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Positionality of Income: An Exploration of the Influence of Cognition

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Positionality of Income:
An Exploration of the Influence of Cognition

by

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Abstract

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        Neoclassical economic theory asserts that individuals act independently in a utility maximizing manner. Recent literature modifies this theory and introduces a relative income or positional term in the utility function, making utility functions interdependent. The neoclassical theory views income as a non-positional good, whereas the modification views income as a positional good. Studies employing choice experiments through use of hypothetical surveys pose the Relative Income Question, which asks individuals to select between absolute or relative income. Many individuals exhibit a positional concern for income specifically.

        Individuals may consider various factors when evaluating their view on the positionality of income. A cognitive influence was first observed by Rand (2008), who found that individuals preferring absolute income scored significantly higher on cognitive ability tests compared to those preferring relative income. The focus of this study is to understand factors individuals may integrate in deciding whether they view income as a positional or non-positional good.

        The purpose of this paper is three-fold, to: (1) replicate the findings of the original relative income question experiment using new data; (2) evaluate whether relative income or absolute income is the more appropriate basis for economic models oriented towards policy making; (3) and investigate the relevance of a cognition argument in choosing between relative income and absolute income. The hypothesis is that individuals with relatively higher cognitive measure scores will select the absolute state as this is the more (economically) rational answer, as per the standard economic theory. It was found that the standard economic theory does not universally apply, supporting the importance and relevance of a relative income term in the utility function. However, individuals with higher scores on a measure of cognition tended view income as a non-positional good, complying with standard economic theory.

TABLE OF CONTENTS

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Chapter 1

Introduction

1.1 The Neoclassical Economic Theory and Utility Maximization

The American economist, Thorstein Veblen, first coined the term "Neoclassical Economics". This meta-theory of economics is based on three main principles: (1) individuals have rational preferences among outcomes; (2) individuals aim to maximize utility while firms aim to maximize profits; and (3) individuals act independently of one another (Weintraub, 1993). As can be observed, utility maximization is a core concept of this economic theory. According to conventional economics, all individuals are assumed to act out of independent self-interest. The idea of preserving self-interest may then be extended to all utility maximizing behaviors as well. As per the idea of utility maximization, an individual will select the bundle that will maximize his/her utility over the feasible set (i.e. income). This is indicated in Figure 1.1, where an individual consumption occurs at the point of tangency between the indifference curve and the budget line. As the individual's feasible set increases, the budget constraint moves outward.
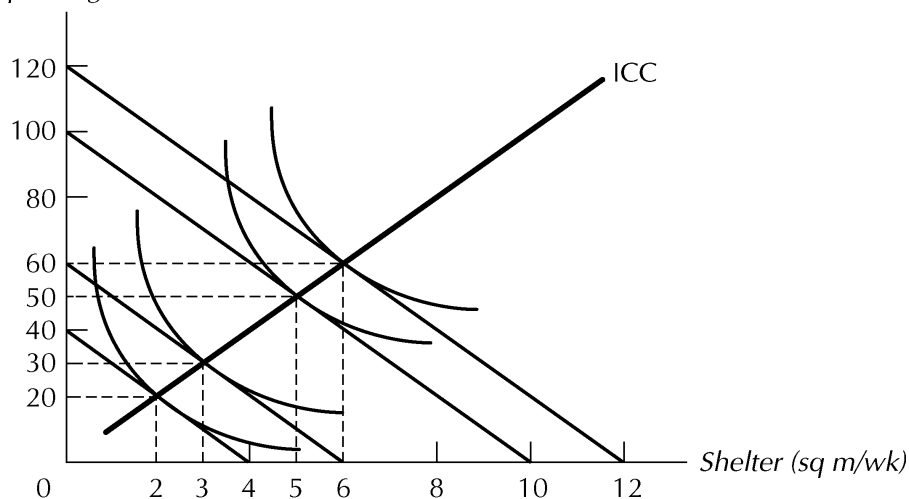

Figure 1.1: Income-Consumption Function
Source: Frank (1997)

Social well-being has been used as a measure of an individual's level of utility. To quantify social well-being, and thus utility, self-reported levels of happiness are used. For centuries, economists have proposed public policies that aim to maximize the overall level of happiness in society based on these conventional principles. These ideas are rooted in Keynesian thought, where people consume and save income on an individual basis. Specifically, the Keynesian theory states that as income increases, an individual will consume less and save more (Koçkese, 2007). One potential problem with this model is that an individual is assumed to maintain constant preferences.

