004
Hyp – 3rd party (≤2)	0.566	54.9	0.938	0.029	0.555	55.2	0.648	0.030	0.001
Hyp – WTP	1.001	43.6	0.961	0.214	1.904	114.7	0.540	0.112	0.056

Table A.5: Regressions of real purchase frequencies on hypothetical choice frequencies and non-choice rating variables

Rating variable	Slope, hyp. purch. freq.	Slope, rating var.	Constant	R^2
Approve/disapprove	0.360 (0.031)	0.035 (0.006)	-0.018 (0.02)	0.533
Happiness	0.360 0.039)	0.031 (0.008)	0.036 (0.017)	0.506
Liking	0.362 (0.032)	0.036 0.006)	0.005 (0.017)	0.528
Regret	0.458 (0.026)	-0.014 (0.005)	0.138 (0.018)	0.496
Tempting	0.449 (0.032)	0.014 (0.01)	0.064 (0.021)	0.489
Enjoy if harmless	0.443 (0.031)	0.018 (0.009)	0.051 (0.022)	0.491
Good/bad for you	0.463 (0.026)	-0.011 (0.004)	0.136 (0.018)	0.496
Pos/neg impression	0.452 (0.028)	0.016 (0.007)	0.056 (0.018)	0.494
Over/understate	0.459 (0.026)	0.028 (0.008)	0.023 (0.022)	0.502

Note: Standard errors appear in parentheses.

Table A.6: Model selection, specifications employing two predictors

Predictors	Predicting from $0.75 to $0.25		Predicting from $0.25 to $0.75	
	AIC	CV-MSPE	AIC	CV-MSPE
Hypothetical	-465.2	56.8	-394.8	61.8
Hypothetical plus:				
Hyp - cheap talk	−470.3	55.3	−424.8	53.7
Hyp – likely (1)	−472.1	51.5	−409.6	55.5
Hyp – likely (≤2)	−479.2	50.6	−406.9	54.7
Hyp – 3rd party (1)	−488.3	50.7	−407.7	62.3
Hyp – 3rd party (≤2)	−477.0	54.3	−396.5	64.3
Hyp – WTP	−469.4	54.3	−406.2	67.1
Approve/disapprove	−473.6	53.5	−421.3	55.7
Happiness	−466.3	55.1	−408.4	59.8
Liking	−476.2	51.4	−426.2	54.7
Regret	−463.2	56.8	−405.6	57.1
Tempting	−463.8	56.4	−396.1	63.3
Enjoy if harmless	−464.4	56.1	−397.9	62.3
Good/bad for you	−463.3	56.7	−403.9	57.4
Pos/neg impression	−463.2	56.8	−403.4	57.4
Over/understate	−464.9	55.8	−405.6	54.1
Hyp – duplicate	−495.1	46.2	−424.5	47.8

Table A.7: Predictive accuracy of specifications employing two types of hypothetical choice frequencies

Model	Predicting from $0.75 to $0.25				Predicting from $0.25 to $0.75				Chow Test
	NAE	MSPE	Calibration (level)	Calibration (change)	NAE	MSPE	Calibration (level)	Calibration (Δ)	
Benchmarks									
Myopia	0.000	93.3	1.001	NA	0.000	93.3	0.690	NA	NA
RPF predictor	0.998	37.9	0.996	-3.984	0.998	26.2	0.992	0.993	NA
Augmented predictors: LASSO	0.999	36.9	1.023	0.558	1.027	25.5	1.042	0.903	NA
Hyp - preferred univariate	0.927	36.2	0.919	0.531	0.942	36.4	0.692	0.523	0.860
Hypothetical plus:									
Hyp - cheap talk	1.125	32.5	0.930	0.650	1.342	38.8	0.730	0.609	0.043
Hyp – likely (1)	1.154	36.7	0.879	0.545	1.110	35.5	0.726	0.567	0.290
Hyp – likely (≤2)	1.218	35.9	0.919	0.604	1.144	33.7	0.720	0.631	0.175
Hyp – 3rd party (1)	1.022	32.3	0.924	0.645	0.975	31.8	0.728	0.674	0.949
Hyp – 3rd party (≤2)	0.963	34.6	0.961	0.596	0.967	34.8	0.699	0.575	0.781
Hyp – WTP	1.121	35.5	0.955	0.574	1.566	58.5	0.657	0.427	0.070
Hyp – duplicate	1.094	33.7	0.936	0.600	1.119	34.3	0.706	0.588	0.337

Table A.8: Predictive accuracy of specifications employing one hypothetical choice variable and one non-choice rating

Model	Predicting from $0.75 to $0.25				Predicting from $0.25 to $0.75				Chow Test
	NAE	MSPE	Calibration (level)	Calibration (change)	NAE	MSPE	Calibration (level)	Calibration (Δ)	
Benchmarks									
Myopia	0.000	93.3	1.001	NA	0.000	93.3	0.690	NA	NA
RPF predictor	0.998	37.9	0.996	-3.984	0.998	26.2	0.992	0.993	NA
Augmented predictors: LASSO	0.999	36.9	1.023	0.558	0.997	25.5	1.042	0.903	NA
Hyp – preferred univariate	0.927	36.2	0.919	0.531	0.942	36.4	0.692	0.523	0.860
Hypothetical plus:									
Approve/disapprove	0.860	33,8	0.964	0.662	0.921	33.1	0.711	0.659	0.324
Happiness	0.857	34.3	0.950	0.628	0.802	33.5	0.722	0.725	0.152
Liking	0.629	39.7	0.987	0.783	0.463	47.8	0.722	1.064	0.000
Regret	0.918	36.1	0.921	0.537	0.859	35.8	0.701	0.573	0.319
Tempting	0.867	35.8	0.935	0.568	0.781	36.2	0.709	0.630	0.200
Enjoy if harmless	0.855	35.7	0.938	0.576	0.775	36.2	0.708	0.635	0.161
Good/bad for you	0.916	36.1	0.922	0.538	0.890	35.9	0.698	0.553	0.358
Pos/neg impression	0.919	36.1	0.921	0.536	0.818	35.8	0.705	0.602	0.253
Over/understate	0.895	35.9	0.927	0.550	0.879	35.8	0.699	0.560	0.332
Hyp – duplicate	1.094	33.7	0.936	0.600	1.119	34.3	0.706	0.588	0.337

