Loving a bad bet:
Factors that induce low-income individuals to purchase state lottery tickets

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Abstract

Playing the state lottery is clearly inconsistent with expected value maximization; lotteries only return approximately 50 cents on the dollar, on average. Moreover, low-income individuals spend a higher percentage of their income, and possibly even a higher absolute amount, on lottery tickets than do wealthier individuals. However, little research has explored what factors encourage or discourage lottery ticket purchases. In a series of controlled experiments, we examine the influence of different factors on the attractiveness of playing the lottery. Experiment 1 examines the hypothesis that people buy tickets, in part, because they view the decision to purchase a ticket *myopically*, meaning that they make one decision at a time, rather than *broadly bracketing* the decision – i.e., considering the aggregate consequences of purchasing multiple tickets. Experiments 2 & 3 address the question of what makes state lotteries so appealing to low-income populations. In Experiment 2 we find that people are more likely to purchase tickets when they are implicitly primed to perceive that their own income is low relative to some standard, suggesting that the lottery is viewed as a means to correct low standing on the income hierarchy. In Study 3 we find that people are more likely to purchase tickets when they are subtly reminded that all income groups have an equal chance of winning. This suggests that part of the lottery's allure for low-income individuals is that it guarantees them fair odds *relative* to other income groups. We discuss the policy implications of these results for deterring low-income individuals from playing the lottery and the use of lotteries to promote positive behaviors, such as saving.

Introduction

State lotteries are a multibillion dollar industry. In 2005, total sales from state lotteries surpassed $50 billion (Hanson, 2007). Playing the lottery is inconsistent with expected value maximization (or with expected utility maximization assuming diminishing marginal utility). Yet, despite their highly negative expected value, clearly many people find lottery tickets appealing.

Research on state lottery players finds that lotteries are most appealing to the poor. Low-income individuals spend a higher percentage of their income on lottery tickets than do wealthier individuals (Brinner & Clotfelter, 1975; Clotfelter & Cook, 1987, 1989; Livernois, 1987; Spiro, 1974; Suits, 1977), a pattern highlighted by the statistic that households with an income of less than $10,000 spend, on average, approximately 3% of their income on the lottery (Clotfelter et al., 1999). Some studies even find higher absolute demand for lottery tickets among low-income populations (Clotfelter et al., 1999; Hansen, Miyazaki & Sprott, 2000; Hansen, 1995).

The connection between lottery play and income is unfortunate because the purchase of lottery tickets by the poor can be considered a type of "poverty trap" – a cycle of inefficient behavior that prevents low-income individuals from improving their financial situations. State lotteries have the lowest payout rate of any form of legal gambling (Clotfelter & Cook, 1989) and provide a much lower rate of return than the assets that more affluent families tend to invest in. Over the years 1964-2003, the average expected value was -$.47 for each dollar spent (LaFleur & LaFleur, 2003).[1] Moreover, poverty creates "smaller margins of error," so that behaviors that have

[1] Given diminishing marginal utility, the situation appears even bleaker when the return on the lottery is viewed in terms of expected utility instead of expected value. The evidence is equivocal about whether winning actually even increases average utility. Gardner & Oswald (2007) find significant improvements in psychological stress with medium-sized lottery wins (up to $200,000). However, Brickman et al. (1978) find that lottery winners are no happier than people who did not win and winners actually take less pleasure in mundane activities.

negligible effects on the financial well-being of a middle class person, such as playing the lottery, can have a profound impact on that of a poor person (Bertrand, et al., 2004).

This paper presents a series of experiments intended to illuminate psychological factors that encourage people to purchase state lottery tickets. Experiment 1 demonstrates how a common decision bias – myopia – can lead to increased lottery ticket purchases. Experiments 2 & 3 address the question of why the dream of winning the lottery seems to be particularly attractive to people with low-incomes. These experiments examine the effect of implicit comparisons with other income classes on the propensity to purchase lottery tickets. We discuss the implications of our results for deterring low-income populations from playing state lotteries and the use of lotteries to encourage positive behavior in low-income populations, such as saving.

All three experiments were conducted in a low-income sample because we wanted to understand what drives the purchase behavior of the poor, who are disproportionately affected economically by playing the lottery. We conducted *framed field experiments* as defined by the criteria and terminology of Harrison & List (2004). The experiments were conducted with a subject pool chosen to represent the target population (low-income participants), using a commodity that is not artificial (actual state lottery tickets), and in a domain of behavior in which most of the subjects had prior experience and/or prior information.

Experiment 1: Myopic Risk Seeking

Experiment 1 explores the possibility that people buy tickets, in part, because they view the decision to purchase tickets *myopically*, meaning that they make one decision at a time, rather than *broadly bracketing* the decision – i.e., considering the aggregate consequences of purchasing multiple tickets. Our study is modeled after prior research on 'myopic loss aversion' (Bernartzi & Thaler, 1995), which refers to the combination of narrow bracketing and loss aversion (the disproportionate weighting of losses relative to gains). Research on myopic loss aversion examines people's propensity to reject advantageous gambles (i.e. gambles with positive expected values) when they are presented one at a time. As demonstrated in the classic example by Samuelson (1963), a single 50-50 chance of gaining $200 or losing $100 offers an equal chance of ending up with a gain or loss and loss aversion leads to an overweighting of the latter, which discourages people from playing. However, when one considers many plays of such a gamble, the odds of ending up with a loss progressively diminish, which encourages greater risk taking. Myopic loss aversion has been demonstrated in numerous laboratory studies (DeKay & Kim, 2005; Gneezy & Potters, 1997; Gneezy, Kapteyn, & Potters, 2003; Keren & Wagenaar, 1987; Langer & Weber, 2001; León & Lopes, 1988; Redelmeier & Tversky, 1992; Thaler et al., 1997; Wedell & Böckenholt, 1994), and has been used to explain such diverse phenomena as the attractiveness of expensive car rental insurance coverage and the equity premium puzzle (Benartzi & Thaler, 1995).

The current experiment, in contrast, focuses on a different type of prospect than those thus far examined in the myopic loss aversion literature. We examine people's propensity to accept disadvantageous bets – specifically lottery tickets – when evaluating them myopically. Our research builds on the work of Langer & Weber (2001, 2005), who also challenge the generality of the myopic loss aversion results and demonstrate that for some risk profiles "reverse myopic effects" exist in which gambling is more attractive when decisions are made myopically. The prospects identified by Langer and Weber have the risk profile of a junk bond or a loan with a positive expected value, in which there is a large probability of a moderate return from interest, but a small chance of a large loss in the case of default. An example of such a gamble is a 90% chance to gain $15 and a 10% chance to lose $100, which has been shown experimentally to be more attractive with myopic evaluation rather than with broad bracketing (corresponding to playing the gamble three times) (Langer & Weber, 2005). This gamble is more attractive with myopic bracketing because individuals who are prone to loss aversion and diminishing sensitivity to gains do not proportionately appreciate the likely increase in the magnitude of the gain, but greatly dislike the increased chance of ending up with a loss.

