Status and the Demand for Visible Goods: Experimental Evidence on Conspicuous Consumption

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Abstract

Some economists argue that consumption of publicly visible goods is driven by social status. Making a causal inference about this claim is difficult with naturally occurring data. For this reason, we conduct an experiment in which we vary both whether a purchase of a physical product is publicly visible or private and whether the income used for purchase is linked to social status or randomly assigned. Making consumption choices visible leads to a large increase in demand when income is linked to status, but not when income is assigned randomly. We investigate the characteristics that mediate this effect and estimate its impact on welfare.

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1. Introduction

Veblen argued that social status has a profound influence on a person's consumption decisions. His book *The Theory of the Leisure Class* contends that status concerns affect the consumption choices of anyone whose income places them above the level of subsistence. Social conventions specify a minimum standard of clothing, food, and living conditions that are acceptable for each status level (2009 [1899]). Since social status and income are positively correlated, the acceptable standard of consumption for those of higher status includes more and better goods than for those of lower status.

According to Veblen, an important function of consumption is to signal high status to others. Consumption choices can only do this to the extent they are both visible to others and associated with high status. Part of the motivation for wearing a fine suit or driving a luxury car, both of which are visible to others, is to convey the message to others that one has high status.

Consumer goods vary in the degree to which the act of consuming them is visible to the public, and thus in their suitability for serving as public markers of status. Many people see us when we are in our cars, when we wear our work clothes, or when we eat at a restaurant. Far fewer see our sleepwear, what we have for breakfast at home, or the brand of toilet paper we buy.[1] Veblen termed status signaling via the acquisition and display of visible goods *conspicuous consumption*.[2]

[1] With the rise of social networks and associated technologies such as the smartphone, one may argue that many formerly private choices, such as food consumed at home or the decoration of private spaces, have become increasingly visible to the public. Everyday millions of people post descriptions and images from their private lives on social networks such as Facebook and Instagram that feature the goods they consume.

[2] Several attempts have been made over the years to develop Veblen's ideas within a more formal microeconomic framework. Following Leibenstein (1950), some authors have mistakenly attempted to capture Veblen's argument with the notion that price is directly a part of utility. Veblen's analysis implies instead that the determinants of utility are consumption and social status *in the eyes of others*. Those goods which signal social status must be visible, but signaling may occur both through quantity and quality/price (Bagwell and Bernheim, 1996).

A number of studies have presented evidence about the relationship between status and the consumption of visible goods (Ravina, 2007; Grinblatt et. al. 2008; Charles et. al., 2009; Heffetz, 2011; Kuhn et al., 2011). However, there are several difficulties in identifying conspicuous consumption as a motivation for consuming visible goods. First, visibility is only one of many properties possessed by any given good that contribute to the observed demand for it. It is difficult to disentangle demand for visibility from demand for these other properties. While we may conjecture that a person buys a Mercedes rather than a Toyota to signal high social status, a Mercedes is a superior car in many ways besides the signal it sends about status. A second, subtly related problem is the link between income and social status. Income has effects on consumption that are independent of any status motivation. Observed correlations between status and consumption could be pure income effects. Income also tends to be correlated with various characteristics that confer social status directly, such as intelligence, education level, family background, profession, and political clout. Lastly, it is difficult to disentangle conspicuous consumption from social learning as factors that drive individuals with similar social status to make similar consumption decisions (Grinblatt et al., 2008).

We tackle the challenge of identifying conspicuous consumption by designing a laboratory experiment. In our experiment, individuals are provided an opportunity to purchase a desirable consumer good: gourmet chocolate truffles. We independently vary both the visibility of consumption choices to others and whether the income available for consumption is linked to social status.[3] After accruing income, each participant indicates their desired quantity of

[3] Our study is related to a large literature on status signaling as a motivation for charitable giving and behavior in social dilemmas (Andreoni and Petrie, 2004; Soetevent, 2005; Andreoni et al., 2009; Ariely et al., 2009; Bracha and Vesterlund, 2013; Karlan and McConnell, 2014; Samek and Sheremeta, 2014). However, our use of a physical product as a status signal eliminates confounds present in previous studies. Buying chocolate provides only private benefit to the person who purchased it, while charitable giving and social dilemmas provide benefits to others as well. Our study therefore does not involve the confounding factors of generosity and altruism present in these other studies.

chocolate truffles for a list of potential prices. A common price at which sales are actually made is randomly selected from the potential prices at the end of the experiment. We manipulate this process in two ways, using a two-by-two design. In the first manipulation, income is either assigned *randomly* or based on a participant's *rank*. A participant's rank is determined how well they do relative to the eleven other participants in their experimental session on a thirty-minute cognitive test. Our participants are students at Case Western Reserve University (CWRU). As at many elite universities, cognitive ability confers social status at CWRU.[4] When income is assigned by rank it is directly correlated with status, but when it is assigned randomly it is unrelated to status. In the second manipulation, communication about the quantity of truffles purchased is either *private*, so that only the participant and experimenter know, or *public*, so that all participants in the experimental session can see how much each purchased. Participants know how their choices will be communicated before making them. We refer to the four treatments as *rank-private*, *rank-public*, *random-private*, and *random-public*.

Our design allows us to isolate the effect of visibility on demand since all other properties of the chocolate truffles are identical across the *public* and *private* treatments. We can also isolate the effect of the linkage between income and status. We can rule out social learning as a driver of consumption decisions within the experiment because our participants do not interact and have no information about the choices of others when they make their decisions.

Veblen's theory of conspicuous consumption predicts that demand will be higher in *rank-public* than *rank-private* because when status is linked to income, visibility leads people to consume more to signal status. To the extent that by assigning income randomly we completely

[4] While cognitive ability is a source of social status in general, it is particularly important in the social world of university students.

sever the link to status, Veblen's theory also predicts that demand will be the same in *random-public* and *random-private*.

Consistent with these predictions, we find that making consumption choices publicly visible strongly increases demand when income is linked to status, but not when income is assigned randomly. In other words, we find that the necessary conditions for conspicuous consumption are 1) for income to be correlated with status and 2) for consumption choices to be publicly visible to others. The effect is quite large: mean quantity demanded is 1.94 truffles in *rank-private* and 4.98 truffles in *rank-public*, an increase of 257%. When income is unrelated to status, visibility does not induce conspicuous consumption: mean quantity demanded is 1.74 in *random-private* and 1.75 in *random-public*. Although our data provide support for a hypothesis that status is a significant factor motivating consumption of visible goods, the relationship between status level and conspicuous consumption is non-monotonic.[5]

Gender and cognitive reflection are important mediators of conspicuous consumption. Men engaged in conspicuous consumption much more than women. Quantity demanded by men is 329% higher in *rank-public* than *rank-private*. Individuals who scored high on a measure of cognitive reflection (Frederick, 2005), which is the propensity to engage in conscious deliberation when a situation requires it, also engage more in conspicuous consumption. We find no impact of risk aversion or competitive social preferences on conspicuous consumption.

Publicly visible choice causes participants to buy chocolate truffles at higher prices than they would have otherwise. By comparing the demand curves in *rank-private* and *rank-public*, we can estimate both the *rank-private* consumer surplus and the average welfare loss from making consumption public. We find that the average welfare loss is at least 6.5 *times* as large as

[5]We find that participants of moderately high and moderately low status engage in conspicuous consumption more than participants of middle status. Such non-monotonicities are possible in signaling games when players counter-signal (Spence 1973; Feltovich et al., 2002).

the consumer surplus, depending on the price of chocolate. The negative effect of conspicuous consumption on welfare loss comes primarily from men, who account for most of the conspicuous consumption. For women, the loss is much smaller and insignificant. To investigate whether there are benefits to conspicuous consumption outside of the consumption decision itself, we asked participants to rate their mood at the end of the experiment. For men, we find no difference in self-reported mood between *rank-public* and *rank-private,* which provides suggestive evidence that the net welfare effect of conspicuous consumption is negative for men. Women's moods are low in *rank-private,* so the net welfare effect of conspicuous consumption for them is likely positive.

We describe the experimental design and procedures in Section 2. Our main results are presented in Section 3, along with analyses of the welfare effects of conspicuous consumption, the characteristics of those who engage in conspicuous consumption, and how conspicuous consumption is related to the level of status. We discuss connections to the literature and implications of our results in Section 4.

2. Experimental Design and Procedures

The experiment was conducted at Case Western Reserve University. We recruited participants from an email pool of undergraduate and graduate students. There were 12 sessions with 12 participants each, for a total of 144 participants. Participants were seated in an ordinary classroom. The experiment consisted of several parts and participants received instructions (available in the Appendix A) at the beginning of each part.

In all sessions, participants completed a 30-minute cognitive test consisting of 20 multiple-choice questions. The questions were drawn from a Graduate Record Examination

(GRE) test preparation book (Seltzer, 2009). There were 10 mathematical and 10 verbal questions. All were of moderate to high difficulty. Participants worked using pencil and paper and recorded their responses on bubble sheets. The sheets were scanned and scored after 30 minutes had elapsed. Each participant received one point for each correct response and lost one point for each incorrect answer. Unanswered questions carried no penalty. Participants were ranked according to the resulting score, and received a sheet indicating their score and rank among their fellow participants.