Table A.9: Variables included in LASSO specifications

Model	Predicting from $0.75 to $0.25	Predicting from $0.25 to $0.75
Table 1, methods using additional choice data, augmented predictors, LASSO	RPF	RPF
Table 2, all hyp. & ratings, LASSO	HPF HypLikely=1 Hyp3P=1 HypCT squared Over/Understate≤3 Good/Bad4U≤3 Liking Liking ≤6 HPF × Regret HPF × Approve/Disapprove	HPF_CT Hyp3P=1 Liking Liking≤6 HPF × Over/Understate HPF × Approve/Disapprove
Table 2, hyp. only, all hyp., LASSO	HPF HypLikely HypLikely=1 Hyp3P=1 HypLikely squared HPF × HPF_CT HPF × HypWTP	HPF_CT HypLikely=1 Hyp3P=1 HPF × HypCT HPF × HypWTP
Table 2, all hyp., ratings, & phys., LASSO	Hyp3P=1 Over/Understate≤3 Good/Bad4U≤3 Liking Liking≤6 HPF × Over/Understate HPF × Approve/Disapprove HPF × Calories HPF × Sodium	HPF_CT Hyp3P=1 HPF_CT squared Good/Bad4U≤3 Liking Liking≤6 HPF × Over/Understate HPF × Approve/Disapprove HPF × Sodium HPF × Protein
Table 2, all hyp., ratings, & phys., LASSO, with RPF	RPF HPF_CT HPF_CT squared Liking HPF × HPF_CT	RPF HPF HPF squared Hyp3P=1

Table A.10: Variables included in specifications maximizing measures of cross-validated performance

Model	Predicting from $0.75 to $0.25	Predicting from $0.25 to $0.75
Table 2, OLS, CV-Calib optimized	HPF HypLikely=1 Hyp3P=1 HPF_CT squared Over/Understate≤3 Over/Understate≤5 Good/Bad4U≤3 Liking Liking≤6 HPF × Approve/Disapprove Happiness≤2 Impression≤3 Regret	HPF_CT Liking HPF × Approve/Disapprove Tempting≤5 Over/Understate≤5
Table 2, OLS, CV-MSPE optimized	Hyp3P=1 Liking Approve/Disapprove squared HPF × Over/Understate Tempting=1 HypLikely=1	HPF_CT Liking HPF × Approve/Disapprove Tempting≤5 Approve/Disapprove≤6 Approve/Disapprove≤4 Approve/Disapprove=1 Regret≤4 Liking≤6 Over/Understate≤4 Over/Understate≤3 Impression=1 Good/Bad4U≤3 Happy × EnjoyHarmless
Table 2, OLS, AMPE optimized	HPF HypLikely=1 HypLikely≤5 Hyp3P=1 Hyp3P≤2 HPF_CT squared Over/Understate≤3 Good/Bad4U≤3 Liking Liking≤6 HPF × Regret HPF × Approve/Disapprove	HPF_CT Liking HPF × Approve/Disapprove HPF × HPF_CT HypLikely≤4