We also present a "reverse myopic effect" using instant state lottery tickets, which have an outlay of $1 for a very small probability of a large gain ($5,000, putting aside intermediate prizes), with an overall negative expected value. However, our explanation for this effect differs from that described by Langer & Weber (2001, 2005). As we discuss in detail below, the attractiveness of a single lottery ticket can be explained by a combination of overweighting the small probability of winning and underweighting the small cost of the ticket. Both of these effects are diminished with broad bracketing, leading to the prediction that people will be less prone to purchase lottery tickets under broad than narrow (myopic) bracketing. This prediction is opposite to the positive relationship between broad bracketing and risk taking observed for the positive expected value prospects commonly examined in the myopic loss aversion literature, but is consistent with the general assertion that broad decision bracketing induces people to assess the aggregate consequences of decisions, leading to better outcomes and expected value maximization (Kahneman & Lovallo, 1993; Read, Loewenstein & Rabin, 1999). However, as explored by Langer & Weber (2001, 2005), there exist exceptions to this general rule whereby broad bracketing will lead to the rejection of advantageous prospects with positive expected values.

Why broad bracketing discourages lottery ticket purchases

That broad bracketing will decrease lottery ticket purchases is predicted by theories that can account for why people play the lottery in the first place: Markowitz's theory of the utility of wealth (1952) and the probability weighting function from Kahneman and Tversky's (1979) prospect theory.

One possible reason why people play the lottery is that spending small amounts on the tickets yields smaller disutility than one would expect if one assumed diminishing marginal utility. To explain the occurrence of simultaneous gambling and insurance purchases, Markowitz (1952) proposed a utility function defined over gains and losses (rather than absolute levels of wealth) that had three inflection points, one at the status quo, one on the gain side and another on the loss side (Figure 1). Markowitz's utility function is convex for small gains and concave for small losses. In the domain of gains this implies that people are more risk seeking for small stakes gambles with only small certain gains (e.g. $.10 for sure or a gamble with a 10% chance to win $1) compared to high stakes gambles with larger certain gains (e.g. $100 for sure over a 10% chance to win $1000). In the domain of losses, people are more risk averse for small stakes losses (e.g. lose $.10 for sure or a 10% chance to lose $1) as compared with large stake losses (e.g. lose $100 for sure or a 10% chance to lose $1000). This underweighting of small gains and small losses was later dubbed the "peanuts effect" (Prelec & Loewenstein, 1991), and has been demonstrated empirically in numerous laboratory studies (see Greene & Myerson, 2004, for a review and see Weber & Chapman, 2005 for a recent in-depth investigation of the effect). The peanuts effect in Markowtiz's utility function can help to explain why people buy lottery tickets. When people decide whether or not to purchase a $1 lottery ticket, they are choosing whether to incur the loss of $1 to obtain a small chance to win a large sum of money and they underweight the small cost of the ticket. However, as costs rise, as would be the case if one bought multiple tickets, the marginal disutility of paying for tickets increases as the utility function becomes steeper. Thus, Markowitz's utility function predicts that people will purchase fewer tickets as the decision is bracketed more broadly, because thinking in terms of large money amounts (e.g., spending $5 for 5 lottery tickets) shifts them to a point on the utility function where the marginal disutility of making the payments is larger.

Another possible reason for why people play the lottery is that they place disproportionate weight on small probabilities, as specified by many generalized expected utility theories (e.g. Edwards, 1962; Kahneman & Tversky, 1979; Quiggin, 1982; Tversky & Kahneman, 1992). Overweighting small probability outcomes increases the appeal of lottery tickets, which offer a small probability of winning a large prize. Moreover, most of the theories that posit overweighting of small probabilities also assume insensitivity to variations in probability at low levels -- that is, the probability weighting function is elevated but relatively flat for low levels of probability (Kahneman & Tversky, 1979; Prelec, 1998; Tversky & Kahneman, 1992). The implication of this general property of the weighting function, termed discriminability, is that people become less sensitive to changes in probability as they move away from the "certainty will not happen" and "certainly will happen" endpoints (Gonzalez & Wu, 1999). Again, this property leads to the prediction that broad bracketing will decrease lottery ticket purchases, because people are insensitive to the difference between, for example, a 0.001 chance of winning relative to a 0.002 chance of winning, but will be sensitive to the increased cost required to produce such a doubling of probability.

Experiment 1 Methods

To test the hypothesis that broad decision bracketing will decrease ticket purchases, we gave participants the opportunity to earn $5 and then offered them the opportunity to purchase up to five lottery tickets. This decision was framed in three different ways. In the *myopic* condition, participants made five decisions about whether to purchase a ticket, one decision at a time. In the *broad bracketing* condition, participants decided how many tickets to buy in one single decision (between 0 and 5 tickets). We also included a third, *all-or-nothing* condition, similar to the *broad bracketing* condition, in which participants were given a single choice between buying five lottery tickets or none. Based on the theories described above, we predicted that participants would purchase more lottery tickets in the *myopic* condition than in the *broad bracketing* condition or the *all-or-nothing* condition.

The sample consists of 122 participants who were approached while they waited to board buses at the Greyhound station in Pittsburgh, Pennsylvania. See Table 1 for demographic information. Everyone in the station was approached unless they were sleeping, talking on the phone, about to board, unable to speak English, or exhibiting signs of psychosis. We asked potential participants to complete a survey in exchange for $5.[2] This survey, unrelated to the experiment, asked about their opinions on Pittsburgh.

After completing the survey, all participants were given the opportunity to either keep the $5 they had earned from completing the survey or to use this money to purchase instant win scratch-off lottery tickets. Since many participants were traveling out of state, they were told

[2] We had subjects "earn" the money, instead of merely endowing them with it, to reduce the house money effect. The house money effect describes the propensity for people to consume (Henderson & Peterson, 1999) or risk (Ackert et al. 2006; Thaler & Johnson, 1990) money that they have received as a result of a windfall. Although our procedure may not completely eliminate this effect, we feel that the results are still important even if they are only generalizable to lottery ticket purchases made with financials, gifts, bonuses, or when people feel they have 'money to burn.'

that we would cash in a winning ticket for any amount other than the jackpot. We chose instant lottery tickets because they account for the largest fraction of lottery sales (Hansen, 2007) and simplified the study methodology.