We employed the two-by-two design shown in Table 1. The first treatment manipulation varied the manner in which participants received income. There were 12 income levels between $5 and $13.25. In the *rank* treatments, income was allocated based on each participant's rank on the test. The participant who ranked first on the test got $13.25, while the participant who ranked last got $5. Participants were given a table showing how rank translated into income with their own rank and income circled. In the *random* treatments, income was allocated using a random draw without replacement. Participants privately drew a card from bag containing cards numbered 1 through 12. Each participant had a table showing how the random numbers translated into income, from $5 for number 12 to $13.25 for number 1. Note that in the *rank* treatments income and performance on the test are positively correlated while in the *random* treatments they are uncorrelated.

Participants were then given an opportunity to spend some of their income on gourmet chocolate truffles. We chose gourmet chocolate truffles because 1) they are a rival and excludable consumption good; 2) they are desirable to participants; 3) they are packaged as small, discrete pieces; and 4) they are of high quality. We wanted a rival and excludable good rather than a public good, such as a donation to charity, because the benefit of consuming it is

purely private. The motivations underlying demand for rival and excludable goods are less complex, which makes interpretation of behavior clearer.

Participants completed a table that listed nine potential truffle prices between $0.20 and $0.60. We asked each participant to indicate how many truffles they would like to purchase at each of nine potential prices and explained that the roll of a die would later determine the actual price. They could indicate any quantity between zero and a number exhausting their total income and would then purchase the indicated quantity corresponding to the actual price. Participants were told that the remaining cash would be paid to them at the end of the session. Calculators were provided for this portion.

The second treatment manipulation varied how the participants would communicate the quantity of chocolate they purchased. Before participants completed the table of chocolate choices, we told them how they would receive their selection once the actual price was determined. In the *private* treatments, we explained that we would collect their selection tables and package the chocolate at the side of the classroom in brown paper bags labeled with their subject numbers. This would keep everyone's selections private. Bags would be distributed as participants came up to get their payments at the end of the experiment. Each participant would get a bag regardless of whether they purchased any chocolate. In the *public* treatments, participants were told that after the actual price was determined, each participant would come up to the whiteboard and write the quantity of chocolate they selected and the total cost along with their first name and subject number. We told them that this would speed up our packaging of the chocolate and computation of payments, which was true.

We collected several other types of data to help us understand what individual characteristics might mediate the effects of our treatments. Before the GRE test, we measured

cognitive reflection. After participants completed their chocolate choice tables but before the actual price was determined, we collected measures of risk aversion, social preferences, and demographic characteristics. The risk aversion and social preferences measures were incentivized.

The three-question cognitive reflection test (CRT) was participants' first task in the session (Frederick, 2005). The CRT questions are simple math problems designed to have an intuitively appealing, incorrect answer. The test measures an individual's ability to resist their intuition and solve the problem. For example, the first question is "A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost?" The appealing but incorrect answer is $0.10. The correct answer is $0.05.

Participants made a series of 20 binary choices to measure risk aversion (similar to Holt and Laury, 2002). The choices involved a risk-free amount varying from $0.50 to $10.00 and a lottery offering a 50% chance to get $10 and a 50% chance to get nothing (see the Appendix A). One of the 20 choices was randomly selected to be paid out at the end of the experiment. We measure risk aversion by the share of choices for which the participant selected the risk-free option.

Next, participants made 12 binary choices to measure social preferences (similar to Charness and Rabin, 2002). The choices involved additional income for themselves and another participant with whom they were anonymously paired. Each choice offered the option of $3 to both self and other or an unequal amount with total value between $3.50 and $8.50 (see the Appendix A). One of the 12 choices was randomly selected to be paid out at the end of the experiment, and one of the paired participants was randomly selected to be the decision maker, while the other was selected as a receiver. We use these choices to distinguish participants who

always maximize social welfare from those with competitive preferences. We define a measure of competitive social preferences as the share of choices in which a participant sacrificed social welfare to increase the amount by which their payment would be greater than the receiver.

Finally, at the end of the experiment, random draws were conducted to determine payouts for the risk aversion and social preferences choices as well as the price of chocolate. As the chocolate was being packaged at the end of the experiment, participants completed a demographic survey. On average participants earned $15.18 and the experiment lasted for about 70 minutes.

3. Results

In this section we present the main results. We start by describing participant characteristics and our main findings. We then examine how conspicuous consumption is related to status level and what types of participants are most likely to engage in conspicuous consumption. Finally, we analyze the welfare effects of conspicuous consumption.

3.1 Participant Characteristics

Table 2 shows the characteristics of our 144 participants. Over three-quarters of our participants are undergraduate students. They come from a wide range of majors and departments. Only 13% of participants study economics, finance, or another business-related field. On average, students are 20 years old. Gender composition is balanced, with 48% female and 52% male students. Whites make up 58%, Asians 25%, and African-Americans 8%. The average income in their family of origin is $141,000. Forty-two percent work in addition to

studying, and of those who do, the average work week is 11.5 hours. Overall, our participant pull is representative of the student body of Case Western Reserve University.

3.2. Main Findings

Our main question of interest is whether participants use their consumption of chocolate to signal their status. If there is no conspicuous consumption, we should observe no difference in demand for chocolate across our treatments. If there is conspicuous consumption when income is linked to social status, we should observe greater demand in *rank-public* than *rank-private*. If conspicuous consumption is about signaling one's income level itself, we should observe greater demand in *random-public* than *random-private*.

Figure 1 shows aggregate chocolate demand curves for each of the four treatments. The markers show the total quantity demanded at each potential price for the 36 participants in each treatment. Across all treatments, as standard microeconomic theory predicts, the quantity demanded falls as price increases. Demand for chocolate in the *rank-public* treatment is much higher than the other three treatments. The demand shift is so large that this curve has limited overlap with the others despite price varying by a factor of three. The curves tell us that making choices publicly visible increases demand when income is related to status but not when it is assigned randomly.

We show the average quantity demanded over all potential prices for the four treatments in Table 3. Mean quantity demanded is 1.94 in *rank-private* and 4.98 in *rank-public*, a large and statistically significant difference of 257%. The total income available to spend on chocolate is the same in *rank-public* and *rank-private*, and its distribution in terms of test performance is also the same. This allows us to interpret the increased consumption as a causal effect of making

consumption visible. By contrast, when income is assigned randomly rather than by test rank, mean quantity demanded is 1.75 in both *random-private* and *random-public*. Again, the total income available to spend on chocolate is the same in *random-public* and *random-private*, and its distribution in terms of test performance is also the same. This tells us that visibility alone is not enough to induce an increase in consumption. Our interpretation is that income must be correlated with status, here performance in the test, for public consumption of chocolate to be a meaningful signal of status. In other words, the necessary conditions for conspicuous consumption are 1) income must be correlated with status and 2) consumption choices must be publicly visible to others.

We explore how quantiles of demand vary by treatment for different prices in Table 4. Panel A compares *rank-private* and *rank-public*. All quantiles of demand are higher in the *rank-public* treatment for every price level. A Wilcoxon rank-sum test at each price level shows the differences in distributions to be statistically significant. All but one of the p-values are less than 0.05 and most are less than 0.01. Panel B compares *random-private* and *random-public*. The Wilcoxon test shows no statistically significant difference in the distributions at any price other than $0.25. Overall, the detailed analysis shows that differences found for means from Table 3 are reflected at all prices and parts of demand curves.

Treatments were randomly assigned to experimental sessions, so the expectation is for participants in each session to be the same on average in terms of their characteristics. It is nevertheless possible that in our realized experiment participants in different sessions differ in ways important for demand. To check the robustness of our results, we conduct a regression analysis in which we examine whether controlling for observable characteristics affects our results.

Let q_{ip} be the chocolate demanded by individual i when the price is p, X_i be a vector of characteristics for i, $Public_i$ indicate whether consumption choice of i is public, and $Rank_i$ indicate whether i's income was assigned by test rank. Our specification is then

$$q_{ip} = \alpha + \beta_P Public_i + \beta_R Rank_i + \beta_{PR}(Public_i \times Rank_i) + X_i'\theta + \varepsilon_{ip}. \quad (1)$$

When estimating this regression, we compute standard errors allowing for arbitrary correlation of ε_{ip} within each individual. Our control vector includes the characteristics we elicited from our participants as shown in Table 2.

Table 5 reports the results of estimating equation (1) using OLS. Column 1 shows estimates without any controls. The constant shows average quantity demanded in *random-private*. Average quantity demanded in other treatments replicating the means from Table 2 may be obtained by adding the appropriate coefficients from the set $Public$, $Rank$, and $Public \times Rank$. Notably, the differences in average quantity demanded computed from the regression are 3.04 ($p<0.01$) between *rank-public* and *rank-private* and 0.01 ($p=0.99$) between *random-public* and *random-private*. Column 2 adds in controls for participant characteristics. Demand is higher for those who have consumed chocolate in the recent past and lower for those who have eaten in the past five hours, which makes intuitive sense. Demand is also lower for African-Americans. However, addition of the controls does not measurably affect the differences between treatments. Conditional on controls, the differences in average quantity demanded are 2.71 ($p<0.01$) between *rank-public* and *rank-private* and -0.74 ($p=0.26$) between *random-public* and *random-private*.