Figure A.1: A typical choice task

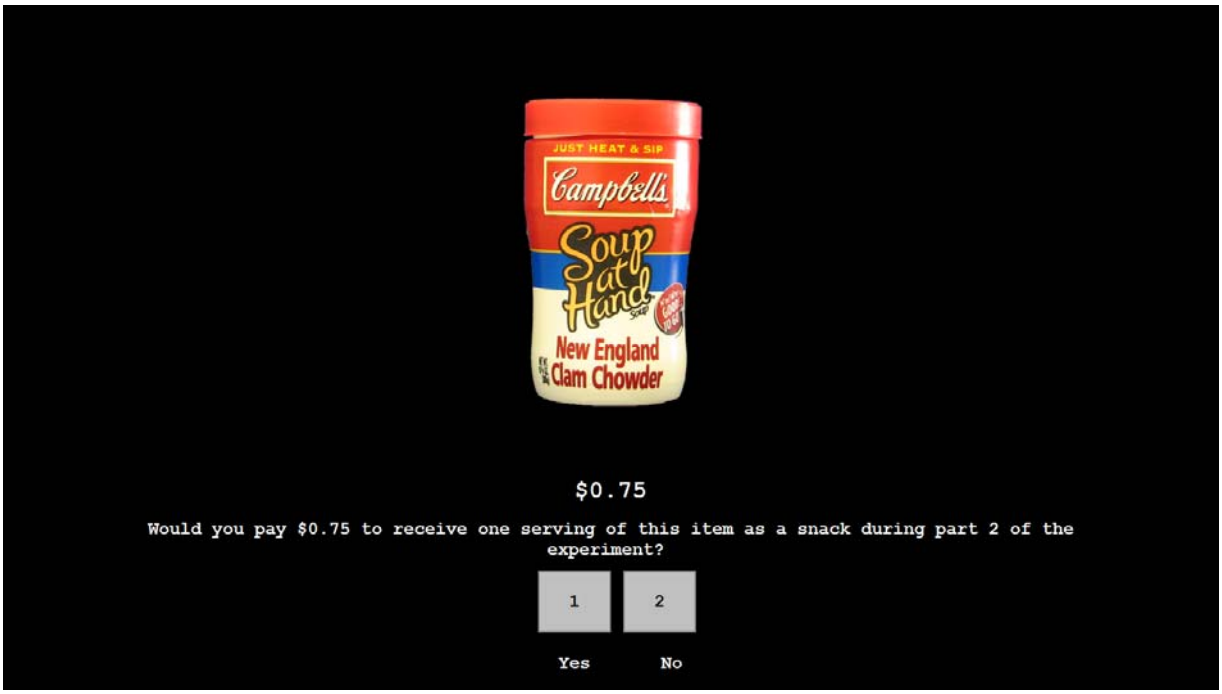
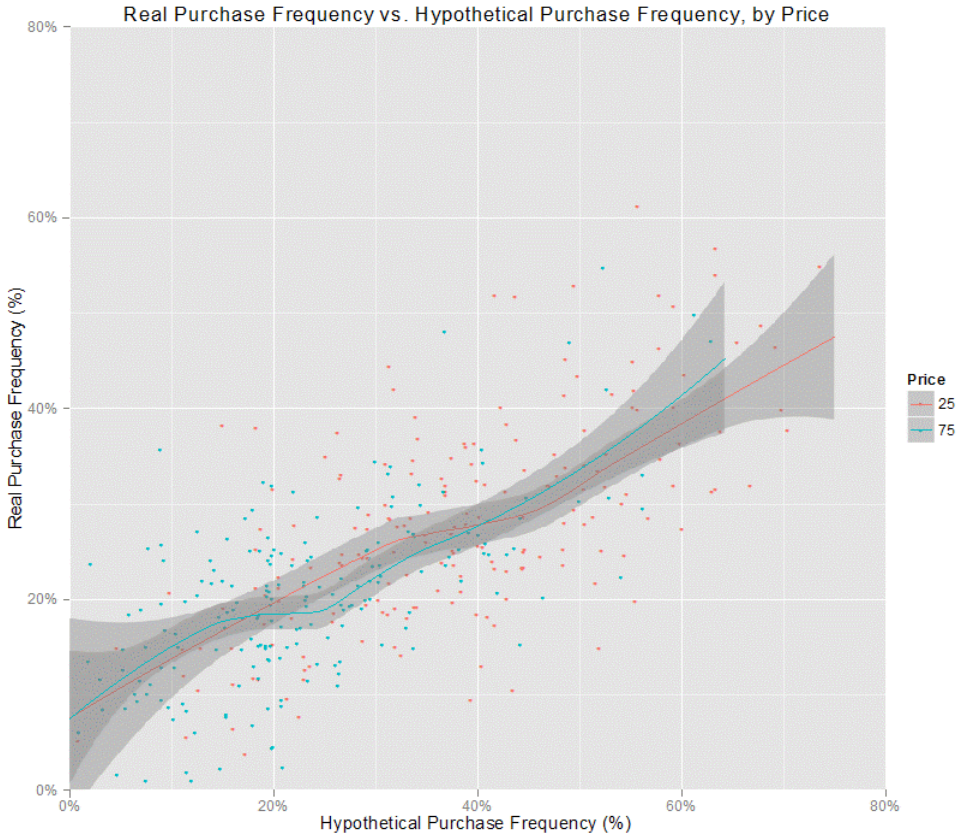


Figure A.2: Stability across prices of relationship between real and hypothetical purchase frequencies (kernel regressions).



Appendix B: Experimental Instructions

1. Instructions for Treatment R

The following instructions were supplied in writing:

Group 1.2
Subject ID #_____
Session # _____

Participant Instructions – Group 1.2 (Real Choices)

The experiment has two parts.

- *During the first part, you will make choices on a computer (this will take approximately 30 minutes).*

- *During the second part, you will answer some questions on paper (this will take approximately 20 minutes), and depending on your choices in part 1, you may also receive a snack that you will be allowed to eat during this time.*

At the end of the experiment you will receive either $30, $29.75, or $29.25 (depending on your choices in the first part) as compensation for your participation in the experiment.

Instructions for Part 1

In each trial you will be shown a picture of a food snack on a computer screen, and you will have to indicate whether or not you are willing to pay either $0.25 or $0.75 to be able to eat one serving of that snack during the second part of the experiment.

You should press the 1 key for "yes" and the 2 key for "no". To avoid mistakes, please keep your fingers on the keyboard at all times.

At the end of the experiment we will select one of the trials at random and will implement your decision. Thus, if we randomly select a trial in which you say yes, you will receive the snack shown in that trial, and the appropriate charge will be deducted from your $20 participation fee.

You will have a minimum of 4 seconds to make your decision. That means there is no incentive to rush through the questions. Once you have finished, please wait until an experimenter comes to assist you.

Important: Since you don't know in advance which trial will be selected, you should treat every decision as if it were the only one.

Instructions for Part 2

After part 1 is completed, you will follow the experimenter to another area, where you will be put in separate rooms.

During this part you will be asked to fill out a short written questionnaire. Your answers to these questions will NOT affect in any way the payment you receive at the end of the experiment.

You will have to stay in the room for 20 minutes for this part. If you finish early, you will be free to work on homework or any other quiet activity, but you must stay in the room until you are dismissed.

During this time you may eat any food purchased as part of the experiment, ***but you may not eat anything else***.

Important: If you have a medical condition that might require you to eat something during that 20 minute period, it is extremely important for you to notify a staff member before the experiment begins.