Participants were randomly assigned to one of the three conditions. They were informed that they would be making decisions about instant scratch off tickets, each of which cost $1. In the *myopic* condition, participants were told they would be receiving their payment in stages. In each stage, the participant was told, "Here is $1 as part of the payment for your time filling out the survey" and were handed $1. When they flipped to the next page, they were shown an instant scratch-off ticket and read the following:

Would you like to buy a lottery ticket?

____ *Yes* ____ *No*

This procedure was repeated five times. To hold information constant across conditions, participants were not allowed to scratch-off any ticket(s) they purchased until the conclusion of the experiment.

In the *broad bracketing* condition, participants were told, "Here is $5 as the payment for your time filling out the survey," and were handed $5. When they flipped to the next page, they were shown 5 instant scratch-off tickets and read:

How many tickets do you want to purchase?
____ *5 lottery tickets*
____ *4 lottery tickets*
____ *3 lottery tickets*
____ *2 lottery tickets*
____ *1 lottery tickets*
____ *No lottery tickets*

In the *all-or-nothing* condition, the procedure was identical to the broad bracketing condition, except now participants could only buy 5 lottery tickets or none:

Do you want to buy 5 lottery tickets?

____ *Yes* ____ *No*

Next participants reported demographic information and their usual frequency of playing the lottery. We anticipated that people who frequently play the lottery would tend to buy lottery tickets in our experiment.

Experiment 1 Results

The main dependent variable for each participant was the total number of lottery tickets purchased. The prediction that broad bracketing would lead to fewer purchases was supported. The mean number of tickets purchased in both the *broad bracketing* (0.75) and the *all-or-nothing* conditions (0.64) was lower than in the *myopic* condition (1.58). Figure 2 compares the distribution of ticket purchases for each of the experimental conditions.

Table 2 presents an ordered probit analysis of lottery ticket purchases. We restrict the analysis to the *myopic* and *broad bracketing* conditions, since the *all-or-nothing* condition had a binary dependent variable as opposed to the multiple possible values of the dependent variable in the other two conditions (ranging from 0 to 5 tickets). Decision bracketing was a dummy variable, coded 0 for *myopic bracketing* and 1 for *broad bracketing*.

Specification 1 shows that participants in the *broad bracketing* condition purchased significantly fewer tickets than those in the *myopic bracketing* condition. In Specification 2, we include the dummy variable chronic only, which reflects the tendency to play the lottery in daily life (coded 1 if the participant reported playing the lottery at least a few times a month, 0 otherwise). As expected, the coefficient on chronic is significant and positive, indicating that across conditions, chronic players purchased more lottery tickets. Specification 3 includes both chronic and decision bracketing and shows that the effect of decision bracketing remains significant after controlling for chronic.

Specification 4 includes other control variables. Previous research found that ticket purchases decrease with age (Clotfelter et al., 1999). Age, however, is only significant when included with age squared. The results indicate that there is a negative effect of age on percentage of lottery ticket purchases before age 30 and a positive effect thereafter. Past research suggests that African Americans (coded as 1 if African American, 0 otherwise) have a higher propensity to play lotteries (Clotfelter et al., 1999; Light, 1977). Previous research has also shown that education is inversely related to lottery play (Clotfelter et al., 1999), however the, variable college (coded 1 for a college graduate, 0 otherwise) is not significant. Specification 5 includes all experimental and demographic variables. The coefficient on decision bracketing remains significant after controlling for all other variables. The coefficients and significance of the control variables remain largely unchanged, except that now the coefficient on African American is significant and the coefficient on education is significant, but in the wrong direction. Note that our sample is more specialized than samples used in prior research; a college education may have different significance for a population of people traveling by Greyhound than it would have in a broader sample. Perhaps the college graduates in our sample have unmet income aspirations that motivate them to play the lottery.

In order to interpret the estimated parameter coefficients we present the marginal probability effects of decision bracketing in Table 3 for specifications 1, 3, and 5 of the ordered probit analysis. The marginal probability effects show how moving from myopic to broad decision bracketing affects the distribution of responses. For example, in column 1 we see that broad decision bracketing increases the probability of purchasing 0 lottery tickets by 24%.

Experiment 1 Discussion

We find that myopic decision making results in more lottery ticket purchases relative to the *broad bracketing* and *all-or-nothing* conditions. Studies on myopic loss aversion have thus far have only examined prospects with positive expected values and demonstrated that broader decision bracketing leads to increased risk taking. In contrast, the current study offers evidence that for attractive prospects with negative expected values broad bracketing can reduce risk taking. Combining these findings points to the more general hypothesis that broader bracketing produces behavior closer to expected value maximization.

With the exception of the work by Langer & Weber (2001, 2005), one may be left with the impression from the myopic loss aversion literature that broader decision bracketing necessarily leads to greater risk seeking, since this literature has only examined prospects with positive expected values. The results of the current study extend the literature on myopic loss aversion by demonstrating a "myopic risk seeking effect" – that myopic evaluation of attractive prospects with negative expected values induces risk seeking behavior while broader decision bracketing reduces risk seeking behavior. These findings are reconciled by the more general theory that broad decision bracketing yields decisions more in line with expected value maximization.

Experiment 2: Relative Income Induction

Experiment 1 illuminates how decision framing can stimulate or deter low-income individuals' tendency to purchase tickets. However, it does not address the question of why lottery play is so prevalent among low-income individuals, despite the fact that they have the most compelling reasons *not* to waste money playing the lottery. Experiments 2 & 3 address this question by examining how factors related to income and class status affect low-income individuals' tendency to purchase tickets. In Experiments 2, we propose that implicit comparisons with other income classes engender feelings of low relative status that encourage the purchase of lottery tickets as a means of correcting for low status. After a brief review of the literature of the impact of relative income on happiness and behavior, we present an experiment demonstrating the effect of cognitions about relative income on lottery ticket purchases.

Relative income

Several lines of research in psychology and economics focus on the consequences of comparisons with others for affect and behavior. Social comparison theory (Festinger, 1954; Suls & Wheeler, 2000), equity theory (Adams, 1965) and relative deprivation theory (Crosby, 1976, Walker & Smith, 2001) all posit that people do not simply evaluate the absolute value of their income, performance, achievements, etc., but that these evaluations are heavily influenced by comparisons with others. Economic and decision research has incorporated the idea of relative standing in the formulation of social-comparison based utility functions (Loewenstein, Thompson & Bazerman, 1989, Messick & Sentis, 1985), according to which disadvantageous, and in some cases advantageous, inequality reduces utility.

Research in both economics and psychology has found that happiness depends, in part, on relative standing (Frank, 1985). Easterlin (1974, 1995, 2001) finds that happiness is at best weakly related to changes in absolute income; within a nation, self-reported happiness remains stable over time, even when per capita income increases substantially. Similarly, over the life cycle, the increase in income that comes with middle age and the decrease in income commonly associated with retirement are not correlated with changes in happiness. In contrast, within a country at one point in time, greater income is significantly correlated with greater happiness, suggesting that happiness depends, in part, on relative standing in the income hierarchy.