Result 1: Making consumption choices visible strongly increases demand when income is linked to status, but not when income is assigned randomly.

3.3. Levels of Status and Conspicuous Consumption

Chocolate demand is higher when consumption is *public* for participants whose income was assigned according to *rank*, suggesting that participants engage in conspicuous consumption by buying chocolate to signal their status. In this section, we examine whether conspicuous consumption varies by status level. If high consumption of visible goods serves as a signal of high status, we might expect the relationship between a person's level of status and the degree to which they engaged in conspicuous consumption to be positive. However, if individuals signal strategically, then it is also possible to obtain non-monotonic relationship between status and conspicuous consumption, especially if some participants choose to countersignal their status (Spence, 1973; Feltovich et al., 2002).

In our experiment, status is conferred by one's rank on the cognitive test. When income is assigned by rank, status and income are directly correlated. Previously, we established that conspicuous consumption takes place when income is assigned by rank. To uncover how conspicuous consumption is related to rank, we plot Engel curves for chocolate demand. The Engel curve shows how the share of income spent on chocolate varies with income. Figure 2 displays Engel curves for all four treatments of our experiment. On the vertical axis, participants are binned by six income levels. On the horizontal axis, the share of income spent on chocolate is averaged across all nine potential prices for each participant. All four curves appear non-monotonic, though we must be cautious in interpreting the shapes as there are only six observations behind each data point. As with total demand, the *rank-private* Engel curve stands out as distinct from the other treatments.

We focus on the difference between the *rank-private* and *rank-public* curves in Figure 3. The graph shows the mean effect of visibility on demand for six income/rank levels computed using regression. Confidence intervals for each difference are shown using dotted lines.

Conspicuous consumption is clearly non-monotonic in status overall. Participants of moderately low and moderately high status are most affected. Those in the middle are less affected.

Result 2: Status level has a non-monotonic impact on conspicuous consumption, with participants of moderately high and moderately low status engaging in conspicuous consumption more than participants of middle status.

3.4. Who Engaged in Conspicuous Consumption?

In this section we explore to what extent conspicuous consumption is mediated by individual characteristics such as gender, risk aversion, competitive social preferences, and cognitive reflection. We collected information about these characteristics because we were suspecting that there are similarities between conspicuous consumption and competitive behavior. In particular, in signaling through consumption it is important to consume more than others. A number of studies have documented that competitive behavior is linked to gender (Niederle and Vesterlund, 2007), risk preferences (Cason et al., 2010), and competitive social preferences (Dohmen and Falk, 2011).[6] We also suspected that cognitive reflection (Frederick, 2005) may be important because our treatment manipulations require participants to be sensitive to a social setting they are in.

We regress the quantity of chocolate demanded at the price-individual level on a dummy variable $Public_i$ for the public treatment, a dummy variable M_i that categorizes the mediating factor, the interaction $Public_i \times M_i$, and a vector of additional controls X_i.

$$q_{ip} = \alpha + \beta_P Public_i + \beta_{PM}(Public_i \times M_i) + \gamma M_i + X_i'\theta + \varepsilon_{ip}. \quad (2)$$

[6] For a review of this literature see Dechenaux et al. (2015).

The coefficient β_P measures the effect of making choice public for those who have a zero value for the mediating factor dummy while β_{PM} measures the differential effect of public choice on those who have a value of one for the dummy. We therefore control flexibly for test rank by including a dummy variable for each of the 12 test ranks in the control vector X_i.

Table 6 reports the estimation results of specification (2). The unconditional effect on quantity demanded of making consumption public is 3.04 (column 1). The mediators have no statistically significant effects of their own on quantity demanded when added as controls, and the coefficients are much smaller than the effect of public choice, which remains unchanged (column 2). Adding the interaction of public with female gender shows that the effect of public choice comes entirely from men. The effect for men is 6.13 ($p<0.01$), while for women it is only 0.58 and is not significantly different from zero (column 3). Similarly, visibility seems to primarily affect those individuals who have high CRT scores. The effect for high CRT individuals is 5.68 ($p<0.01$), while it is only 0.55 and not significantly different from zero for low CRT scorers (column 4). Recall that these regressions control for cognitive test rank. CRT scores are, unsurprisingly, correlated with cognitive test scores (Spearman's ρ=0.55). The effect measured here is therefore for that aspect of CRT not correlated with the cognitive test (e.g., impulsivity of behavior). Participants with higher risk aversion are less affected by visibility, though the effect is not statistically significant (column 5). Having above-median competitive social preferences reduce the impact of public consumption (column 6). When we include all mediators in the regression, gender and cognitive reflection remain important mediators (column 7). The magnitudes are not much changed from the separate regressions. Interestingly, women have much higher levels of competitive social preferences than men, which helps explain why it's interaction with public is attenuated in the full regression.

Given that gender and cognitive reflection are the most robust mediators, we now compute the effect of conspicuous consumption on the four CRT-gender groups. We use the following regression, which allows us to control for cognitive test rank.

$$q_{ip} = \alpha + \beta_1 Public_i + \beta_2(Public_i \times Female_i) + \beta_3(Public_i \times CRT_i) + \beta_4(Public_i \times Female_i \times CRT_i) + \gamma_1 Female_i + \gamma_2 CRT_i + \gamma_3(Female_i \times CRT_i) + X_i'\theta + \varepsilon_{ip}. \quad (3)$$

In the regression $Female_i$ is a dummy variable for female gender and CRT_i is a dummy for high CRT.

Table 7 shows the estimated coefficients of the interacted specification (3). We use these coefficients to compute the effect of making choices in public on the consumption decisions of each of the four subgroups, which we present in Figure 4. The figure clearly shows that public consumption has an effect on all male participants, though the effect is greater on high CRT males than low CRT males. Public consumption has no significant effect on females. The point estimate of the effect is greater for high CRT females than low CRT females, though neither are statistically different from zero.

Result 3: Making consumption choices visible has a large effect on men, particularly those who exhibit high levels of cognitive reflection. It has no significant effect on women.

3.5. Welfare Effects of Conspicuous Consumption

In this section we examine implications of conspicuous consumption for economic welfare. Figure 1 shows that the demand for chocolate is much higher in the *rank-public* treatment than in the *rank-private* treatment. This means that at any given price, when consumption is publicly visible participants choose to buy significantly more chocolate than when such consumption is private. Figure 1 allows us to see what equilibrium prices would have

resulted if we had had a limited quantity of chocolate and prices were determined over all participants. For example, if we had 100 chocolates to sell, the price would have been \$0.29 in *rank-private* and \$0.51 in *rank-public*, a difference of 76%. The share of income spent on chocolate would have been 9% and 15%, respectively.

In the analysis to follow, we distinguish between two types of welfare effects. One type results from the excess purchases of chocolate. This is what economists usually mean by welfare. In addition, we also allow the experience of revealing one's consumption to others may be inherently pleasant or unpleasant. We use the terms *decision welfare* and *experience welfare* to distinguish between the two (see Kahneman et al., 1999).

If we take demand in *rank-private* as representative of participants' underlying preferences for chocolate consumption, the excess consumption of chocolate when choices are public creates a loss of *decision welfare*. We can compute both consumer surplus in *rank-private* and the welfare loss from the data. Figure 5 shows the basic idea of our approach. First, we fix a market price of chocolate. We use the participants' data on chocolate demand to calculate the equilibrium quantity demanded in *rank-private* (demand without status signaling) and in *rank-public* (demand with status signaling). The area between the market price and the *rank-private* demand curve is the consumer surplus in the *rank-private* treatment. The area between the equilibrium quantity in the *rank-public* treatment, given by the intersection of the market price and the *rank-public* demand curve, the *rank-private* demand curve, and the market price is the welfare loss. The welfare loss represents the excess amount paid for the extra units of chocolate purchased in *rank-public* over what would have been paid for them had they actually been purchased in *rank-private*.

We measured demand in *rank-public* and *rank-private* at \$0.05 price intervals between \$0.20 and \$0.60. To compute the consumer surplus and the welfare loss, we must use this data to approximate a continuous demand curve. The consumer surplus calculation for a fixed market price requires an approximation of the *rank-private* demand curve for all prices for which demand would be positive. The welfare loss calculation for a fixed market price requires that the *rank-private* demand curve be defined for the equilibrium *rank-public* quantity at that price. We approximate a continuous curve by fitting a fractional polynomial regression of quantity on price to the data in each treatment. A fractional polynomial regression allows for a more flexible range of curve shapes than a standard polynomial by including logarithms, negative powers, and non-integer powers of the independent variable (Royston and Altman, 1994). We use the subset of powers from the set $\{x^{-2}, x^{-1}, x^{-1/2}, \ln(x), x^{1/2}, x^{1}, x^{2}, x^{3}\}$ that maximizes the likelihood of the model to construct the curves.

We show the mean demand data and fitted values from the fractional polynomial models in Figure 6. Circles and diamonds represent, respectively, the mean quantity demanded for *rank-private* and *rank-public* at each elicited price. The solid lines show the fitted curves. The curve for *rank-private* shows the out-of-sample extrapolations needed to calculate consumer surplus and the welfare loss for market prices between \$0.20 and \$0.60. We do not need to make extrapolations for *rank-public.* The *rank-private* fit uses two terms and the *rank-public* fit uses four terms. As Figure 6 shows, the fitted curves match the data quite closely. The R^2 for both fractional polynomial fits exceed 0.99.