1.2 Deviations from the Standard Economic Theory: The Relative Income Hypothesis

The Bandwagon, Snob, and Veblen effects include the first noted deviations from the meta-theory of neoclassical economics, in that that they all violate the assumption of rational behavior by individuals (Leibenstein, 1950). The bandwagon effect describes behavior of individuals whose consumption, and therefore utility, is based on their desire to "join the crowd;" in this case, the demand for a good is increased purely because others are consuming that good as well (Leibenstein, 1950). The snob effect describes the desire of individuals to be exclusive; in this case, the demand for a good is decreased purely because others are consuming that good as well. The Veblen effect describes "the phenomenon of conspicuous consumption;" in this case, the demand for a good is increased because it is more expensive (Leibenstein, 1950). The main difference between the snob effect and the Veblen effect is that the snob effect is a "function of the consumption of others," whereas the Veblen effect is a function of price (Leibenstein, 1950). These effects all indicated a potential gap in the neoclassical theory that failed to account for consumption of individuals based on external factors, opening the door for a theory accounting for interdependent preferences.

The Relative Income Hypothesis emerged from James Duesenberry's investigations in *Income, Saving and the Theory of Consumer Behavior* (1949). In this piece he shared a theory of an individual utility index centered not simply on his/her consumption, but rather a ratio of individual consumption to a weighted average of the consumption of others (Koçkese, 2007). Under this theory, individual tastes and preferences may be derived from society.

At the time, the Duesenberry theory was not as well-supported as the life-cycle/permanent-income hypothesis of Franco Modigliani and Richard Brumber (1954) and Milton Friedman (1957). These hypotheses related individual consumption to expected lifetime resources (Koçkese, 2007).

In order to investigate the suggested correlation between income and levels of happiness, Easterlin (1974) analyzed economic trends over a fifty-year period with respect to reported levels of happiness. He found that within a given society, rich people tend to be much happier than poor people; this opened the door for the possibility of a relative income term in the utility function as evidence of interpersonal comparisons, which is not allowed for in conventional economists, was noted. He also found that though richer people are happier than poorer people within a society, rich societies are not significantly happier than poor societies. Additionally, as countries get richer they do not necessarily get happier. Layard (2005) supplements this finding: he observed that despite a rise in real income from 1946 to 1996, reported levels of individuals who are "very happy" did not increase (Figure 1.2).
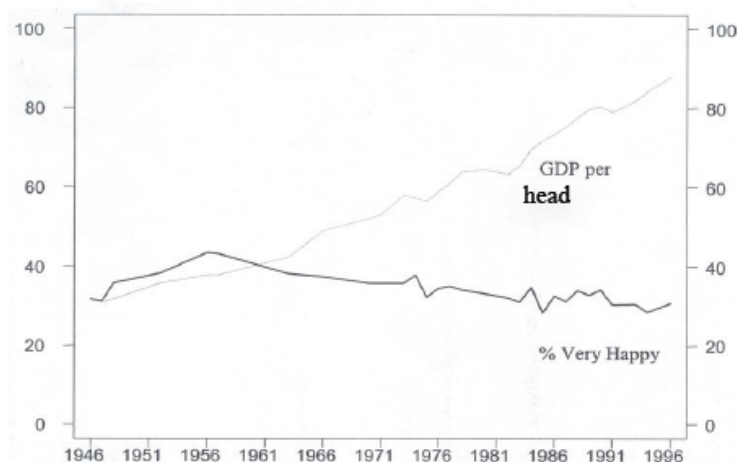

Figure 1.2: Happiness and GDP Per Head (1946-1996)
Source: Layard (2005)

Note: Year is on the X-axis and Percent "Very Happy" is on the Y-axis and. GDP per head is presented as a comparison line.

Solnick and Hemenway (1998) further explored this by asking individuals to select between a positional and absolute state in different contexts, including income (the "Relative

Income Question"). They observed that regarding income, many individuals exhibited a positional concern. That is, many individuals cared more about their relative income position vis a vis others, than their absolute level of income. Therefore, the notion proposed by the Easterlin paradox was confirmed by Solnick and Hemenway's work; these works propose a modification of the standard economic theory through the addition of a term beyond simply the individual's own income. Perhaps the rational individual observes interdependent utilities, and considers interdependent prefers that are relativity-sensitive when making decisions. This sharply contrasts neoclassical economic theory models that all assume individuals operate by considering only absolute income and personal consumption.