Further research has substantiated the claim that relative standing is a powerful predictor of happiness by examining income reference points set by relevant social comparison groups. Luttmer (2005) finds that controlling for absolute income, high neighborhood earnings are associated with lower levels of happiness, an effect that is stronger for those who socialize more with their affluent neighbors as opposed to friends and relatives outside of their neighborhood. Hagerty (2000) finds that although a person's absolute income is the strongest predictor of income satisfaction, the income distribution of the community in which they live is also a significant predictor. Clarke and Oswald (1996) observe no relationship between satisfaction and absolute income level, but find that income relative to co-workers has a significant effect on satisfaction. Solberg et al. (2002) find that poor financial standing relative to others creates unmet desires, which partially mediates the effect of social comparisons on income satisfaction.

Since social comparisons of income and compensation have substantial influences on happiness and satisfaction, it is not surprising that they can be powerful motivators of behavior and influence decision-making. Many economists have theorized that people seek to compensate for a low relative income status by engaging in conspicuous consumption or working longer hours (e.g., Duesenberry, 1949; Frank, 1985, Veblen, 1934). Consistent with such predictions, Schor (1998) finds that people who perceive their financial situation to be below that of their reference group save significantly less than those who perceive it to be above that of their reference group. Bowles & Park (2005) demonstrate a similar effect on labor supply. Data on work hours from ten countries shows that greater income inequality is associated with longer working hours. Closely related, Neumark and Postlewaite (1998) find evidence that women whose sisters' husbands have a higher income than their own husbands are more likely to be employed.

The motivation for Experiment 2 dates back to what may have been the first attempt by economists to understand lottery ticket purchases. Friedman and Savage (1948) proposed that normally risk-averse low-income individuals are motivated to play the lottery because they derive disproportionate utility from increases in income that could potentially propel them into the middle or upper class. We build on this theory that the purchase of state lottery tickets, in part, derives from a desire to correct for low-income status by positing that whether one considers oneself to have a low-income is in part a *subjective* judgment which depends on explicit or implicit social comparisons, not merely the absolute value of one's income. Experiment 2 tests the hypothesis that inducing a person to view their relative financial standing in negative terms will increase lottery ticket purchases. Previous work has examined the relationship between absolute income and lottery ticket purchases; however, it is difficult to infer causality because relative income is in part endogenous (due to decisions made by the individual). In this experiment, we demonstrate causality by manipulating subjects' *subjective* feelings of poverty.

The rationale behind this hypothesis is that lottery tickets may be seen as a vehicle to correct for low-income status. This is similar to the conceptualization by Bowles & Park (2005) that forgoing leisure for longer workdays may be considered a means of correcting for lower relative income standing. It is also related to the idea, proposed by Kahneman and Tversky (1979), that people tend to be risk-seeking when their wealth falls below some salient point of reference.

Experiment 2 Methods

Participants were recruited from the Greyhound Bus Station in downtown Pittsburgh, PA. The mean income of the sample was $29,228 and median income was $19,944 (see Table 1 for complete demographic information). Seventy-nine participants were asked to complete a survey which elicited their opinions about the city of Pittsburgh, in exchange for a $5 payment. As in Experiment 1, the survey was not used for research purposes, but served as a pretense for paying them $5, which they could later spend on tickets.

After completing the survey, participants filled out demographic information on age, gender, race, marital status, and finally, income. Our relative income manipulation was embedded in the income question. By random assignment, half of the sample was induced to feel that their income was in the middle of the income range with the following question:

What is your yearly income (choose an income bracket):
____*Less than $10,000*
____*Between $10,001 and $20,000*
____*Between $20,001 and $40,000*
____*Between $40,001 and $60,000*
____*More than $60,000*

The other half of the sample was induced to feel that their income was on the low end of the income range with the following question:

What is your yearly income (choose an income bracket):
____*Less than $100,000*
____*Between $100,001 and $250,000*
____*Between $250,001 and $500,000*
____*Between $500,001 and $1 Million*
____*More than $1 Million*

This second version of the income measure was designed to induce the experience of *low relative income*.

Immediately after filling out the income question, participants were handed five $1 bills and then shown a Pennsylvania State Instant scratch-off ticket. They were told that the instant tickets were previously purchased for $1 each and that they could purchase between 0 and 5 tickets for $1 each. Finally, participants filled out additional demographic information.

Experiment 2 Results

Participants who reported their income on a low scale (checks at intervals between $10,000 and $60,000), designed to make they feel they had a *high relative income,* purchased .67 tickets on average. Participants who reported their income on a high scale (check at intervals between $100,000 and $1,000,000), designed to make them feel they have a *low relative income,* purchased 1.28 tickets on average. Figure 3 presents the frequency distribution of ticket purchases in the two conditions.

Since the dependent variable is an ordered categorical variable, we analyze the data using ordered probit. Specification 1 of Table 4 shows the marginally significant effect ($p<.09$) of the induction (coded 1 for subjective low relative income and 0 otherwise). Specification 2 contains only the dummy control variable, Chronic, which reflects self-reported lottery play in daily life (coded 1 if the participant normally plays the lottery at least a few times per month, 0 otherwise). Not surprisingly, chronic players purchased more tickets at a marginally significant level. After controlling for this factor, as can be seen in Specification 3, the relative income manipulation becomes significant at the .05 level. Specification 4 includes various demographic variables: African American (code 1 if African American, 0 otherwise), Education (code 1 if the participant had a college degree, 0 other otherwise), Age and Age^2. These variables were included based on results we obtained from a previous study in the same population (Haisley et al., 2007) and a national survey on state lottery players (Clotfelter et al., 1999). The coefficients of the control variables all have the correct signs, but are not significant. Specification 5 shows that the effect of the induction remains significant, when all control variables are included in the estimation equation.

To interpret the estimated parameter coefficients, Table 5 presents the marginal probability effects of the relative income manipulation for specifications 1, 3, and 5 of the ordered probit analysis. For example, in the full model, we see that the relative income induction decreases the probability of purchasing 0 lottery tickets by 27% and increases the probability of purchasing 5 tickets by 11% (see Specification 3 of Table 3).

Experiment 2 Discussion

These results support the hypothesis that inducing people to perceive that their income is lower than some reference point increases their propensity to purchase lottery tickets. This manipulation does not force an explicit social comparison and the participant is very unlikely to be aware of the manipulation, as it is embedded in other demographic questions. Despite its subtlety, however, the experimental manipulation of subjective poverty has a substantial effect. Ticket purchases were nearly doubled in the low relative income condition. Results support the idea that when people are made to feel subjectively poor, they view the lottery as a means to correct for their low-income status.