Recall that men are much more affected by communicating their consumption choices in public than women. We show demand data and fitted values separately for men and women in Figure 7. Note in particular the demand curves for men shown in Panel A. There is almost no

overlap in elicited mean demand between the *rank-private* and *rank-public* treatments: participants purchase as much for \$0.60 per piece in *rank-public* as they do for \$0.20 per piece in *rank-private*. The shallowing of the *rank-private* fitted curve to the right of the elicited data depends a lot on the \$0.20 data point, and could in reality be steeper than our estimates.

We present our welfare computations in Table 8. We begin with consumer surplus in the *rank-private* treatment for all participants (Panel A). For five fixed prices between \$0.20 and \$0.60, we calculate the area between the fitted demand curve, the price, and the zero-quantity line using a rectangular Riemann approximation with a price delta of \$0.001. Mean consumer surplus ranges from \$0.01 for a chocolate price of \$0.60 (at which mean demand is only 0.4 pieces) to a \$0.76 for a chocolate price of \$0.20. The consumer surplus calculations are not very sensitive to assumptions because the fractional polynomial fits the data closely and relatively little out-of-sample extrapolation is used.

We also use a rectangular Riemann approximation to calculate the welfare loss of making consumption choices public. These rectangles lie between the *rank-private* demand curve and a vertical line descending from the intersection of the fixed price and the *rank-public* demand curve to the *rank-private* demand curve as shown in Figure 5. The mean welfare loss associated with public consumption choice is also shown in Table 8. The estimates for all participants range from \$2.10 to \$4.94 depending on which price we fix. Note that the \$0.20 and \$0.30 estimates rely on extrapolation of the *rank-private* demand curve. The estimated welfare losses are large relative to the average budget \$9.13 and are 6.5 to 248 times as large as consumer surplus. One implication of this is that participants in the *rank-public* treatment would have been better off in decision welfare terms if we had never offered them the chance to buy chocolate, even at the

heavily subsidized price of $0.20 per piece. We can conclude that conspicuous consumption had a negative effect on *decision welfare*.

Next, we break down the consumer surplus and welfare loss calculations by gender. The estimates for men are shown in Table 8, Panel B. Men are not very price-sensitive in *rank-private*, so their consumer surplus is lower than average. It ranges from $0.01 to $0.57. As might be expected from the large effects of public choice on men's demand, the welfare losses for men are quite large, ranging from $5.22 to $9.96. Given the extrapolation used to calculate these figures, they should be taken as lower bounds. For women, consumer surplus is somewhat greater, ranging from zero to $0.94 depending on price. The welfare losses from conspicuous consumption are of course lower, between $0.08 and $1.34, since women are not effected much by making consumption choice public.

We measured *experienced welfare* by asking participants to rate their overall mood after the chocolate distribution was completed. They selected an item from a seven-point scale ranging from "very bad" to "very good". Experienced welfare is more difficult to measure than decision welfare because there is no single dimension like money into which behavioral data can be easily transformed. It is important to note that, for this reason, our measure does not capture all of the aspects or dimensions of experience that might bear on an understanding of welfare.

We show the mean mood by of participants by treatment in Table 9. There is no sizable or statistically significant difference in mood between participants in *random-private* and *random-public* (Panel A). Recall there was also no difference in demand. The average mood for both of these groups is just over 5, which corresponds to the response "a little bit good." Mood does differ between the treatments in which income is assigned by rank. In *rank-private*, the average mood is much lower at 4.43. But the average mood in *rank-public* is 5.12, similar to the

random treatments. The difference of 0.69 points is statistically significant at 5%. Making consumption choice public therefore increases average mood in the *rank* treatments to about the same level as the *random* treatments. The effect of making consumption public has a positive effect on experienced welfare. It is also worth noting that when consumption is private, assigning income by rank rather than at random has a negative effect on overall mood.

We break down participant mood by gender in Panels B and C. Recall that male demand was most strongly affected by public choice. Interestingly, while the mean experienced welfare for men of 4.94 in *rank-private* is lower than 5.28 in *rank-public*, the difference is only -0.34 and is not statistically significant. The increase in experienced welfare due to public choice comes entirely through women. For women, mean experienced welfare in *rank-private* treatment of 3.56 was 1.73 points lower than the 5.29 in the *rank public* treatment. Even though public consumption scarcely changed women's choices, it did make them feel better. Note that experienced welfare in the *random-private* and *random-public* averaged 4.8, which is much closer to *rank-public* than *rank-private*. It might be more correct to say that when income was assigned by rank private consumption made women unhappy than that public consumption made them happy.

In summary, the experiment suggests that pubic consumption causes a loss of *decision welfare* by inducing more consumption of chocolate. This loss falls primarily on men, who accounted for most of the conspicuous consumption. The loss exceeds the consumer surplus of chocolate consumption by a wide margin, so that *rank-public* men were worse off in terms of decision welfare than if they had not been offered a chance to buy chocolate. Moreover, for men, we find no differences in self-reported moods between *rank-public* and *rank-private*, suggesting that the net welfare effect of conspicuous consumption is negative for men. For women, we find

that the decision welfare loss is much smaller and insignificant. Also, for women, we find that conspicuous choice elevated their mood, suggesting an increase in *experienced welfare*, which probably results in positive net welfare effect of conspicuous consumption.

Result 4: Conspicuous consumption has a large negative effect on the decision welfare of men, who accounted for most of the conspicuous consumption. Conspicuous choice elevated the mood of female participants, but not of males, likely offsetting their small loss in decision welfare. The net welfare effect of conspicuous consumption is therefore negative for men and positive for women.

4. Discussion

Standard economic theory suggests that the utility people derive from the consumption of goods and services drives demand. Veblen proposed that, in addition to consumption utility, demand for publicly visible goods is also driven by the social signals they send about those who purchase them.

We use a controlled laboratory experiment to examine whether adding the element of visibility to the purchase of a good induces conspicuous consumption. Our experiment provides clear evidence that this happens. Although we are not the first to examine social status motivations using an experiment, our use of a physical good to measure of conspicuous consumption eliminates confounds present in previous studies. To the best of our knowledge, the only experimental studies attempting to find evidence of conspicuous consumption use contributions to charities and social dilemmas. For example, many laboratory and field experiments have found that recognizing donors by revealing their identities increases donations to charities and contributions to public good (Andreoni and Petrie, 2004; Soetevent, 2005; Ariely

et al., 2009; Karlan and McConnell, 2014; Samek and Sheremeta, 2014). One may be tempted to conclude that this change of behavior is evidence of conspicuous consumption. However, it is not clear whether such change of behavior is due to social status (Glazer and Konrad, 1996; Hopkins and Kornienko, 2004), or due to other factors, such as a desire to be seen as generous (Ariely et al., 2009; Benabou and Tirole, 2006; Andreoni et al., 2009) or to avoid being seen as stingy (Bracha and Vesterlund, 2013; Samek and Sheremeta, 2014), or perhaps a purely altruistic desire to set an example for others to follow (Karlan and McConnell, 2014). The nice feature of our experimental design is that, instead of giving to a charity or another participant, our participants buy chocolate. Since buying chocolate provides only private benefit to the person who purchased it, we are able to study conspicuous consumption without confounding factors of generosity and altruism, which are present in other studies. Further, since participants did not know the consumption decisions of others, our experiment isolates the effect of conspicuous consumption from social learning.

We manipulated not only the visibility of the consumption good but also the link between status and income. In human societies, income and status tend to be naturally related to one another. We show that the linkage of income to status is critical for producing the conspicuous consumption response to the visibility of one's choices to others. This rules out the hypothesis that conspicuous consumption is about signaling one's income level itself. The necessary conditions for conspicuous consumption are thus that 1) a good be visible to others and that 2) income be an indicator of one's status.

Although our data provide support for a hypothesis that status is a significant factor motivating consumption of visible goods, the relationship between status level and conspicuous consumption is non-monotonic. Specifically, we find that participants of moderately high and

moderately low status engage in conspicuous consumption more than participants of middle status. This pattern makes it difficult to infer someone's status from their chocolate purchases. However, such non-monotonicities are possible in signaling games when players counter-signal (Spence 1973; Feltovich et al., 2002). [7]

In addition to finding direct evidence for conspicuous consumption, we also investigated the characteristics that mediate the effect. We found that men are significantly more likely to engage in conspicuous consumption than women. This finding contributes to an extensive literature on gender differences in behavior (Croson and Gneezy, 2009). A possible explanation why men engage in conspicuous consumption more than women is that men are more competitive (Niederle and Vesterlund, 2007). As such, when seen by others, men are more likely to express their competitiveness through generosity (Pan and Houser, 2011), or conspicuous consumption in our case.[8] Alternatively, women may not care about the particular status attribute studied in our experiment – rank on a cognitive test – as much as men.

We also found that participants who exhibit high levels of cognitive reflection were more likely to engage in conspicuous consumption. We suspect that participants with high scorers on cognitive reflection test are better at comprehending the experiment and thus are more sensitive to treatment manipulations.