1.3 Justification for Interdependent Preferences

Though the ideas of interdependent preferences and concern for the relative position have recently started to be integrated in economics – through the development of theories beyond neoclassical economic theory, determinants for these ideas have been evident in sociology and psychology literature for centuries. The reference group theory states that individuals identify themselves with others to enhance self-worth. The relative deprivation theory states that when doing worse off than the norm (i.e. reference group), individuals feel less happy (Davis, 1959). The theory of habituation, as described by Rand (2008), indicates that an individual might even extend the comparison to a past version of himself. Based on the principles of aspirations, individuals are thought to assume more income will guarantee more happiness. An additional psychological theory giving insight to interdependent preferences is that of altruism. The ideas of altruism suggest an individual would prefer choosing the absolute state when compared to a status-oriented individual who would prefer the positional (i.e. relative) state. Evolutionary psychology also introduces a new argument for interdependent preferences, as status may be relevant to protecting species survival.

The current economics literature recognizes some of these ideas on a theoretical level with discussions of these ideas increasing in recent studies. Of these, Zizzo (1998) describes the lack of concern given to cognitive psychology in the economics realm. Zizzo suggests that in situations evoking interdependent preferences there may be a cognitive influence present. Rand (2008) observed that individuals who preferred absolute income scored

significantly higher on cognitive ability tests compared to those who preferred relative income. Understanding these cognitive influences is the main focus of this paper.

1.4 Focus and Organization of Study

This study attempts to replicate the findings of the original relative income question experiment, evaluate whether relative income or absolute income is the more appropriate basis for economic models oriented towards policy making, and investigate the relevance of a cognition argument in selecting between relative and absolute income.

Chapter two reviews the literature regarding income and happiness. This chapter presents the shift in economic literature from the neoclassical economy theory, with absolute income as the most important attribute, to both the Easterlin Paradox and Relative Income Hypothesis, which present relative income as an important attribute. Social well-being is explored as the universal medium through which to explore this shift from absolute to relative. Studies that have explored the Easterlin Paradox and Relative Income Hypothesis are discussed in detail. Theories from psychology and sociology are introduced to provide new insight as to the economic stance on interdependent preferences. As cognition is the issue of ultimate concern, literature involving cognition and interdependent preferences is discussed as well.

Chapter three describes the data and methodology used in this study. Psychology studies using online surveys to measure individual differences between an individual's preferences for relative or absolute income were utilized to perform the analysis.[1] An econometric model is presented, and a regression analysis is used to capture the effect for each variable, including the degree of effect based on the coefficient of the variable. These variables included demographics, earnings information, manipulations of research question, and a measure of cognitive performance. The main variable of study is the cognitive measure of all participants.

Chapter four describes the regression analysis and its relevance based on existing literature linking cognition and interdependent preferences.

Chapter five summarizes the findings, explores limitations of the research, presents ideas for future studies and shares real world implications of the study. Specifically, tax

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[1] This data was provided by Professor Chabris (Psychology Department, Union College).

policies and progressive taxes are explored. If a correlation is observed between cognitive ability and income, then individuals with lower income and lower cognitive abilities would prefer a highly progressive tax system, whereas individuals with higher cognitive abilities and higher incomes would prefer to main their absolute incomes. Overall, the paper aims to introduce psychological and sociological principals to solidify economic theories upon which individuals base many policies and decisions.

Chapter 2

Overview and Review of Existing Literature

2.1 Defining Happiness: Social Well-being

As economists, psychologists, and sociologists attempt to understand happiness, it becomes increasingly important to universally define and quantify "happiness." Economists are primarily concerned with the idea of maximizing utility, where "utility" serves as a measure of an individual's preferences (Greene and Nelson, 2007). In economics, individual preferences are monotonic in utility – that is, by definition, more utility is always preferred to less. Furthermore, preferences are assumed to be transitive: if state A is preferred to B, and B is preferred to C, then A is preferred to C. Past studies have named social well-being, which serves as an assessment by an individual in all parts of his life, as a measure to quantify utility (McBride, 2001).

Social well-being is measured through self-reported levels of happiness (Alpizar et al, 2005). Social well-being is validated as a reasonable predictor of happiness as it is correlated with other "objective measures of personal well-being," including smiling, laughing, heart rate measures, sociability and electric activity in the brain (Diener, 1984). These self-reported levels of happiness are also appropriately correlated with life changes for individuals; subjective well-being is shown to rise with marriage and fall through a divorce (Stevenson and Wolfers, 2008). These measures of well-being are stable over time and have high test-retest correlation (Tov and Diener, 2007). The existence of such patterns indicates that reports of subjective well-being are based on actual well-being levels (Sacks et al, 2010).