Experiment 3: The Lottery as a Social Equalizer

Experiment 2 presents evidence that lottery ticket purchases are driven in part by the perception of low relative income. But why should such a perception motivate the poor to resort to the lottery as a means to correct for their low standing? Low-income individuals may feel that their low standing in society prevents them from having the same opportunities as those with higher socioeconomic status. A game of chance, in a sense, levels the playing field and gives the poor the same opportunity to win as everyone else. This would make lotteries disproportionately attractive to low-income individuals, since they may feel they rarely get such fair odds *relative* to those from upper income classes. Thus, we test the hypothesis that being primed to judge the lottery as an 'equal-opportunity prospect' for all class categories will increase lottery ticket purchases.

Prior research supports this idea that opportunities that ensure equality among different classes can be motivating for people who are usually discriminated against. In a study conducted with boys from different castes in India, Hoff & Pandey (2004) found that when the caste of each boy was announced, low caste boys performed worse on a pay-for-performance task. The authors theorized that the caste announcement triggers the belief in low caste boys that however good their performance, they will be rewarded prejudicially. This theory was substantiated by the finding that low caste boys performed better when the payment was determined by a *lottery* that selected one boy to be paid for his productivity at a very high wage, even though the caste of each boy had been announced.

A similar logic can explain why low-income individuals have a particular affinity for state lotteries. Members of the lower class may feel that their low status prevents them from having the same opportunities as other members of society due to class discrimination or by virtue of having fewer monetary, educational, or social capital advantages. Lotteries may be considered a 'social equalizer' in that, no matter what your position in society, everyone has an equal chance to win. The poor may feel they are rarely given such fair odds *relative* to others in their daily life.

Recognition of this fact could potentially make low-income individuals disproportionately motivated to play the lottery.

Experiment 3 Methods

Eighty-three participants were recruited from the Greyhound Bus Station in downtown Pittsburgh, PA. As in the previous experiments, people waiting to board buses were approached to complete a short survey in exchange for $5. In the control condition, participants filled out the survey from Experiments 1 & 2 that elicited their opinions about Pittsburgh. In the experimental condition, participants completed a survey which asked them a series of questions about whether a rich person, middle class person or poor person would have an advantage or an equal chance when it came to eight different outcomes: 1) being awarded a scholarship 2) wining playing a slot machine 3) being elected mayor 4) finding $100 on the ground 5) becoming a superstar singer 6) being a victim of identity theft 7) getting a promotion 8) getting discounted housing. These events were deliberately chosen so that some would favor rich people (e.g. being elected mayor), some poor people (e.g. getting discounted housing), and some neither (e.g. win playing a slot machine).[3] Although we did not ask them explicitly whether a rich or poor person would have a better chance of winning the lottery, the questions--particularly the question about playing a slot machine--were intended to make respondents think about the fact that everyone would have an equal chance.

Immediately after they completed either the control or the survey, participants were handed five $1 bills as their payment and were given the opportunity to purchase lottery tickets. Next participants filled out demographic information. See the fifth column of Table 1 for demographic information.

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[3] Although it is not relevant to the focus of this paper, Appendix 1 reports the response frequency distributions for each item.

Experiment 3 Results

The hypothesis that participants in the experimental group would purchase more lottery tickets compared to those in the control group was supported. Participants in the control group purchased .54 tickets on average while participants in the experimental group purchased 1.31 tickets on average. Figure 4 presents the frequency distribution of ticket purchases in the two conditions.

Again, we use ordered probit to analyze lottery ticket purchases. Specification 1 in Table 6 shows the significant effect of the social equalizer induction variable (coded 1 for the experimental group, 0 for the control group). Specification 2 includes the control variable, Chronic (coded 1 if the participant plays the lottery at least a few times per month, 0 otherwise). The coefficient of Chronic is in the right direction, but not significant, probably due to the low number of chronic players in this sample (16 participants). Specification 3 shows that the effect of the induction remains significant when chronic is included in the model. Specification 4 includes the demographic variables. They are in the right direction, but not significant, and Specification 5 shows that the effect of social equalizer induction remains significant when all control variables are included in the model. Table 7 shows the marginal probability effects of the social equalizer induction for specifications 1, 3, and 5 of the ordered probit analysis.

Experiment 3 Discussion

These results support our hypothesis that low-income individuals may be particularly drawn to playing the lottery because lotteries afford them an ‘equal opportunity’ of winning. They are likely to perceive the lottery as a rare opportunity to compete on equal footing with people who are more affluent.

One potential criticism of this finding is that the induction materials introduce a number of ideas, about class, luck, ability, social equity, and therefore obfuscate the driver of our effect. We conducted additional analyses on the participants in the experimental condition only to bolster our claim that the effect is driven by the belief among the poor that a game of chance does not discriminate among classes but that upper and middle classes have an advantage when it comes to rewards based on ability.

This supplemental analysis uses the responses to the manipulation questions: “Check which group is most likely to win playing a slot machine” and “Check which group is more likely to get a promotion.” These two questions were chosen because the first measures the belief that all class categories are equally lucky and the second measures the belief that the middle and upper class have the advantage when it comes to receiving a reward based on ability. A variable was created by giving one point for reporting that all classes have an equal chance at winning playing a slot machine and one point for reporting that middle income and rich people were most likely to get a promotion. This variable predicts ticket purchases in the experimental condition with ordered-probit analysis, though not at a significant level with a two-tailed test (β=0.42, z= 1.56, p=.11).

Conclusion

These experiments shed light on factors that help explain why people play the lottery. Experiment 1 demonstrates how a common decision bias – the failure to consider the aggregate consequences of multiple decisions – applies to lottery ticket purchases. Participants in the myopic condition fail to grasp that multiple purchased decisions add up to a large purchase that would be deemed unacceptable by itself. As pointed out by Bertrand, et al. (2004), these common decision biases affect everyone, rich or poor. However, they may have more severe consequences for the poor, as is the case for playing the lottery. Experiments 2 and 3 demonstrate how negative comparisons with other income classes encourage lottery play. Although negative income comparisons may have this effect on people from every class, these effects can be expected to affect the poor the most, since they are most likely to experience negative comparisons. Experiment 2 indicates that lotteries are more alluring for poor people because they provide an opportunity to correct for low-income status. Experiment 3 indicates that part of their appeal is that they are one of the few opportunities available to the poor for a sudden increase in wealth.