Finally, we provided estimates of the impact of conspicuous consumption on economic welfare. Status-seeking behavior may have significant negative effect on economic outcomes by leading to more aggressive sabotage in work places (Charness et al., 2013) and overly

[7] Another explanation, consistent with the signaling story, is that the low status participants try to avoid being recognized as the lowest performers on the test and thus purchase more chocolate. Yet another explanation is that people who performed poorly on the test might use consumption of chocolate to comfort themselves (although we find limited support for this as low status people do not consume much chocolate in other conditions).

[8] Another explanation is that women may be discouraged from public consumption of chocolate, since purchasing a rich and highly caloric treat in public may have more negative connotations for women than men. Indeed, when income is allocated randomly, women consume less chocolate in the public condition than when consumption is private (see Table B1 in the Appendix B).

competitive behavior in contests (Sheremeta, 2010).[9] Our study points a more fundamental negative impact of conspicuous consumption. When people engage in conspicuous consumption, they purchase more of a good than they would if consumption were private. This leads to a welfare loss for participants in the experiment 6.5 to 248 times as large as the baseline surplus, depending on prices. The loss for men, who were most affected by choosing publicly, was 17 to 522 times as large as the baseline surplus. These losses could be offset by the non-consumption benefits of status signaling. However, we find that the mood of men in our study was no different under publicly visible or private choice. In a market setting, conspicuous consumption of goods for which public visibility is an integral property will tend to raise prices. Depending on the shape of the demand curve, this may amplify or mute the welfare effect, though it will surely be negative.

[9] Of course, in some environments status-seeking behavior may be beneficial to economy. For example, status and social recognition may be used to enhance worker performance (Kosfeld and Neckermann, 2011) or to encourage donations to charities (Karlan and McConnell, 2014; Samek and Sheremeta, 2014).

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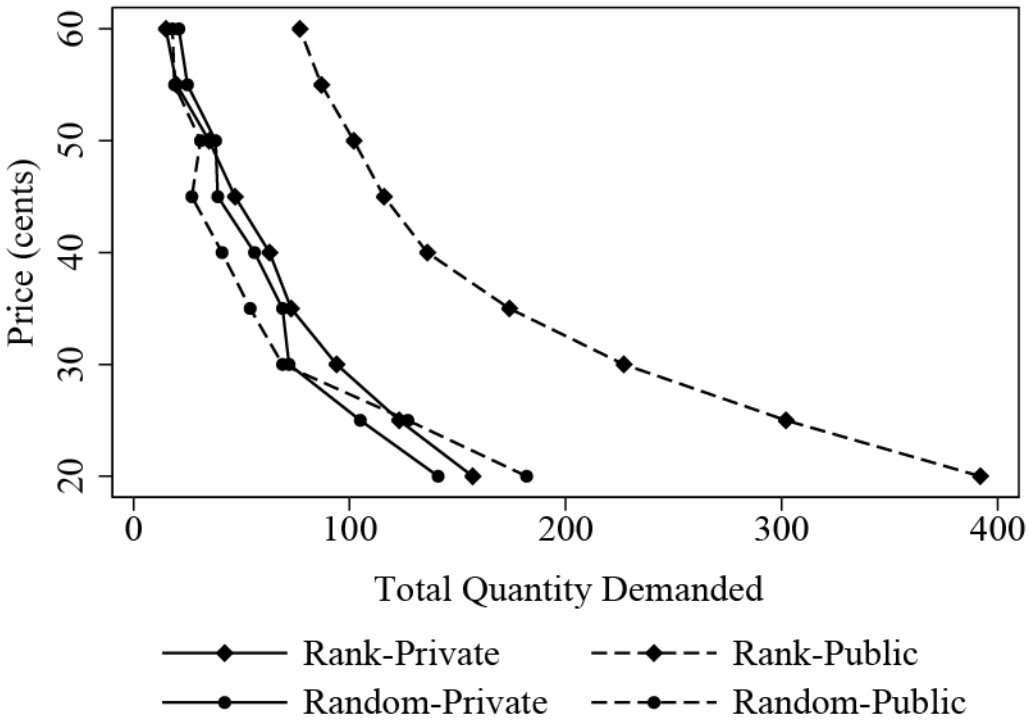
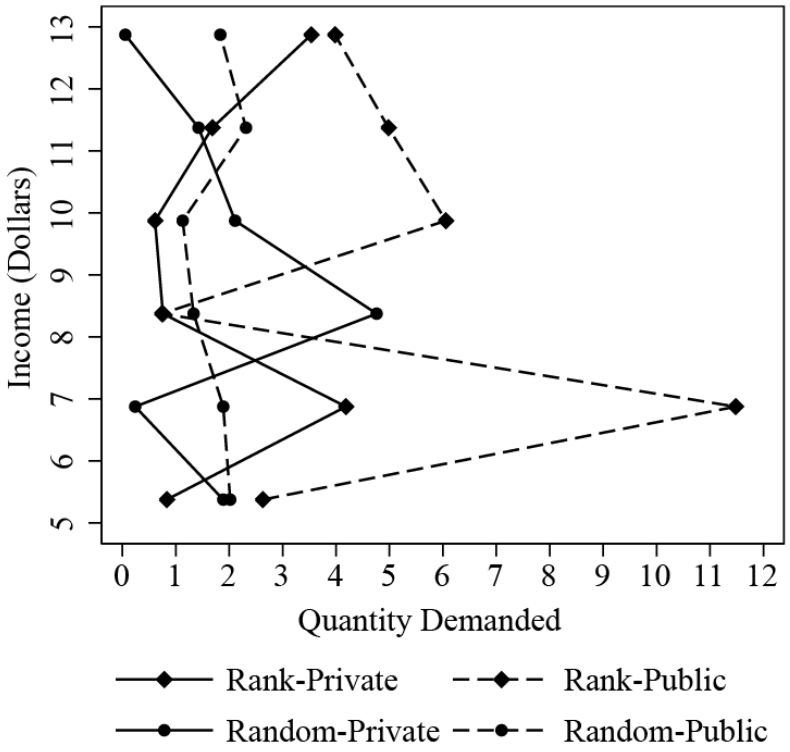
Figure 1: Aggregate Demand Curves by Treatment



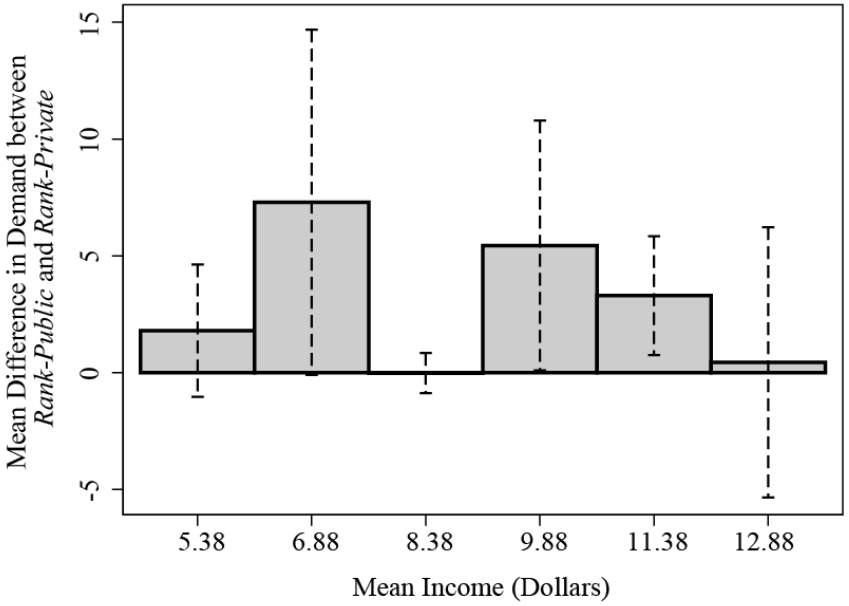
Notes: Lines plot total quantity demanded for each potential price of chocolate in each treatment.

Figure 2: Engel Curves by Treatment



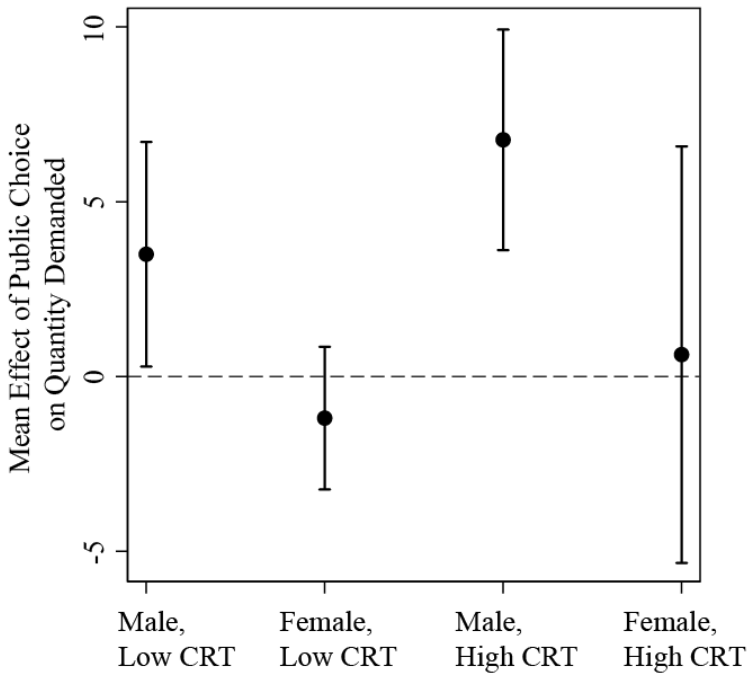
Notes: Lines plot the quantity demanded averaged across all nine potential prices for participants in each treatment. Participants are binned by six income levels, which correspond to test ranks 1 and 2, 3 and 4, etc.