Do you have questions about the instructions or activities? If so, please ask the experimenter. If not, please answer the following questions:

- If I am hungry during the experiment and did not choose the snack that was randomly selected, I may eat a snack I brought with me or buy one from a vending machine.
  Circle one: True False

- If I only answer *"Yes"* to one snack item, it is more likely that that item will be drawn.
  Circle one: True False

The following supplemental instructions appeared on the computer screen:

Welcome to the experiment.

You will see pictures of many food items, one at a time.

For each food item, answer the following question.

Would you pay $x (where $x will either be $0.25 or $0.75) to receive one serving of this item as a snack during part 2 of the experiment?

If yes, press "1". If no, press "2".

At the end of the experiment we will select one trial at random and implement your decision for that trial. Since you don't know in advance which trial will be selected, you should treat every decision as if it were the only one.

We have placed $2 in quarter next to this computer. It is part of your $20 payment for participating. If you end up buying an item, you will pay for it out of this money.

If you are not sure what constitutes one serving size, please ask the experimenter.

You will have as much time as you like to answer the question, but the slide will not advance until at least 5 seconds have passed.

To reduce errors, it is recommended that you keep your fingers on the keyboard and look at the screen.

Press any key to continue.

2. Instructions for Treatments H and HD

The following instructions were supplied in writing:

Group 2.3
Subject ID #_____
Session # _____

Participant Instructions – Group 2.3 (Hypothetical Choices)

The experiment has two parts.

- *During the first part, you will make choices on a computer (this will take approximately 30 minutes).*

- *During the second part, you will answer some questions on paper (this will take approximately 20 minutes.*

At the end of the experiment you will receive $30 as compensation for your participation in the experiment.

Instructions for Part 1

In each trial you will be shown a picture of a food snack on a computer screen, and you will have to indicate whether or not you would be willing to pay either $0.25 or $0.75 to be able to eat one serving of that snack during the second part of the experiment. Keep in mind that these choices will be hypothetical. That is, you will not actually receive any of the items. However, your answers are still very important for the success of our experiment, so we thank you for taking the questions seriously.

You should press the 1 key for "yes" and the 2 key for "no". To avoid mistakes, please keep your fingers on the keyboard at all times.

Treat each food independently; that is, think of each food as the only one you might receive, regardless of your previous answers.

If you are not sure what constitutes a serving size for that food, please raise your hand to ask the experimenter.

You will have as much time as you need to make your decision, but you will not be able to advance to the next item until the current one has been on your screen for 4 seconds. That means

there is no incentive to rush through the questions. Once you have finished, you may work on a quiet activity until the next part.

Instructions for Part 2

During this part you will be asked to fill out a short written questionnaire. Your answers to these questions will not affect in any way the payment you receive at the end of the experiment.

If you finish early, you will be free to work on homework or any other quiet activity, but you must stay in the room until you are dismissed.

Do you have questions about the instructions or activities? If so, please ask the experimenter. If not, please answer the following question:

- Multiple choice: Which possible prices will you see during Part 1?

  Circle up to 2:

  - $0.25
  - $0.50
  - $0.75
  - $1.00

The following supplemental instructions appeared on the computer screen:

Welcome to the study.

You will see pictures of many food items, one at a time.

For each food item, answer the following hypothetical question.

Would you pay $x (where $x will either be $0.25 or $0.75) to receive one serving of this item as a snack during part 2 of the experiment?

If yes, press "1". If no, press "2".

Treat each food independently; that is, think of each food as if it is the only one you might receive, regardless of your previous answers.

Remember, the question is hypothetical -- you will not actually buy this item.

We have placed $2 in quarters next to this computer. It is part of your $25 payment for participating.

If you are not sure what constitutes one serving size, please ask the study leader.

You will have as much time as you like to answer the question, but the slide will not advance until at least 4 seconds have passed.

To reduce errors, it is recommended that you keep your fingers on the keyboard and look at the screen.

Press any key to continue.

3. Instructions for Treatment M

The following instructions were provided in writing:

Subject ID #_____
Session # _____

Participant Instructions

The study has two parts.

During the first part, you will make choices on a computer (this will take approximately 30 minutes).

During the second part, you will answer some questions on paper (this will take approximately 20 minutes), and depending on your choices in part 1, you may also receive a snack that you will be allowed to eat during this time.

At the end of the study you will receive $25 as compensation for your participation in the experiment.

Instructions for Part 1

You will see pictures of many food items, one at a time.

For all but five of the food items, you will have to indicate whether or not you would be willing to pay either $0.25 or $0.75 to be able to eat one serving of that snack during the second part of the experiment. Keep in mind that these choices will be hypothetical. That is, you will not actually receive any of the items. However, your answers are still very important for the success of our study, so we thank you for taking the questions seriously.

You should press the 1 key for "yes" and the 2 key for "no". To avoid mistakes, please keep your fingers on the keyboard at all times.

Treat each food independently; that is, think of each food as the only one you might receive, regardless of your previous answers.

If you are not sure what constitutes a serving size for that food, please raise your hand to ask the experimenter.

Please note that FIVE (and only five) of your decisions will actually be REAL choices. These will be clearly marked, so that you know which ones they are.

At the end of the experiment we will select one of these REAL choices at random and implement that decision.

Important: Since you don't know in advance which of the five REAL choices will be selected, you should treat every decision as if it were the only one.

Instructions for Part 2

During this part you will be asked to fill out a short written questionnaire. Your answers to these questions will NOT affect in any way the payment you receive at the end of the experiment.

You will have to stay in the room for 20 minutes for this part. If you finish early, you will be free to work on homework or any other quiet activity, but you must stay in the room until you are dismissed.

During this time you may eat any food purchased as part of the study, ***but you may not eat anything else***.

Important: If you have a medical condition that might require you to eat something during that 20 minute period, it is extremely important for you to notify a staff member before the experiment begins.