The results of Experiments 2 & 3 point to a cruel irony. People with low-incomes play the lottery, which amounts to effectively burning $.47 on every dollar spent, in part because the cognitions associated with poverty increase the appeal of playing. This creates a vicious cycle. The subjective feeling of poverty leads people to take actions that effectively exacerbate the financial condition which led to the actions in the first place. The cost is not insubstantial. Approximately 50% of households with an income less than $25,000 play the lottery, and among the households that play, the annual per capita expenditure on lotteries is above $550 (Clotfelter, et al, 1999).

Do these findings indicate that lottery ticket purchases are evidence of irrationality? Though our findings show that preferences for lottery tickets are not fixed or stable, but are influenced by the decision context, we do not believe that the purchase of tickets is *necessarily* irrational (aside from compulsive gamblers for whom playing the lottery is clearly an irrational, addictive behavior).[4] People spend money on a lot of recreational activities, such as movies, amusement parks, books, travel and casinos that provide intangible benefits, and it would be

[4] Compulsive lottery playing is not an insignificant problem. Twenty percent of callers to the 1-800-GAMBLER national hotline had trouble controlling spending on state lottery tickets, second only to casino gambling, according to the Council on Compulsive Gambling of New Jersey, 2002 Help Line Statistics.

difficult to argue that 'buying a dream' in the form of a lottery ticket is less rational than any of these purchases.

Regardless of whether playing the lottery meets the qualifications of economic rationality, it is unfortunate that the cost of 'buying a dream' has to be so high. Why should wealthy people purchase dreams that provide an average real return of 7% per annum while poor people purchase dreams that provide an instantaneous return of -47% or worse? Some economists have argued that, although playing the lottery is voluntary, it should be viewed as a substantial regressive tax. In 2006, lottery ticket sales generated $17 billion in net revenue (Stodghill & Nixon, 2007). In our opinion, states should not be in the business of extracting wealth from poor people, especially when, as we show, the psychological experience of poverty is in part responsible for the attractiveness of lotteries. State lotteries should not be banned, as that would surely drive the activity underground. Instead, we propose a simple solution that would avoid leveling a high tax on low-income families: provide an actuarially fair rate of return less any cost of administration, and reduce the variation in prize returns by increasing the number of winners and reducing the jackpot amounts.

Additionally, the marketing, advertising, and use of game variability and promotions should be curbed.[5] Though the mandate of many state lotteries is explicit in its goal of maximizing revenue, using lotteries to generate discretionary revenue for the state through a *seemingly* “painless” tax only encourages exploitation of the poor’s naturally tendency to be drawn to the lottery. As argued by Clotefelter & Cook (2007), a profit maximization strategy is inappropriate and states should adapt a model similar to that of state-run liquor monopolies, where the goal is to regulate and control the sale of alcohol in order to accommodate “unstimulated” demand, but not to

[5] The most recent development is the introduction of lottery video game terminals, which are part of an effort to attract younger customers (Stodghill & Nixon, 2007).

promote it. Given the important source of revenue that lotteries have become for states, however, one shouldn't hold one's breath waiting for such changes to occur.

Is there a middle ground? Our findings point to policy recommendations that allows for a compromise between doing away with the profit maximization strategy of state lotteries and completely ignoring the financial well-being of low-income lottery patrons.

The results of Experiment 1 suggest a policy application that could selectively reduce ticket purchases by low-income players and promote responsible gambling. Lottery tickets could be sold in packages of multiple tickets, e.g. packs of 5 undiversified $1 tickets. In line with our findings, this should decrease the sale of lottery tickets overall by reducing people's propensity to discount the low cost of a ticket as a 'peanut' without realizing how costs add up over time. This could selectively reduce sales for low-income players rather than high-income players because the dollar value of a 'peanut' can be expected to increase as income increases (Markowitz 1952). Such an intervention would be attractive to a state that would like to decrease its share of gambling revenue generated by low-income consumers. Of course, this must be pilot tested first to avoid unintended consequences. One could imagine a scenario in which problem gamblers are hooked on a "daily dose" of lottery gambling and might step up their daily consumption to the purchase minimum.

Eperiments 2 & 3 find that the feelings and cognitions associated with poverty increase the attractiveness of lotteries. So why not capitalize on this tendency instead of lamenting it? These results suggest that lotteries are powerful *motivators* for low-income populations. Perhaps they can be used to encourage financially beneficial behaviors, such as saving. There is a wealth of evidence that lottery-linked savings accounts can be applied quite successfully in low-income populations. In developing countries, microfinance institutions have utilized such accounts where, for example, customers accumulate lottery tickets by making regular minimum deposits (Ashraf et al., 2003). Many commercial banks outside of the U.S. also use lottery-linked savings accounts. In a typical arrangement, monthly drawings are held for cash and prizes and customers get one lottery ticket for every $X they have on deposit at the time of the drawing (Guillen & Tschoegl, 2002). These accounts tend to draw customers from the lower end of the income distributions. These programs benefit banks by increasing deposit balances and benefit customers by increasing their financial security, although often these accounts have slightly reduced interest rates to help cover the costs of the prizes. Policy makers should explore the establishment of similar financial services in the U.S., either through partnerships with banks or directly through state lotteries, such as by offering lottery tickets with a savings component. Again, careful pilot research must be done to evaluate the social benefit and avoid unintended consequences of such programs before implementing them on a wide scale.

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Table 1. Demographic information

		Experiment 1	Experiment 2	Experiment 3
N		122	79	83
Age	Mean	31.6	40.2	29.4
	Median	26	38	24
	Range	18-78	18-78	18-62
Income	Mean	$28,575[a]	$29,228	$19,944
	Median	$19,000	$20,000	$16,500
	Range	$8,400-$85,000	0-$256,000	$0-$85,000
Education	At Least College Degree	21%	19%	14.6%
	No College Degree	79%	81%	85.4%
Gender	Males	52%	49%	61%
	Female	48%	51%	39%
Race	African American	54%	41%	48.2%
	Caucasian	36%	49%	37.0%
	Hispanic	3.5%	3%	2.5%
	Asian	3%	4%	2.5%
	Reported “other”	3.5%	4%	9.8%
Occupation[c]	Managerial Professional	7%		
	Technical Professional	5%		
	Sales and Marketing	10.5%		
	Administrative / Clerical	16%		
	Skilled Blue Collar	17%		
	Unskilled Blue Collar	21.5%		
	Students	18%		
	Retired	2%		
	Homemaker	3%		

a. Occupation data was collected for Experiment 1 only.

Table 2. Ordered probit analysis on the number of tickets purchased in Experiment 1 (broad vs. myopic decision bracketing).