One of the most documented self-reported levels of happiness originates from the General Social Statistics (GSS) survey, which asks: "Taken all together, how would you say things are these days – would you say you are very happy, pretty happy or not too happy?" (Greene and Nelson, 2007). The World Value Survey asks the aforementioned question along with, "All things considered, how satisfied are you with your life as a whole these days?" (Stevenson and Wolfers, 2008). The Gallup World Poll aims to measure subjective well-being by using a ladder analogy; "interviewees are asked to imagine a ladder with each rung representing a successively better life" and select which "step" on the latter is the most appropriate description of their life (Stevenson and Wolfers, 2008).

Measures of subjective well-being allow for comparisons across countries. Tov and Diener (2007) present the idea that there is a biologically based set of emotions universal to all individuals and present in all cultures. The following facial emotions have been clearly recognized across cultures: anger, sadness, and joy (Stevenson and Wolfers, 2008). Research also shows that individuals across cultures have uniform beliefs about what factors may constitute happiness: money, health, and family (Easterlin, 1974). Based on the prospect of such universal identification of emotions and parameters of happiness, it may be argued that subjective well-being allows for global comparisons.

As for comparisons within countries overtime, the aforementioned arguments may be applied as well. However, research has indicated that potential issues in data compilation may lead to forming inaccurate conclusions. Large changes in reported happiness may be linked to slight ordering changes in question phrasing of the GSS survey or the presence of day of week and season cycles (Smith, 1986). Inter-temporal comparisons may lead researchers to compile data using different coding mechanisms, which may add to measurement errors and influence statistically significant findings (Stevenson and Wolfers, 2008). Despite these documented measurement issues, there is much evidence that justifies self-reported levels of happiness as good measures of an individual's well-being (Alpizar et al, 2005).

2.2 Economic Explanations for Deviations from the Neoclassical Economic Theory: The Easterlin Paradox

The first empirical analysis attempting to understand the relationship between national income and happiness was performed by Richard Easterlin in 1974. Easterlin aimed to discover if richer countries were happier (Stevenson and Wolfers, 2008). Economic trends were established by using Gross Domestic Product per capita measures. Happiness levels were established by using the GSS (Greene and Nelson, 2007). Easterlin noted real income growth in Western societies without a corresponding rise in reported levels of happiness. Specifically in the United States, real income per capita doubled while the GSS measures of happiness were basically unchanged (Mujcic and Frijters, 2010). This paradox existed in Japan and Europe, both which had large increases in real per capita income but no obvious

increase in subjective well-being (Easterlin, 1995). This means that, economic growth did not seem to improve subjective well-being, and thus overall human welfare (Rand, 2008).

Easterlin noted that subjective happiness increases with income in a given year (Alpizar et al, 2005). This finding was in stark contrast to the premise economists had been preaching for years of forming economic policies on maximizing happiness and utility based on absolute income. Suddenly, a new idea had been introduced that it is not about maximizing absolute social well-being, but rather relative social well-being. As Easterlin states, "individual's utility depends positively on own consumption but negatively on the consumption of others that she compares herself with; as the income and consumption of one's peers rise it requires more income to achieve the same satisfaction" (Easterlin, 1974; Easterlin, 2001). In simpler terms, the happiness-paradox states "at a point in time both among and within nations, happiness varies directly with income, but over time, happiness does not increase when a country's income increases" (Easterlin, 2010). This opened the door for the possibility of a relative income term in the utility function.

Many researchers have commented on and tried to replicate Easterlin's original findings. Lane (2000) states that individuals have a "subsistence level;" once an individual's income rises above this level, the main source of well-being shifts from income to friends and family. Many researchers, however, have countered the original Easterlin paradox to re-affirm that absolute income – not relative income – is significant in determining happiness (Sacks et al, 2010). Both Frank (1985) and Oswald (1997) conclude that utility depends on both absolute and relative incomes, however, the absolute component bears less weight than the relative component in richer countries (i.e. the United States). Hagerty and Veenhoven (2003) state that past research regarding the Easterlin Paradox has low statistical power and attempted to differentiate between the short and long-term effects of income on happiness. Easterlin re-affirmed his original findings about the happiness-income paradox, emphasizing that it holds true over the long term (i.e. period of 10 years or more) (Easterlin, 2010). In his most recent paper, Easterlin analyzes the paradox for numerous developing countries using his largest sample of study thus far. He explores eastern European countries in transition from socialism to capitalism and developed countries. The findings from his most recent paper support those from his original findings, and indicate no long-term relationship between happiness and income. However, a short-term effect was noted: "happiness tends to

fall in economic contractions and rise in expansions" (Easterlin, 2010). Easterlin also acknowledges and invalidates critiques of his original study by stating they are due to statistical misinterpretation or confusion between the predicted short and long term effects by the critics (Easterlin, 2010).