Do you have questions about the instructions or activities? If so, please ask the study leader. If not, please answer the following questions:

1. If I only answer *"Yes"* to one REAL choice, it is more likely that that item will be drawn.

Circle one: True False

2. *Fill in the blank:* I will see _____ REAL choices; the rest will be HYPOTHETICAL.

The following supplemental instructions appeared on the computer screen:

Welcome to the experiment.

You will see pictures of many food items, one at a time.

For all but five of the food items, you will answer the following hypothetical question.

Would you pay $x (where $x will either be $0.25 or $0.75) to receive one serving of this item as a snack during part 2 of the experiment?

If yes, press "1". If no, press "2".

Treat each food independently; that is, think of each food as if it is the only one you might receive, regardless of your previous answers.

Remember, the question is hypothetical -- you will not actually buy this item.

If you are not sure what constitutes one serving size, please ask the experimenter.

To reduce errors, it is recommended that you keep your fingers on the keyboard and look at the screen.

Press any key to continue.

--- page break ----

Please note that FIVE (and only five) of your decisions will actually be REAL choices. These will be clearly marked, so that you know which ones they are.

At the end of the experiment we will select one of these REAL choices at random and implement that decision. Since you don't know in advance which of the five REAL choices will be selected, you should treat each of them as if it were the only REAL choice.

We have placed $2 in quarters next to this computer. They are part of your payment. If you end up buying an item, you will pay for it out of this money.

4. Instructions for Treatment HCT

The following instructions were provided in writing:

Group 2
Subject ID #_____
Session # _____

Participant Instructions – Group 2 (Hypothetical Choices)

The experiment has two parts.

- *During the first part, you will make choices on a computer (this will take approximately 30 minutes).*

- *During the second part, you will answer some questions on paper (this will take approximately 15 minutes.*

At the end of the experiment you will receive $30 as compensation for your participation in the experiment.

Instructions for Part 1

In each trial you will be shown a picture of a food snack on a computer screen, and you will have to indicate whether or not you would be willing to pay either $0.25 or $0.75 to be able to eat one serving of that snack during the second part of the experiment. Keep in mind that these choices will be hypothetical. That is, you will not actually receive any of the items. However, your answers are still very important for the success of our experiment, so we thank you for taking the questions seriously.

You should press the 1 key for "yes" and the 2 key for "no". To avoid mistakes, please keep your fingers on the keyboard at all times.

Treat each food independently; that is, think of each food as the only one you might receive, regardless of your previous answers.

If you are not sure what constitutes a serving size for that food, please raise your hand to ask the experimenter.

You will have as much time as you need to make your decision, but you will not be able to advance to the next item until the current one has been on your screen for 4 seconds. That means

there is no incentive to rush through the questions. Once you have finished, you may work on a quiet activity until the next part.

Instructions for Part 2

During this part you will be asked to fill out a short written questionnaire. Your answers to these questions will not affect in any way the payment you receive at the end of the experiment.

If you finish early, you will be free to work on homework or any other quiet activity, but you must stay in the room until you are dismissed.

Do you have questions about the instructions or activities? If so, please ask the experimenter. If not, please answer the following question:

- Multiple choice: Which possible prices will you see during Part 1?

  Circle up to 2:

  - $0.25
  - $0.50
  - $0.75
  - $1.00

The following instructions were provided orally:

Before you begin the experiment, we would like to make you aware of a problem we often have in studies like this one. As we have explained, you will be asked to make hypothetical choices, not real ones. You will not actually pay money in exchange for a snack at the end of the experiment. But we have also asked you to respond to the choices as though you are really deciding whether to purchase the snack.

And that creates a problem.

In most studies of this kind, people seem to have a hard time thinking about hypothetical choices. They choose differently when the choices are hypothetical, and they don't really have to pay money to buy something, than they do when the choices are real, and they really can buy something.

For example, in a recent study, a number of subjects made the same types of hypothetical choices you will be making here. No one actually had to pay money even if they said they would be willing to buy an item at a particular price. Another set of subjects made real choices involving the same items. They really did have the chance to buy the same items at the same prices. The result was that the percentage of items people said they would buy in response to hypothetical questions was 15 percentage points higher than the percentage of items other people actually bought when they faced real choices. That's quite a difference, isn't it?

We call this a "hypothetical bias." "Hypothetical bias" is the difference that we usually see in the way people respond to hypothetical choices compared to real choices.

How can we get people to think about hypothetical choices like they think about real choices, where if they say they're willing to buy something, they actually buy it? How do we get them to think about what it means to really dig into their pocket and pay money, if in fact they really aren't going to have to pay anything?

Here's why we think we see this hypothetical bias, why people make hypothetical choices differently than real choices. When we are asked whether we would buy something like a tasty snack in a hypothetical situation, we think to ourselves, sure, I like that item, so yes, I would buy it. We may even think hard about whether or not we want a particular item at a particular price, and say to ourselves "yes, I really would buy that item now, I really think I would," but still answer based on whether we like the item, rather than on whether we would actually pay money for it. If that's the case, then answers to hypothetical questions only tell us whether people like the items that are offered, and "liking something" is not the same as "buying something" when a purchase decision is real.

When the choice is real, and we actually have to spend our money to buy the item, we think differently. We may still think the item is desirable, but we think about whether we really want or need it right now, and whether we really want to spend our money that way. For example, if we buy a snack now, that's money we don't have to buy a snack or a soft drink later today, or a cup of coffee later at a coffee shop. So when the choice is real, we choose in a way that takes into account the limited amount of money we have -- even when the item we are considering doesn't cost very much, like a snack or a soft drink. This is just a theory, of course, but it's what we think may be going on with hypothetical choices.