Figure 3: Conspicuous Consumption by Income/Status Level



Notes: Graph shows differences in mean income share spent on chocolate between the *rank-private* and *rank-public* treatments for six income/status bins. Differences and confidence intervals computed from a regression of mean income share on bin dummies, a public choice dummy, and their interactions. Confidence intervals allow for heteroskedasticity.

Figure 4: Conspicuous Consumption Effects by Subgroup



Notes: Graph shows estimated difference in mean quantity demanded for each subgroup between *rank-private* and *rank-public*. Estimates computed from regression that interacts a public treatment dummy with dummies for female gender and high CRT and their interaction. Bars show 95% confidence intervals.

Figure 5: Welfare Loss from Conspicuous Consumption

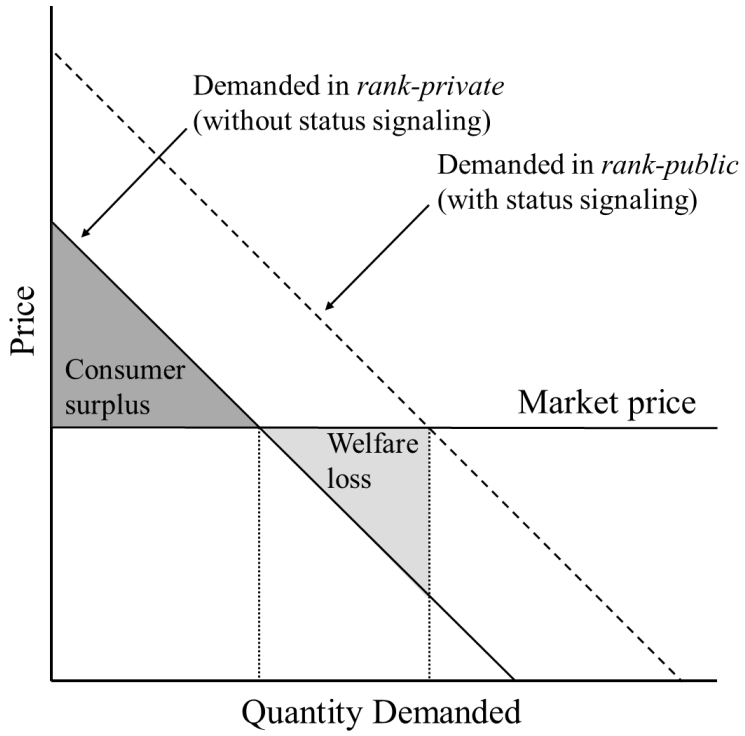
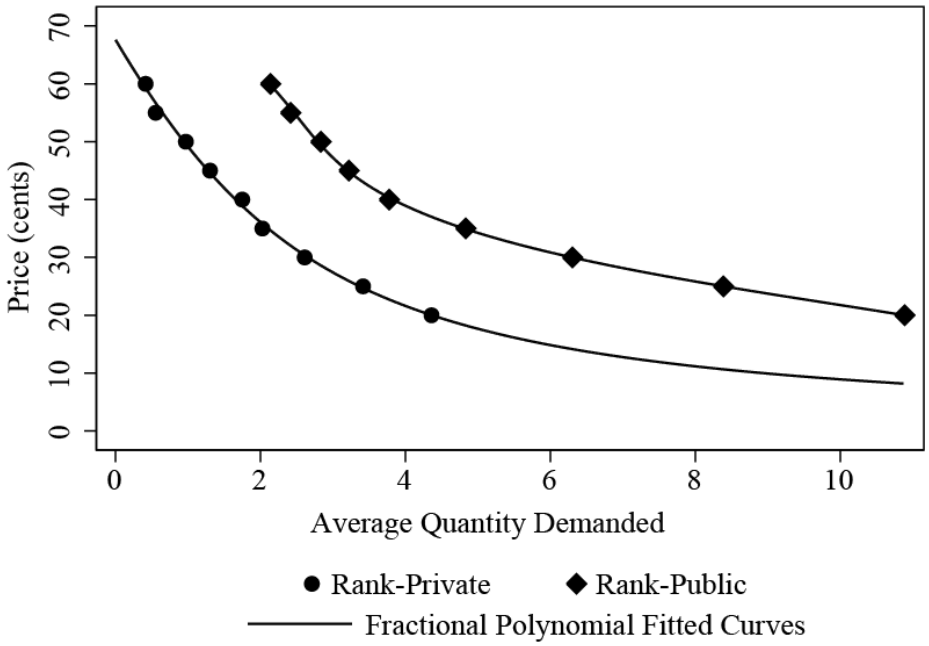


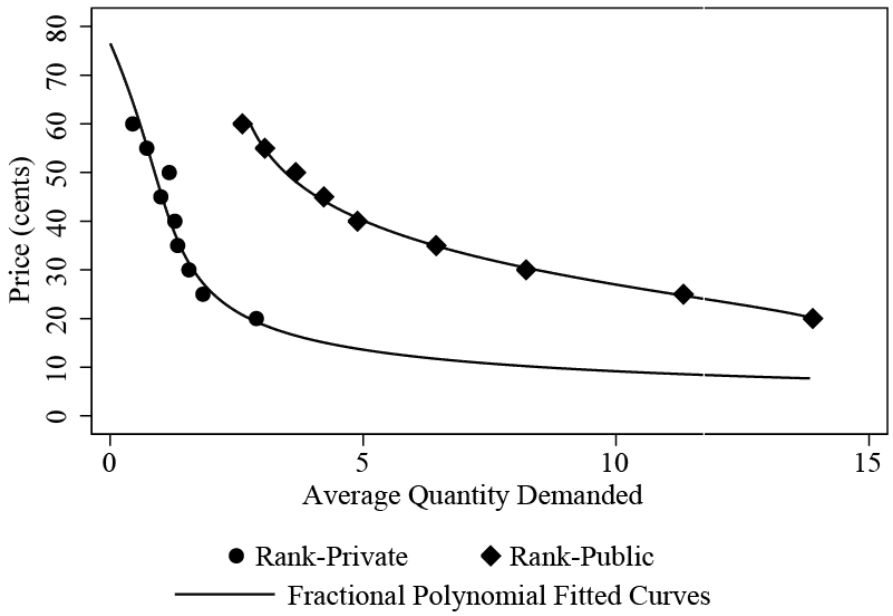
Figure 6: Fitted Demand Curves for *Rank-Public* and *Rank-Private*



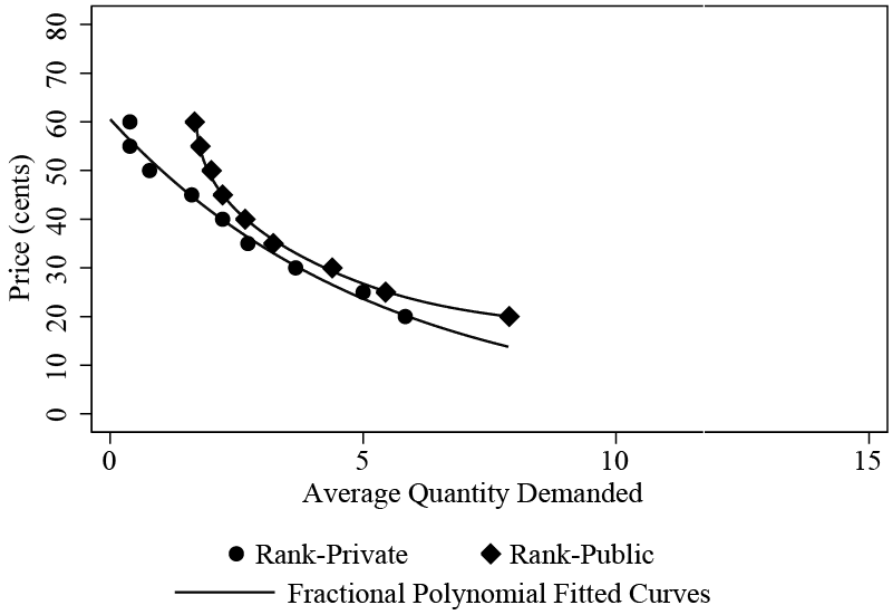
Notes: Lines show fitted values from fractional polynomial regressions as described in Section 3.5.

Figure 7: Fitted Demand Curves for *Rank-Public* and *Rank-Private* By Gender

Panel A: Men



Panel B: Women



Notes: Lines show fitted values from fractional polynomial regressions as described in Section 3.5.