	Coefficients				
	(1)	(2)	(3)	(4)	(5)
BROAD BRACKETING	-0.635**		-0.720**		-0.902**
	(0.25)		(0.25)		(0.29)
CHRONIC		1.067**	1.155**		1.460**
		(0.32)	(0.32)		(0.36)
AGE				-0.135**	-0.167**
				(0.045)	(0.048)
AGE^2				0.00169**	0.00197**
				(0.00055)	(0.00058)
AFRICAN AMERICAN				0.499	0.648*
				(0.28)	(0.29)
EDUCATION				0.409	0.809*
				(0.34)	(0.36)
Observations	83	83	83	72	72
Pseudo R^2	0.0276	0.0471	0.0816	0.0548	0.167

Note: Standard errors in parentheses
** p<0.01, * p<0.05

Table 3. Marginal probability effects of decision bracketing in Experiment 1.

	(1) Decision Bracketing	(2) Decision Bracketing with Chronic	(3) Decision Bracketing with all control variables
0 Tickets	0.24**	0.27**	0.32**
	(0.09)	(0.09)	(0.10)
1 Ticket	-0.03	-0.03	-0.05
	(0.02)	(0.03)	(0.05)
2 Tickets	-0.07*	-0.09*	-0.12*
	(0.04)	(0.04)	(0.05)
3 Tickets	-0.06^{+}	-0.07*	-0.80*
	(0.03)	(0.03)	(0.04)
4 Tickets	-0.03	-0.04	-0.04
	(0.02)	(0.02)	(0.03)
5 Tickets	-0.05^{+}	-0.04^{+}	-0.04
	(0.03)	(0.03)	(0.02)

Note: Standard errors in parentheses
** p<0.01, * p<0.05, $^{+}$ p<0.10

Table 4. Ordered probit analysis on the number of tickets purchased in Experiment 2 (the relative income induction).

	Coefficients				
	(1)	(2)	(3)	(4)	(5)
INDUCTION	0.447+		0.557*		0.712*
	(0.26)		(0.28)		(0.30)
CHRONIC		0.534+	0.667*		0.635+
		(0.33)	(0.34)		(0.36)
AGE				-0.0306	-0.0306
				(0.045)	(0.046)
AGE^2				0.000413	0.000426
				(0.00050)	(0.00052)
AFRICAN AMERICAN				0.297	0.394
				(0.28)	(0.30)
EDUCATION				-0.321	-0.234
				(0.36)	(0.39)
Observations	79	77	77	75	75
Pseudo R-squared	0.0159	0.0144	0.0376	0.0172	0.0616

Note: Standard errors in parentheses
* $p<0.05$, $^{+}$ $p<0.10$

Table 5. Marginal probability effects of the relative income induction in Experiment 2.

	(1) Relative Income Induction	(2) Relative Income Induction with Chronic	(3) Relative Income Induction with all Control Variables
0 Tickets	-0.17^{+}	-0.21*	-0.27**
	(0.10)	(0.10)	(0.10)
1 Ticket	0.04	0.05^{+}	0.07^{+}
	(0.03)	(0.02)	(0.04)
2 Tickets	0.06	0.08^{+}	0.09*
	(0.04)	(0.04)	(0.05)
3 Tickets	-	-	-
4 Tickets	-	-	-
5 Tickets	0.08^{+}	0.09^{+}	0.11**
	(0.05)	(0.05)	(0.05)

Note: Standard errors in parentheses
** p<0.01, * p<0.05, $^{+}$ p<0.10

Table 6. Ordered probit analysis on the number of tickets purchased in Experiment 3 (the social equalizer induction).

	Coefficients				
	(1)	(2)	(3)	(4)	(5)
INDUCTION	0.673**		0.649*		0.672*
	(0.27)		(0.28)		(0.29)
CHRONIC		0.248	0.156		-0.00884
		(0.33)	(0.33)		(0.36)
AGE				-0.0777	-0.0663
				(0.074)	(0.077)
AGE^2				0.00117	0.000963
				(0.0010)	(0.0011)
AFRICAN AMERICAN				0.0530	0.153
				(0.28)	(0.29)
EDUCATION				-0.563	-0.629
				(0.46)	(0.49)
Observations	83	80	80	79	79
Pseudo R-squared	0.0322	0.00309	0.0326	0.0199	0.0495

Note: Standard errors in parentheses
**p<0.01, * p<0.05

Table 7. Marginal probability effects of the social equalizer induction in Experiment 2.

	(1) Relative Income Induction	(2) Relative Income Induction with Chronic	(3) Relative Income Induction with all Control Variables
0 Tickets	-0.25**	-0.24**	-0.24*
	(0.10)	(0.10)	(0.10)
1 Ticket	0.05⁺	0.05⁺	0.06⁺
	(0.03)	(0.03)	(0.03)
2 Tickets	0.07*	0.06⁺	0.07⁺
	(0.03)	(0.03)	(0.04)
3 Tickets	0.30	0.03	0.03
	(0.02)	(0.02)	(0.02)
4 Tickets	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)
5 Tickets	0.09*	0.08*	0.08*
	(0.04)	(0.04)	(0.04)

Note: Standard errors in parentheses
** $p<0.01$, * $p<0.05$, $^{+}$ $p<0.10$

Figure 1. Markowitz's proposed utility function

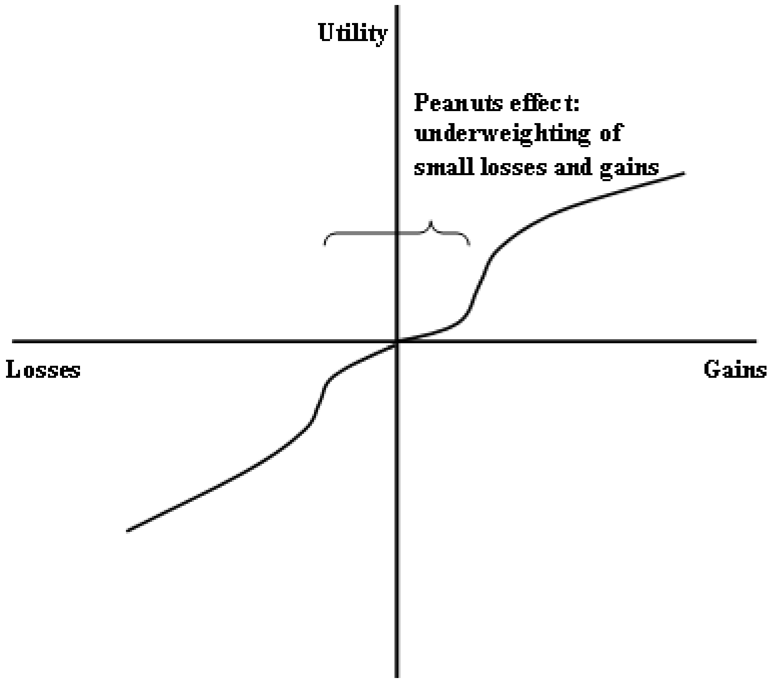


Figure 2. Histogram of lottery tickets purchased in the myopic, broad bracketing and all-or-nothing conditions for Experiment 1.