In any case, the only way that we know of to get people like you to make hypothetical choices the same way you would make real choice is simply to ask you the following. In the hypothetical choices that you'll start making in a few minutes, please think hard about what you're choosing. Ask yourself, if the choice were real – if you really were deciding whether to buy that item (and only that item) for the stated price – would you actually want to spend the money to buy it, right here and now? If you would, then indicate yes, and if you wouldn't, indicate no. In short, we ask you to choose <u>exactly</u> as you would if you were really going to face the consequence of your choice, which is to either pay the price and have the snack during the second half of the experiment, or not pay the price, keep your money for something else, and have no snack during the experiment.

Please keep this in mind throughout the experiment.

The following supplemental instructions appeared on the computer screen:

Welcome to the study.

You will see pictures of many food items, one at a time.

For each food item, answer the following hypothetical question.

Would you pay $x (where $x will either be $0.25 or $0.75) to receive one serving of this item as a snack during part 2 of the experiment?

If yes, press "1". If no, press "2".

Treat each food independently; that is, think of each food as if it is the only one you might receive, regardless of your previous answers.

Remember, the question is hypothetical -- you will not actually buy this item.

We have placed $2 in quarters next to this computer. It is part of your $25 payment for participating.

If you are not sure what constitutes one serving size, please ask the study leader.

You will have as much time as you like to answer the question, but the slide will not advance until at least 4 seconds have passed.

To reduce errors, it is recommended that you keep your fingers on the keyboard and look at the screen.

Press any key to continue.

5. Instructions for Treatment HL

The following instructions were provided in writing:

Group 2.4
Subject ID #_____
Session # _____

Participant Instructions – Group 2.4 (Hypothetical Choices)

The experiment has two parts.

- *During the first part, you will make choices on a computer (this will take approximately 30 minutes).*

- *During the second part, you will answer some questions on paper.*

At the end of the experiment you will receive $30 as compensation for your participation in the experiment.

Instructions for Part 1

In each trial you will be shown a picture of a food snack on a computer screen, and you will have to indicate how likely you would be to pay either $0.25 or $0.75 to be able to eat one serving of that snack during the second part of the experiment. Keep in mind that these choices will be hypothetical. That is, you will not actually receive any of the items. However, your answers are still very important for the success of our experiment, so we thank you for taking the questions seriously.

You should answer on a scale from 1 to 5, with 1 = very likely, 3 = uncertain, and 5 = very unlikely. To avoid mistakes, please keep your fingers in the keyboard at all times.

Treat each food independently; that is, think of each food as the only one you might receive, regardless of your previous answers.

If you are not sure what constitutes a serving size for that food, please raise your hand to ask the experimenter.

You will have as much time as you need to make your decision, but you will not be able to advance to the next item until the current one has been on your screen for 4 seconds. That means there is no incentive to rush through the questions. Once you have finished, you may work on a quiet activity until the next part.

Instructions for Part 2

During this part you will be asked to fill out a short written questionnaire. Your answers to these questions will not affect in any way the payment you receive at the end of the experiment.

If you finish early, you will be free to work on homework or any other quiet activity, but you must stay in the room until you are dismissed.

Do you have questions about the instructions or activities? If so, please ask the experimenter. If not, please answer the following question:

- Multiple choice: Which possible prices will you see during Part 1?

  Circle up to 2:

  - $0.25
  - $0.50
  - $0.75
  - $1.00

The following supplemental instructions appeared on the computer screen:

Welcome to the study.

You will see pictures of many food items, one at a time.

For each food item, answer the following hypothetical question.

How likely is it that you would pay $x (where $x will either be $0.25 or $0.75) to receive one serving of this item as a snack during part 2 of the experiment?

Answer on a scale of 1 to 5, with 1 = very likely, 3 = uncertain, and 5 = very unlikely.

Treat each food independently; that is, think of each food as if it is the only one you might receive, regardless of your previous answers.

Remember, the question is hypothetical -- you will not actually buy this item.

We have placed $2 in quarters next to this computer. It is part of your $25 payment for participating.

If you are not sure what constitutes one serving size, please ask the study leader.

You will have as much time as you like to answer the question, but the slide will not advance until at least 4 seconds have passed.

To reduce errors, it is recommended that you keep your fingers on the keyboard and look at the screen.

Press any key to continue.

6. Instructions for Treatment HV

The following instructions were provided in writing:

Group HV
Subject ID #_____
Session # _____

Participant Instructions – HV

The study has two parts.

- *During the first part, you will make choices on a computer. (This will take approximately 30 minutes.)*
- *During the second part, you will answer some questions on paper. (This will take approximately 15 minutes.)*

At the end of the study you will receive $25 as compensation for your participation in the study.

Instructions for Part 1

This part consists of 2 rounds. In each round, you will be asked a question about a food item. You will then see many food items, presented one at a time. Please answer the question for each food item using the number keys.

Important:

- We thank you in advance for rating your perceptions accurately, as this will be a great help for our research.
- After you have finished answering the questions, we ask that you sit quietly at your computer until time is up. Rushing through the questions will not affect how long the experiment lasts. Once it is time for Part 2, the study leader will come and assist you.

Instructions for Part 2

During this part you will be asked to fill out a short written questionnaire. Your answers to these questions will NOT affect in any way the payment you receive at the end of the experiment.

You will have to stay in the room for the remainder of the hour. If you finish early, you will be free to work on homework or any other quiet activity, but you must stay in the room until you are dismissed.

Do you have questions about the instructions or activities? If so, please ask the experimenter. If not, please answer the following question:

Fill in the blank: In Part 1, there are __ rounds.

The following supplemental instructions appeared on the computer screen:

Welcome to the study.

This part of the study consists of 2 rounds.

In each round, you will see pictures of many food items, one at a time.