Interdependent utility functions may cause a problem for economists, as defined by the fundamental welfare theorem. This theorem asserts that resources will be efficiently allocated in an economy if all individuals act out of their own self-interest; if interests are interdependent, this theorem is no longer upheld and resource allocation within a society may no longer be efficient (Feldman, 2006).

2.3 Determinants for Interdependent Preferences: Theories from Psychology and Sociology

Many theories from psychology and sociology may help to explain the determinants for interdependent preferences indicated in economics by the Easterlin paradox.

The reference group theory states that individuals identify themselves with "esteemed groups" as means to enhance self-worth (Pingle and Mitchell, 2002). An individual's decision affects not only the individual himself but also the frame of reference in which he operates (Schaffner et al, 2008). This theory supports the notion that relative standings are of more value as individuals integrate their environments, specifically for how they stand compared to the norm, prior to decision making.

Building on the reference group theory, the relative deprivation theory, as described by Rand (2008), states that individuals feel deprived and less happy when their circumstances do not live up to the standard norms; this suggests that individuals doing relatively worse-off would feel less happy. Therefore standings with the selected reference group may directly impact feelings of happiness, and therefore subjective well-being and utility.

A further extension of the reference group theory is that of habituation. This theory of habituation indicates that an individual might even extend the comparison to a past version of himself (McBride, 2001). In this case, a past version of the individual becomes his own reference group. Subjective well-being may again be influenced by the comparison one makes to himself; therefore accounting for the importance of relative standing.

Another psychological principal is that of aspirations. As explained by Rand (2008), this theory claims that individuals will always assume more income will increase their happiness, while the neglecting to acknowledge deflecting effect the rise in material desires associated with higher incomes. Rand cites Gilbert's (2006) notion that "the human being is the only animal that thinks about the future," and humans achieve happiness through projecting what makes them happy. After Easterlin's (1974) original paper revealed the paradox, two later papers detailed the role of aspirations in helping to explain the paradox. Aspirations were analyzed at both the national level (Easterlin, 1995) and the individual level (Easterlin, 2001). In general, the increases in levels of income lead to both a rise in expected material norms as well as increases in happiness; however the increase in norms cancels out any increase in happiness. This leads to no overall effect from rising income levels, especially with regards to social well-being (Easterlin, 1995). This idea is also referred to as the "hedonic treadmill" by economists (Stevenson and Wolfers, 2008).

The ideas of altruism suggest an individual would prefer choosing the absolute state when compared to a status-oriented individual who would prefer the positional (i.e. relative) state. An altruistic person's desire for a higher standing society overall would trump any personal desires for higher standing (Solnick and Hemenway, 1998). An altruistic individual would select the absolute state even if they do not view utility in an independent fashion, as assumed by the neoclassical economic theory.

Evolutionary psychology also may be involved in interdependent preferences, as status may be relevant to protecting species survival. Hill and Buss (2006) propose that individuals will have a positional bias for "resources that are known to affect survival or reproduction" and "personal attributes that affect individual's abilities to acquire such resources." An argument can be made that income is a resource that may affect survival, thus evoking positional concerns from individuals. Additionally, envy has been implicated as part of a strategic inference theory where "negative emotions have been shaped by selection to signal someone or something impeding one's preferred behavioral strategy" (Hill and Buss, 2006). Namely the feeling of envy is a result of natural selection to bring awareness of a comparative disadvantage and promote motivation to posses that advantage as well. Often, individuals are most envious of those whom they consider part of their reference group (Hill and Buss, 2006).

2.4 Relative Income Hypothesis

Prior to the publication of the Easterlin Paradox, which suggested the need to add a relative income variable to the utility function, one's own absolute income was regarded as the only income relevant in the standard theory of consumer economics. Increase in an individual i's income would lead to an outward shift of his budget constraint, allowing for increased consumption. This increase in consumption may be tied to an increase of individual i's utility (i.e. social well-being or happiness). If individual i's utility was solely a function of income and consumption, one may expect the utility to parallel individual i's income function (McBride, 2001). Therefore, increases in income and levels of utility – measured by levels of happiness – are correlated with one another in classical economic theory. An exception to this correlation occurs if the individual has reached a satiation point or a bliss point. In this scenario, the marginal utility of additional income becomes zero. The utility function has reached a maximum, therefore additional income and consumption are no longer desired and there are no relative income considerations applicable (Hayden, 2011).