Table 1: Treatments

	Chocolate choice	
Income allocation	*Private*	*Public*
Rank	3 sessions, 36 participants	3 sessions, 36 participants
Random	3 sessions, 36 participants	3 sessions, 36 participants

Table 2: Participant Characteristics

	Mean	SD	Min	Max
Female	0.48			
Age	19.96	1.88	18	23
White	0.58			
Asian	0.25			
African-American	0.08			
Undergraduate	0.78			
Study Economics/Business	0.13			
Family Income	141K	116K	20K	400K
Employed	0.42			
Average Hours if Employed	11.53	10.10	0	40
CRT Score	1.50	1.18	0	3
GRE Test Score	6.80	5.19	-7	14
Risk Aversion	0.75			
Competitive Social Prefs.	0.14			
Had Chocolate Today/Yesterday	0.49			
Last Ate < 5 Hours Ago	0.60			

Table 3: Mean Quantity Demanded by Treatment

	Random	*Rank*	H_0: *Random = Rank*
Private	1.747	1.935	p=0.82
Public	1.753	4.978	p<0.01
H_0: *Public = Private*	p=0.99	p<0.01	

Notes: Means for each treatment are computed by averaging over all potential prices. The tests of the null hypotheses are computed using a pooled regression of quantity demanded on four treatment dummies. Tests allow for arbitrary correlation of unobservables at the participant level.

Table 4: Distribution of Quantity Demanded for Each Price

Panel A: Income Assignment Based on *Rank*

Price (cents)	*Pub.* 30th	*Priv.* 30th	*Pub.* 50th	*Priv.* 50th	*Pub.* 70th	*Priv.* 70th	*Pub.* 90th	*Priv.* 90th	*Pub. = Priv.* p-value
20	2	0	5	2	12	4	35	10	0.007
25	1	0	4	1	10	3	21	8	0.004
30	1	0	3	0.5	8	2	20	10	0.007
35	1	0	2	0	7	2	13	6	0.007
40	0	0	1	0	6	1	11	5	0.061
45	0	0	1	0	5	1	10	3	0.037
50	0	0	1	0	4	1	9	4	0.035
55	0	0	1	0	3	0	8	3	0.003
60	0	0	0.5	0	3	0	8	1	0.003

Panel B: Income Assignment is *Random*

Price (cents)	*Pub.* 30th	*Priv.* 30th	*Pub.* 50th	*Priv.* 50th	*Pub.* 70th	*Priv.* 70th	*Pub.* 90th	*Priv.* 90th	*Pub. = Priv.* p-value
20	1	0	4	1	6	4	10	10	0.103
25	0	0	3	0	5	2	8	8	0.048
30	0	0	1	0	3	1	5	8	0.176
35	0	0	0	0	2	1	4	8	0.296
40	0	0	0	0	1	1	4	5	0.476
45	0	0	0	0	1	0	2	4	0.310
50	0	0	0	0	1	0	2	3	0.207
55	0	0	0	0	1	0	2	2	0.365
60	0	0	0	0	0	0	2	2	0.337

Notes: P-values are from Wilcoxon tests of the equalities of distributions.

Table 5: Effects of Visibility on Demanded

Quantity demanded	(1)	(2)
Public	0.01	-0.78
	(0.69)	(0.91)
Rank	0.19	-0.05
	(0.82)	(0.93)
Public × *Rank*	3.04**	3.49**
	(1.29)	(1.44)
Female		0.83
		(0.73)
High CRT		1.28
		(0.78)
Risk Aversion		-0.63
		(2.00)
Competitive Social Prefs.		-1.06
		(1.55)
Ate Chocolate Recently		1.33*
		(0.77)
Ate Recently		-1.31**
		(0.64)
Age 21+		-0.10
		(0.88)
White		0.02
		(0.81)
African-American		-2.04**
		(0.94)
Undergraduate		0.42
		(0.85)
Family Income > $120K		-0.07
		(0.68)
Employed		0.38
		(0.71)
Constant	1.75***	1.62
	(0.62)	(1.86)
Adjusted R^2	0.07	0.11
N	1,296	1,296

Notes: * significant at 0.10, ** significant at 0.05, and *** significant at 0.01 level. Standard errors allow for arbitrary correlation of unobservables at the participant level.

Table 6: Mediators of Conspicuous Consumption

Quantity demanded	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Public	3.04***	3.26***	6.13***	0.55	4.60	4.29***	0.62
	(1.09)	(0.89)	(1.31)	(1.07)	(4.58)	(1.05)	(3.84)
Public × Female			-5.55***				-4.36**
			(1.62)				(1.80)
Public × High CRT				5.68***			4.15**
				(1.59)			(1.84)
Public × Risk Aversion					-1.72		4.08
					(5.60)		(5.08)
Public × Comp. Soc. Prefs.						-5.84**	-1.43
						(2.61)	(3.12)
Female		-0.50	2.18	-1.28	-0.54	-0.32	1.18
		(1.42)	(1.48)	(1.31)	(1.45)	(1.39)	(1.42)
High CRT		1.21	1.63*	-1.74	1.18	1.12	-0.56
		(0.99)	(0.96)	(1.09)	(0.99)	(1.00)	(1.08)
Risk Aversion		1.44	2.10	2.74	2.76	1.67	-0.17
		(2.38)	(2.21)	(2.00)	(4.94)	(2.31)	(4.27)
Comp. Soc. Prefs.		-1.32	-1.18	-0.52	-1.35	2.08	0.27
		(2.26)	(2.21)	(2.16)	(2.24)	(2.78)	(2.82)
Constant	1.94***	2.19	0.85	3.29	1.22	0.95	3.93
	(0.54)	(3.05)	(2.84)	(2.43)	(4.26)	(2.97)	(3.34)
Adjusted R^2	0.06	0.22	0.27	0.27	0.22	0.23	0.29
N	648	648	648	648	648	648	648

Notes: * significant at 0.10, ** significant at 0.05, and *** significant at 0.01 level. Regressions of participant chocolate choices in the *rank-private* and *rank-public* treatments. All columns include test rank dummies. Standard errors allow for arbitrary correlation of unobservables at the participant level.

Table 7: Conspicuous Consumption by Gender and CRT

Quantity demanded	(1)
Public	3.50**
	(1.64)
Public × Female	-4.69**
	(1.85)
Public × High CRT	3.27
	(2.30)
Public × Female × High CRT	1.82
	(3.31)
Female × High CRT	1.75
	(3.14)
Female	0.01
	(1.70)
High CRT	-1.61
	(1.77)
Constant	4.95**
	(2.24)
Adjusted R^2	0.29
N	648

Notes: ** significant at 0.05 level. Regressions of participant chocolate choices in the *rank-private* and *rank-public* treatments. Includes test rank dummies. Standard errors allow for arbitrary correlation of unobservables at the participant level.

Table 8: Mean Decision Welfare

Panel A: Overall

Chocolate Price	*Rank-Private* Demand	Consumer Surplus	Welfare Loss	Welfare Loss / Consumer Surplus
$0.60	0.4	$0.01	$2.48	248
$0.50	1.0	$0.08	$2.28	29
$0.40	1.8	$0.21	$2.10	10
$0.30	2.6	$0.42	$3.53	8.4
$0.20	4.3	$0.76	$4.94	6.5

Panel B: Men

Chocolate Price	*Rank-Private* Demand	Consumer Surplus	Welfare Loss	Welfare Loss / Consumer Surplus
$0.60	0.4	$0.01	$5.22	522
$0.50	0.7	$0.12	$6.68	56
$0.40	1.3	$0.22	$7.10	32
$0.30	1.6	$0.36	$9.70	27
$0.20	2.9	$0.57	$9.96	17

Panel C: Women

Chocolate Price	*Rank-Private* Demand	Consumer Surplus	Welfare Loss	Welfare Loss / Consumer Surplus
$0.60	0.4	$0.00	$1.34	--
$0.50	0.8	$0.01	$0.43	43
$0.40	2.2	$0.17	$0.08	0.5
$0.30	3.7	$0.47	$0.12	0.3
$0.20	5.8	$0.94	$0.67	0.7

Notes: Calculations based on numerical integration of estimated demand curves from the *rank-private* and *rank-public* treatments. See Section 3.5 for an explanation.

Table 9: Participant Mood by Treatment

Panel A: Overall

	Random	*Rank*	*H_0: Rank = Random*
Private	5.11	4.43	p=0.05
Public	5.25	5.12	p=0.68
H_0: *Public = Private*	p=0.69	p=0.05	

Panel B: Men

	Random	*Rank*	*H_0: Rank = Random*
Private	5.25	5.28	p=0.95
Public	5.78	4.94	p=0.06
H_0: *Public = Private*	p=0.15	p=0.48	

Panel C: Women

	Random	*Rank*	*H_0: Rank = Random*
Private	4.94	3.56	p=0.01
Public	4.65	5.29	p=0.16
H_0: *Public = Private*	p=0.60	p<0.01	

Notes: Mood is measured on a seven point scale ranging from very bad (1) to very good (7).

Appendix A – Instructions for the *Rank-Public* Treatment

PART 1 – EXERCISE

In this exercise you will be asked to answer three questions. Below are three items that vary in difficulty. Answer as many as you can.

1. A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball.
How much does the ball cost? _____ cents

2. It takes 5 machines 5 minutes to make 5 widgets.
How long does it take 100 machines to make 100 widgets? _____ minutes

3. In a lake, there is a patch of lily pads. Every day, the patch doubles in size. It takes 48 days for the patch to cover the entire lake.
How long does it take for the patch to cover half of the lake? _____ days

PART 2 – COGNITIVE TEST

You will now take a 30-minute cognitive test containing 20 questions. You may use the margins of this booklet work out your answer if needed. You may ONLY use pencil, paper, and calculator provided. No other aids are permitted.