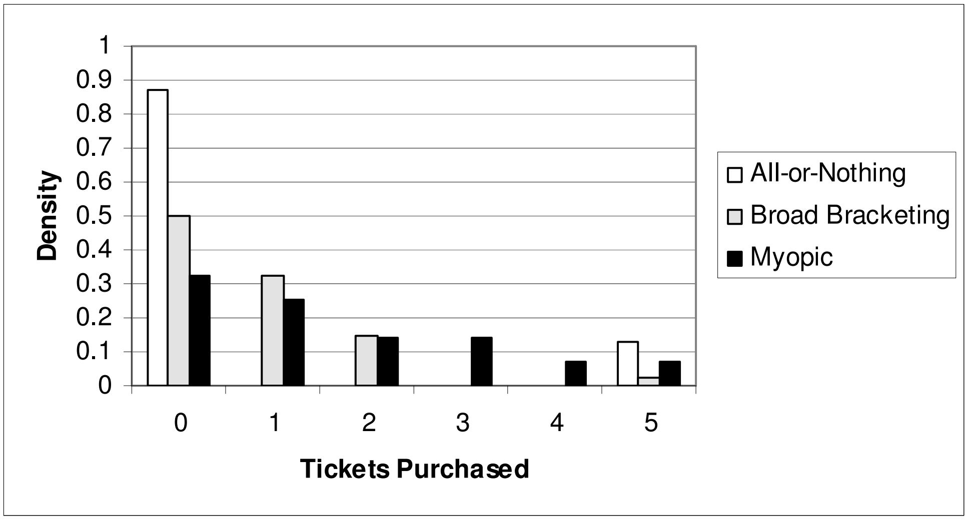


Figure 3. Histogram of lottery tickets purchased in the high and low relative income conditions in Experiment 2.

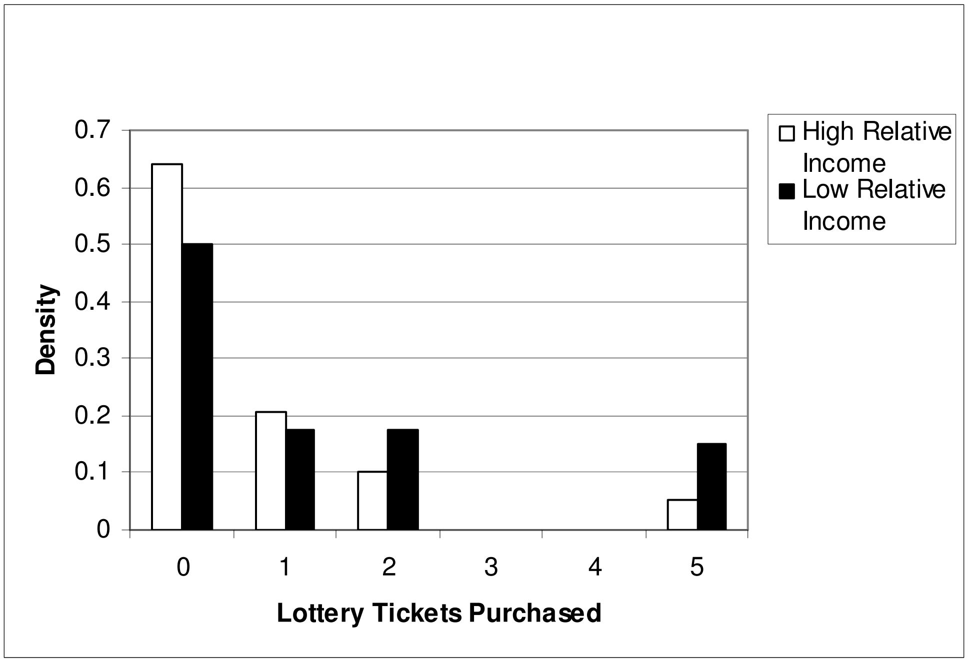
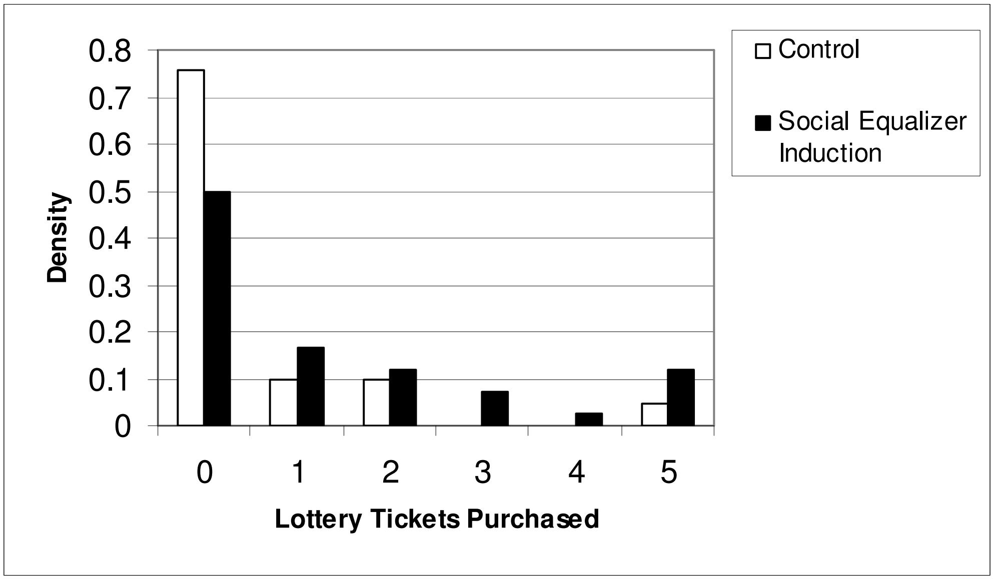


Figure 4. Histogram of lottery tickets purchased the control and the social equalizer induction conditions in Experiment 3.



Appendix 1

Survey used in the experimental condition of Experiment 2. The response frequencies are filled in on this survey.

Check which group is most likely to:	Poor People	Middle Class People	Rich People	Equal chance for all
get a scholarship.	10%	40%	19%	31%
win playing a slot machine.	3%	31%	14%	52%
be elected mayor.	2.5%	12%	78%	7.5%
find $100 on the ground.	14.5%	22%	10%	53.5%
become a superstar singer.	5%	24%	20%	51%
be a victim of identity theft.	16.5%	24%	16.5%	43%
get a promotion.	0%	30%	30%	40%
get discounted housing.	63%	10%	5%	22%