For each item, answer the question you are asked on the screen.

To enter your response, use the number keys.

To reduce errors, it is recommended that you keep your fingers on the keyboard and look at the screen.

Press any key to continue.

7. Instructions for Treatments HWTP and L

The following instructions were provided in writing:

Subject ID #_____
Session # _____

Participant Instructions

The experiment has two parts.

- *During the first part, you will answer questions on a computer. (This will take approximately 40 minutes.)*
- *During the second part, you will answer some questions on paper. (This will take approximately 10 minutes.)*

At the end of the experiment you will receive $25 as compensation for your participation in the experiment.

Instructions for Part 1

You will see many food items, presented one at a time. Please answer the question you are asked for each food item using the number keys. There will be two rounds, with a different question in each round.

Please note: In the first round, you will be asked to enter a price in cents. So, if your desired response is $0.25, you should type 25 and then press the enter key.

Important:

We thank you in advance for rating your perceptions accurately, as this will be a great help for our research.

After you have finished answering the questions, we ask that you sit quietly at your computer until time is up. Rushing through the questions will not affect how long the experiment lasts. You are free to work on homework, however. Once it is time for Part 2, an experimenter will come and assist you.

Instructions for Part 2

During this part you will be asked to fill out a short written questionnaire. Your answers to these questions will NOT affect in any way the payment you receive at the end of the experiment.

You will have to stay in the room for the remainder of the hour. If you finish early, you will be free to work on homework or any other quiet activity, but you must stay in the room until you are dismissed.

Do you have questions about the instructions or activities? If so, please ask the experimenter.

The following supplemental instructions appeared on the computer screen:

Welcome to the study

The first part of the study consists of 2 rounds.

In the first round, you will be shown a series of pictures of snack items. In each case, imagine that you will be offered an opportunity to buy this item to eat as a snack during the second part of this experiment, and that the alternative is to have no snack. Hypothetically, what is the maximum amount you would be willing to pay for it?

For example, if you answer that 10 cents is the most you are willing to pay for an item, that means you would want to buy the item and eat it as your only snack during the second part of the experiment if the price turned out to be less than 10 cents (say 9 cents), but that you would prefer to have no snack during the second half of the experiment if the price turned out to be more than 10 cents (say 11 cents). Likewise, if you answer that $1.50 is the most you are willing to pay for an item, that means you would want to buy the item and eat it as your only snack during the second part of the experiment if the price turned out to be less than $1.50 (say $1.42), but that you would prefer to have no snack during the second half of the experiment if the price turned out to be more than $1.50 (say $1.63).

Remember that these are hypothetical choices, and that they will not be implemented. However, we encourage you to answer as honestly as possible.

You will enter your answer in cents. So, if your answer is $1.25, you will enter 125. Press the enter key to submit your response.

The directions for the second round will be given later.

To reduce errors, it is recommended that you keep your fingers on the keyboard and look at the screen.

Press any key to continue.

--- WTP questions ---

In this round, you will see pictures of many food items, one at a time.

Think about receiving each item you are shown as a snack during the second part of the experiment.

Then answer the following question:

How much would you like to eat this item during the second part of the experiment, on a scale of 1 to 7, with 1 being not at all, and 7 being very much?

To enter your response, use the number keys.

To reduce errors, it is recommended that you keep your fingers on the keyboard and look at the screen.

Press any key to continue.

8. Instructions for Treatment SWB

The following instructions were provided in writing:

Subject ID #_____
Session # _____

Participant Instructions

The experiment has two parts.

- *During the first part, you will answer questions on a computer. (This will take approximately 30 minutes.)*
- *During the second part, you will answer some questions on paper. (This will take approximately 20 minutes.)*

At the end of the experiment you will receive $25 as compensation for your participation in the experiment.

Instructions for Part 1

You will see many food items, presented one at a time. Please answer the question you are asked for each food item using the number keys.

Important:

- We thank you in advance for rating your perceptions accurately, as this will be a great help for our research.
- After you have finished answering the questions, we ask that you sit quietly at your computer until time is up. Rushing through the questions will not affect how long the experiment lasts. You are free to work on homework, however. Once it is time for Part 2, an experimenter will come and assist you.

Instructions for Part 2

During this part you will be asked to fill out a short written questionnaire. Your answers to these questions will NOT affect in any way the payment you receive at the end of the experiment.

You will have to stay in the room for the remainder of the hour. If you finish early, you will be free to work on homework or any other quiet activity, but you must stay in the room until you are dismissed.

Do you have questions about the instructions or activities? If so, please ask the experimenter.

The following supplemental instructions appeared on the computer:

Welcome to the experiment.

You will be shown a series of pictures of snack items, each one appearing along with a price.

In each case, imagine that you receive this item (and ONLY this item) to eat as a snack during the second part of this experiment, and that the indicated price will be deducted from your show-up payment. Answer the following question:

How happy would you be with that outcome on a scale of 1 to 7, where 1 indicates very unhappy, and 7 indicates very happy?

To reduce errors, it is recommended that you keep your fingers on the keyboard and look at the screen.

Press any key to continue.

9. Instructions for Treatment N

The following instructions were provided in writing:

Subject ID #_____
Session # _____

Participant Instructions

The experiment has two parts.

- *During the first part, you will answer questions on a computer. (This will take approximately 30 minutes.)*
- *During the second part, you will answer some questions on paper. (This will take approximately 20 minutes.)*

At the end of the experiment you will receive $25 as compensation for your participation in the experiment.

Instructions for Part 1

You will see many food items, presented one at a time. Please answer the question you are asked for each food item using the number keys.