Please use the attached bubble sheet to record your answers. All questions have the following format:

Who is the current President of the United States?
- A. Mitt Romney
- B. Bill Clinton
- C. Barack Obama
- D. George W. Bush
- E. David Cameron

To correctly answer this example question, you would fill in bubble C in line 0.

You will *gain* one point for each *correct* answer and *lose* one point for each *incorrect* answer. There is no penalty for leaving a question blank. Please try to get as many points as you can.

You will have 30 minutes to work on the questions. You may not be able to finish all the questions in this time.

COGNITIVE TEST SCORE AND RANK

Your score on the cognitive test is _____
Your rank among today's test takers is _____/_____
This table shows how many dollars you get based on your rank in the cognitive test.

Rank	Points
1	$13.25
2	$12.50
3	$11.75
4	$11.00
5	$10.25
6	$9.50
7	$8.75
8	$8.00
9	$7.25
10	$6.50
11	$5.75
12	$5.00

PART 3 – CHOCOLATE SELECTION

You have an opportunity to purchase Godiva chocolate truffles using your earnings. Godiva is considered to be a premium chocolate. The chocolates are individually wrapped. Each weighs about 1/3 ounce. You will be able to buy as many chocolates as you want as long as the total cost is less than your earnings.

The price of squares will be between $0.20 and $0.60 per chocolate and will be determined by the roll of a ten-sided die. You will indicate how many chocolates you would like for each price that may be randomly selected by the die. In this way you may choose to purchase different amounts depending on whether the chocolate is relatively expensive or inexpensive.

After you have completed your choices, the actual price will be determined by the roll of a ten-sided die. Once the actual price is determined, each of you will come up to the board and write out your first and last name, your ID, the number of chocolates you purchased, the total amount you spent on chocolate, and your preference for dark or milk chocolate. This will help us package the chocolate for you.

Use the following table to record your decisions:

Roll of die	Price	How many pieces would you like to purchase at this price?	Total spent on chocolate at this price = Price per piece × number of pieces.
1	$0.20	_____	$0.20 × _____ = _____
2	$0.25	_____	$0.25 × _____ = _____
3	$0.30	_____	$0.30 × _____ = _____
4	$0.35	_____	$0.35 × _____ = _____
5	$0.40	_____	$0.40 × _____ = _____
6	$0.45	_____	$0.45 × _____ = _____
7	$0.50	_____	$0.50 × _____ = _____
8	$0.55	_____	$0.55 × _____ = _____
9	$0.60	_____	$0.60 × _____ = _____

PART 4 – DECISION PROBLEMS

In this part of the experiment, you will be asked to make a series of choices in decision problems. How much money you receive will depend partly on chance and partly on the choices you make.

You will see a table with 20 lines. You will state whether you prefer Option A or Option B in each line. You should think of each line as a separate decision you need to make. At the end of the experiment, we will draw a card from a deck of cards numbered 1, 2, …., 20. The number on the card chosen indicates which line in this part will be paid out. You will be paid according to the option you selected on that line.

In the table, option A always offers a 50% chance to get $10 and a 50% chance to get nothing. To determine the earnings for people who choose option A, after drawing the card that determines which line will be paid, we will randomly draw a ball from a bag containing **ten orange balls** and **ten white balls**. That means that when we draw a ball, there is a 50% chance that it is white and a 50% chance that it is orange. If the drawn ball is white and you selected option A in that decision, you will get the $10, otherwise you will get $0.

Use the following table to record your decisions:

Decision Number	Option A		Option B	Choose A or B
1	$10.00 with 50% chance	$0.00 with 50% chance	$0.50 for sure	
2	$10.00 with 50% chance	$0.00 with 50% chance	$1.00 for sure	
3	$10.00 with 50% chance	$0.00 with 50% chance	$1.50 for sure	
4	$10.00 with 50% chance	$0.00 with 50% chance	$2.00 for sure	
5	$10.00 with 50% chance	$0.00 with 50% chance	$2.50 for sure	
6	$10.00 with 50% chance	$0.00 with 50% chance	$3.00 for sure	
7	$10.00 with 50% chance	$0.00 with 50% chance	$3.50 for sure	
8	$10.00 with 50% chance	$0.00 with 50% chance	$4.00 for sure	
9	$10.00 with 50% chance	$0.00 with 50% chance	$4.50 for sure	
10	$10.00 with 50% chance	$0.00 with 50% chance	$5.00 for sure	
11	$10.00 with 50% chance	$0.00 with 50% chance	$5.50 for sure	
12	$10.00 with 50% chance	$0.00 with 50% chance	$6.00 for sure	
13	$10.00 with 50% chance	$0.00 with 50% chance	$6.50 for sure	
14	$10.00 with 50% chance	$0.00 with 50% chance	$7.00 for sure	
15	$10.00 with 50% chance	$0.00 with 50% chance	$7.50 for sure	
16	$10.00 with 50% chance	$0.00 with 50% chance	$8.00 for sure	
17	$10.00 with 50% chance	$0.00 with 50% chance	$8.50 for sure	
18	$10.00 with 50% chance	$0.00 with 50% chance	$9.00 for sure	
19	$10.00 with 50% chance	$0.00 with 50% chance	$9.50 for sure	
20	$10.00 with 50% chance	$0.00 with 50% chance	$10.00 for sure	

PART 5 – DECISION PROBLEMS

In this part of the experiment, you will be asked to make a series of choices in decision problems. You will see a table with 12 lines. You will state whether you prefer Option A or Option B in each line. You should think of each line as a separate decision you need to make. However, only one line will be the 'line that counts' and will be paid out. In particular, at the end of the experiment, we will draw a card from a deck of cards numbered 1, 2, …., 12. The number on the card chosen indicates which line in that part will be paid out.

For each line in the table on the next page, please state whether you prefer option A or option B. Notice that there are a total of **12 lines** in the table – you should think of each line as a separate decision you need to make.

These decisions affect both your own earnings and those of another participant in the experiment today. All participants have randomly and anonymously being divided into pairs according to subject number.

Your earnings for the selected line depend on which option you chose: if you chose option A in that line, you will receive **$3.00** and the other participant who will be matched with you will also receive **$3.00**. If you chose option B in that line, you and the other participant will receive earnings as indicated in the table for that specific line. For example, if you chose B in line 2 and this line is selected for payment, you will receive **$3.00** and the other participant will receive **$2.00**. Similarly, if you chose B in line 3 and this line is selected for payment, you will receive **$3.00** and the other participant will receive **$1.50**.

After you have completed all your choices we will draw a card from a deck of cards numbered 1, 2, …., 12 to determine which line is going to be paid. Within each pair, one participant has the higher and the other the lower subject number. We will then draw a ball from a bag containing 10 orange and 10 white balls. The ball color determines whether the decision of the higher (orange) or lower (white) subject number will be implemented. If your decision is chosen to be implemented, then the earnings to you and the other participant will be determined according to your choice of A or B. If the other participant's decision is chosen to be implemented, then the earnings will be determined according to the other participant choice of A or B.

Use the following table to record your decisions:

Decision Number	Option A (you, the other participant)	Option B (you, the other participant)	Choose A or B
1	$3.00 to you, $3.00 to other	$3.00 to you, $2.50 to other	
2	$3.00 to you, $3.00 to other	$3.00 to you, $2.00 to other	
3	$3.00 to you, $3.00 to other	$3.00 to you, $1.50 to other	
4	$3.00 to you, $3.00 to other	$2.50 to you, $2.00 to other	
5	$3.00 to you, $3.00 to other	$2.50 to you, $1.50 to other	
6	$3.00 to you, $3.00 to other	$2.50 to you, $1.00 to other	
7	$3.00 to you, $3.00 to other	$3.00 to you, $3.50 to other	
8	$3.00 to you, $3.00 to other	$3.00 to you, $4.00 to other	

9	$3.00 to you, $3.00 to other	$3.00 to you, $4.50 to other	
10	$3.00 to you, $3.00 to other	$3.50 to you, $4.00 to other	
11	$3.00 to you, $3.00 to other	$3.50 to you, $4.50 to other	
12	$3.00 to you, $3.00 to other	$3.50 to you, $5.00 to other	

After you have completed your decisions, please fill out the bubble sheet attached to this booklet with your responses for each line, indicating whether you chose A or B.

Appendix B – Additional Tables

Table B1: Mean Quantity Demanded by Treatment and Gender

Panel A: Men

	Random	*Rank*	H_0: *Random = Rank*
Private	0.772	1.358	p=0.41
Public	1.971	6.481	p<0.01
H_0: *Public = Private*	p=0.04	p<0.01	

Panel B: Women

	Random	*Rank*	H_0: *Random = Rank*
Private	2.965	2.512	p=0.77
Public	1.510	3.475	p=0.08
H_0: *Public = Private*	p=0.28	p=0.48	

Notes: Means for each treatment are computed by averaging over all potential prices. The tests of the null hypotheses are computed using a pooled regression of quantity demanded on four treatment dummies. Tests allow for arbitrary correlation of unobservables at the participant level.