In the post-Easterlin Paradox literature, with the establishment of relative variables, a relative income hypothesis was developed. As McBride (2001) states:

> As a person's income (consumption) increases relative to his income standard, so does his SWB. The higher the person's income is relative to the standard (or norm), the greater his happiness. As the economy grows, so do income standards, and this rise in standards acts to deflate the effect of the increased income.

This hypothesis basically validates the Easterlin Paradox and states that individuals are more concerned with how they are doing relative to others.

2.5 Choice Experiments

A series of economists attempted to assess the presence of a relative income term in the utility function through choice experiments. These experiments measure the importance individuals gave to relative standings through a series of hypothetical questions asking participants to select between an absolute and a relative (i.e. positional) state (Alpizar et al, 2005). In general, these experiments are surveys in written format and an entire society forms the reference group for the individual.

All of the choice experiments use hypothetical surveys as the basis for their conclusions. It is possible that individual may exaggerate preferences in answering these questions. However, Kahneman and Tversky (1979, p. 265) share that choices involving hypothetical income values may serve as useful information, as the individuals would have no reasons to disguise true preferences (Carlsson et al, 2007). Additionally, Burkett (2006) cites Roth (Roth 1995, 3-98) and Thaler (Thaler 1987, 99-130) to confirm confidence in hypothetical surveys. Therefore, the use of such surveys has been accepted by the academic society to make conclusions about individual behavior and choice.

Solnick and Hemenway performed the first choice experiment involving selection between an absolute and relative state in 1998. In this study, participants were surveyed in twelve unique contexts to select between the absolute and positional state. In each scenario, the participants were given information about their own position relative to the position of others. The participants included students as well as university staff members. All of these scenarios were designed so that the "positional state was absolutely worse than in the absolute state, but is positionally better" (Pingle and Mitchell, 2002). Of these twelve contexts, the issue of income was discussed. Participants selected between two separate worlds. In both worlds the prices of goods are the same, therefore, the purchasing power of money will remain the same. The choice is between: "A: Your current yearly income is $50,000; others earn $25,000" or "B: Your current yearly income is $100,000; others earn $250,000" (Solnick 1998) (Table 1.1). This question forms the basis of the Relative Income Question. In this scenario, selecting world A shows preference for the positional state, and selecting world B shows preference for the absolute state. The positional state is absolutely worse than the absolute state, but is positionally better; namely, $50,000 is less than $100,000, but more than $25,000.

Table 2.1: The Relative Income Question

Positional State	Your current yearly income is $50,000; others earn $25,000
Absolute State	Your current yearly income is $100,000; others earn $250,000
	Source: Solnick and Hemenway (1998)

Solnick and Hemenway found that roughly 50 percent of the respondents preferred living in a world with half the real purchasing power and a higher relative standing. It was noted that the only demographic category influential in selection between the two states related to educational status. Students were more likely to make positional choices than faculty or staff (Solnick and Hemenway, 1998). The rationale behind this was that perhaps students might be surrounded by constant competition with each other in order to effectively establish themselves post-graduation (Solnick and Hemenway, 1998). Solnick and Hemenway state that while individuals care both about absolute well-being and relative position, positional concerns are of significant concern as well.

Greene and Nelson (2007) cite various issues with the original Solnick and Hemenway study. Firstly, there is no incentive for respondents to give "correct" answers; Greene argues that though there does not need to be a universally correct answer, there should be a correct answer for any given student. The participants have no reason to carefully evaluate the choices before making their selections. A second issue is the lack of uniformity in overall knowledge of the participants. The Solnick and Hemenway study finds that faculty and staff responded less positionally than students, indicating to Greene and Nelson that students have "little knowledge of the world on which to base assessments" (Greene and Nelson, 2007). Greene and Nelson also point to a potential framing issue, where the survey is only of value if the designers of the survey feel status is relatively important. Pingle and Mitchell (2002) also indicate a potential confounding problem. In sharing the income differences in the positional and absolute state, Solnick and Hemenway did not indicate if the differences were due to "differences in work time, differences in wage levels, or both" (Pingle and Mitchell, 2002). Therefore, individuals who believed those who earned more was a result of working more were not simply choosing between two income states but also between two leisure states. It would be important to differentiate positional concerns for income from positional concerns for leisure.