Important:

- We thank you in advance for rating your perceptions accurately, as this will be a great help for our research.
- After you have finished answering the questions, we ask that you sit quietly at your computer until time is up. Rushing through the questions will not affect how long the experiment lasts. You are free to work on homework, however. Once it is time for Part 2, an experimenter will come and assist you.

Instructions for Part 2

During this part you will be asked to fill out a short written questionnaire. Your answers to these questions will NOT affect in any way the payment you receive at the end of the experiment.

You will have to stay in the room for the remainder of the hour. If you finish early, you will be free to work on homework or any other quiet activity, but you must stay in the room until you are dismissed.

Do you have questions about the instructions or activities? If so, please ask the experimenter.

The following supplemental instructions appeared on the computer:

Welcome to the experiment.

You will see pictures of many food items, one at a time.

In each case, we want you to imagine that a subject in this experiment paid a specified price to eat the item as a snack during the second part of the experiment. We would like you to indicate whether you think the typical person would approve or disapprove of this purchase.

In particular, answer the following question:

Imagine that a subject in this experiment paid XX cents to eat the item as a snack during the second part of the experiment. Would the typical person approve or disapprove of this purchase?

Please answer on a scale of 1 to 7, where 1 indicates strong disapproval and 7 indicates strong approval.

To reduce errors, it is recommended that you keep your fingers on the keyboard and look at the screen.

10. Instructions for Treatment S

The following instructions were provided in writing:

Version 1 (questions 1-3)

Group 3
Subject ID #_____
Session # _____

Participant Instructions – Group 3 (Subjective Questions)

The experiment has two parts.

- *During the first part, you will make choices on a computer. (This will take approximately 45 minutes.)*
- *During the second part, you will answer some questions on paper. (This will take approximately 15 minutes.)*

At the end of the experiment you will receive $30 as compensation for your participation in the experiment.

Instructions for Part 1

This part consists of 3 rounds. In each round, you will be asked a question about a food item. You will then see many food items, presented one at a time. Please answer the question for each food item using the number keys.

Important:

- We thank you in advance for rating your perceptions accurately, as this will be a great help for our research.
- After you have finished answering the questions, we ask that you sit quietly at your computer until time is up. Rushing through the questions will not affect how long the experiment lasts. Once it is time for Part 2, an experimenter will come and assist you.

Instructions for Part 2

During this part you will be asked to fill out a short written questionnaire. Your answers to these questions will NOT affect in any way the payment you receive at the end of the experiment.

You will have to stay in the room for the remainder of the hour. If you finish early, you will be free to work on homework or any other quiet activity, but you must stay in the room until you are dismissed.

Do you have questions about the instructions or activities? If so, please ask the experimenter. If not, please answer the following question:

Fill in the blank: In Part 1, there are __ rounds.

Version 2: Questions 4-6

Group 3
Subject ID #_____
Session # _____

Participant Instructions – Group 3.2 (Subjective Questions)

The experiment has two parts.

- *During the first part, you will make choices on a computer (this will take approximately 25 minutes).*
- *During the second part, you will answer some questions on paper (this will take approximately 30 minutes).*

At the end of the experiment you will receive $20 as compensation for your participation in the experiment.

Instructions for Part 1

This part consists of 3 rounds. In each round, you will be asked a question about a food item. You will then see many food items, presented one at a time. Please answer the question for each food item using the number keys.

Important:

- We thank you in advance for rating your perceptions accurately, as this will be a great help for our research.
- After you have finished answering the questions, we ask that you sit quietly at your computer until time is up. Rushing through the questions will not affect how long the experiment lasts. Once it is time for Part 2, an experimenter will come and assist you.

Instructions for Part 2

During this part you will be asked to fill out a short written questionnaire. Your answers to these questions will NOT affect in any way the payment you receive at the end of the experiment.

You will have to stay in the room for 30 minutes for this part. If you finish early, you will be free to work on homework or any other quiet activity, but you must stay in the room until you are dismissed.

Do you have questions about the instructions or activities? If so, please ask the experimenter. If not, please answer the following question:

Fill in the blank: In Part 1, there are __ rounds.

Version 3: Questions 1-6

Group 3
Subject ID #_____
Session # _____

Participant Instructions – Group 3 (Subjective Questions)

The experiment has two parts.

- *During the first part, you will make choices on a computer. (This will take approximately 45 minutes.)*
- *During the second part, you will answer some questions on paper. (This will take approximately 15 minutes.)*

At the end of the experiment you will receive $30 as compensation for your participation in the experiment.

Instructions for Part 1

This part consists of 6 rounds. In each round, you will be asked a question about a food item. You will then see many food items, presented one at a time. Please answer the question for each food item using the number keys.

Important:

- We thank you in advance for rating your perceptions accurately, as this will be a great help for our research.
- After you have finished answering the questions, we ask that you sit quietly at your computer until time is up. Rushing through the questions will not affect how long the experiment lasts. Once it is time for Part 2, an experimenter will come and assist you.

Instructions for Part 2

During this part you will be asked to fill out a short written questionnaire. Your answers to these questions will NOT affect in any way the payment you receive at the end of the experiment.

You will have to stay in the room for the remainder of the hour. If you finish early, you will be free to work on homework or any other quiet activity, but you must stay in the room until you are dismissed.

Do you have questions about the instructions or activities? If so, please ask the experimenter. If not, please answer the following question:

Fill in the blank: In Part 1, there are __ rounds.

The following instructions appeared on the computer screen:

Welcome to the experiment.

The experiment consists of 3 rounds.

In each round, you will see pictures of many food items, one at a time.

Think about choosing each item you are shown as an afternoon snack.

Then answer the question you are asked on the screen.

To enter your response, use the number keys.

To reduce errors, it is recommended that you keep your fingers on the keyboard and look at the screen.

Press any key to continue.