Various researchers remodeled the original study for further experiments. Pingle and Mitchell (2002) perform two different studies – one where income and leisure are confounded and a second without a confounding problem – allowing for the separation of income concerns from leisure concerns. Pingle and Mitchell find that positional concerns for income are exhibited by a specific demographic: "younger, more competitive, non-

Caucasian, less satisfied with how much they are accepted by others, more satisfied with their religious fulfillment, and … those who gambled more often." Johannson-Stenman et al. (2002) asked Swedish students to select between two hypothetical societies for their grandchildren. The students were directed to select the society where they felt their grandchild might be most "content." Johannson-Stenman et al. observe that though individuals care about relative income, absolute income is also as important for well-being as well.

Alpizar et al. (2005), Carlsson et al. (2007), and Andersson (2008), all replicated the procedure employed by Johannson-Stenman et al. by using a future relative as the main individual in question for the survey. Alpizar et al. (2005) surveyed students from Costa Rica. They found that both absolute and relative income are important to determine well-being, and income is considered in between a positional and non-positional good. A positional good is one whose value is primarily determined by its comparison to other goods in the same category. A non-positional good depends less strongly on such comparisons (Frank 1985). Carlsson et al. (2007) use a random sample of the general Swedish population for their study. Carlsson et al. find that income is viewed as positional. Therefore an individual who views income as a positional would gain utility from having more income compared to another individual. Andersson (2008) explores consumption instead of income. Participants included university students as well as staff. This study utilized three different choice experiments: one benchmark experiment with the same values as Johansson-Stenman et al. (2002); an "under" experiment where consumption levels are below society average; and an "over" experiment where consumption levels are above society average. Andersson finds that individuals with consumption levels lower than societal average consumption have a lower concern for relative standings, supporting the Duesenberry (1949) hypothesis that individuals are more concerned with upward social comparison than downward social comparison.

Rand (2008) employs a choice experiment posing the Relative Income Question from the Solnick and Hemenway study, with a minor adaptation as described by Shermer (2007). For the absolute state, in Rand's study, individuals were given a preference of living in a world where they may earn "$100,000 a year while other people earn $250,000 a year" instead of the "$200,000" proposed by Solnick and Hemenway. A significant relationship

was observed between individuals with high scores on a test of cognitive measure and a preference for absolute income.

Mujcic and Frijters (2010) employ a survey that was purely graphical, where the hypothetical societies are described by income distributions. The study alters both the combination of income and status available in each society. Mujcic and Frijters find that an individual's utility is partially determined by how their income may measure up to that of others and that income rank matters when compared to absolute income. The study proposes an interesting idea that though individuals may express positional concern, the most valuable form of relative income has not been discerned (i.e. income rank, ratio comparison income, etc.)

Greene and Nelson (2007) replicate Solnick and Hemenway's original experiment focused solely on the relative income question with a much larger data set. Greene and Nelson find that individuals are more interested in real income rather than relative income. Of all the literature reviewed for this report, this is the only study state that "the idea that other's higher income leaves others worse off really is not convincing." Namely, that they are not proponents of a relative income term in the utility function. All the other studies indicate some potential for the presence of such a term.

Table 1.2 describes the wide variety of variables used by researchers performing choice experiments to explain the relative income hypothesis. This study employed the following variables: sex, race, education, income, age, order in which the absolute and positional choices are presented, length of the explanation regarding these choices, and a measure of cognitive performance. The utilization of the aforementioned variables is detailed in Chapter 3.

Table 2.2: Explanatory Variables Used to Analyze the Relative Income Hypothesis

	Solnick and Hemenway (1998)	Pingle and Mitchell (2002)	Johansson-Stenman et al. (2002)	Alpizar et al. (2005)	Carlsson et al. (2007)	Greene and Nelson (2007)	Andersson (2008)	Rand (2008)	Mujcic and Fijters (2010)	Keshwani (2013)
Age	X	X			X		X	X	X	X
Sex	X		X	X	X	X	X	X	X	X
Education	X		X		X	X	X		X	X
Nationality	X									
Number of Children	X									X
Income	X	X		X	X	X			X	
Occupation	X						X	X	X	X
Order of Question	X									X
Race		X				X		X		
Feelings about relationship with others		X								
Happiness level		X						X		
Feelings of self accomplishment		X								
Extent to which gambling is a problem		X								
Competitive nature		X								
Religious fulfillment		X								
Marital Status		X				X			X	
Scholastic Aptitude Test scores		X								
Grade Point Average		X								
Number of Siblings		X	X					X		
Field of study			X	X				X		
At least one semester in economics			X							
Attending place of worship			X							

	Solnick and Hemenway (1998)	Pingle and Mitchell (2002)	Johansson-Stenman et al. (2002)	Alpizar et al. (2005)	Carlsson et al. (2007)	Greene and Nelson (2007)	Andersson (2008)	Rand (2008)	Mujcic and Fijters (2010)	Keshwani (2013)
Political Preference			X	X		X				
Variations in phrasing of research question						X				X
Performance on Analytic Test								X		X
Performance on Vocabulary Test								X		X
Region								X		
Marital Status								X		
Health								X		
Family Wealth									X	
Migrant									X	
Performance on Wunderlic Test										X

Source: Solnick and Hemenway (1998); Pingle and Mitchell (2002); Johansson-Stenman et al. (2002); Alpizar et al. (2005); Carlsson et al. (2007); Greene and Nelson (2007); Andersson (2008); Rand (2008); and Mujcic and Frijters (2010).

2.6 Cognitive Influences on Interdependent Preferences

The hypothesis that individuals may select for interdependent preferences due to cognitive influence is not greatly explored in existing literature. Pingle and Mitchell (20 cite that an individual's performance on scholastic aptitude tests (i.e. ACT and SAT) an their grade point average had no effect on whether they exhibited positional concerns. A mentioned earlier, Rand (2008) observed that individuals who preferred absolute incom scored significantly higher on cognitive ability tests compared to those who preferred re income. Zizzo (1998) lays the foundation for literature opening the potential for cogniti factors influencing interdependent preferences. Zizzo formed his conclusions by analyz framing studies, public goods experiments, attitudes towards risk, happiness measureme consumption, the labor market and ethics and economics.

With regards to framing studies, Zizzo argues that decisions should remain cons regardless of how they are described. This logic follows the principle of standard ration choice. However, Zizzo cites Tversky and Kahneman (1987)'s work that indicates indiv do in fact respond differently if situations are described in different ways. Zizzo claims this indicates revealed preferences are dependent on some level of cognitive processing this study, cognition is defined by an individual's use of some higher level thinking processes.

Chapter 3

Econometric Techniques and Analytic Approach

The chapter begins with a review of all the economic theories that form a basis for this study. This is followed by an explanation of and justification for the model selection and the independent and dependent variables employed. Data utilized for this study is described, leading to an exploration of variable coding and construction. The chapter ends with descriptive statistics, model statements, and theories supporting the expected coefficients on all the variables. Overall, this section aims to describe the econometric techniques and analytic approach used in the study.

3.1 Review of Economic Theories

This study aims to understand the relationship between utility and income. Utility represents happiness or social well-being of individuals. Income represents the purchasing power of individuals.

Individuals were asked the Relative Income Question to select between two different states (or worlds): the positional state and the absolute state. These states were designed so that the "positional state was absolutely worse than in the absolute state, but is positionally better" (Pingle and Mitchell, 2002). The positional state is represented by a world where "Your current yearly income is $50,000, while others earn $25,000." The absolute state is represented by a world where "Your current yearly income is $100,000, while other earns $250,000."

According to neoclassical economic theory, an individual's utility is based on one's own tastes and preferences – determining one's consumption, and satisfying one's utility is constrained by one's income. In this study, the aforementioned principle will be simplified to state that an individual's utility is based on only on his or her own income, and is independent of anyone else's income. As per the neoclassical economic theory, income is viewed as a non-positional good. This theory is described in Table 3.1, where: $Income_{ME}$ refers to the individual's income and $Income_{YOU}$ refers to the income of others; and a (+) refers to a positive effect leading to an increase in the individual's utility, whereas a (-) refers to a negative effect leading to a decrease in the individual's utility. If an individual shows

preference for the absolute income state, it will indicate that the individual is economically rational (based on the neoclassical economic theory).

A recent potential modification of the neoclassical economic theory states that an individual's utility is based on his or her own income, along with the income of other individuals or the gap between their personal incomes compared to others; in this case, income is viewed as a positional good (Table 3.1). If an individual shows preference for the positional income state, it will indicate that the individual is economically irrational (based on the neoclassical economic theory). Additionally, it may indicate that this individual may be driven by envy, status, or is power-seeking; this individual may also behaving in a manner that complies with the Bandwagon, Snob, or Veblen effects (Zizzo, 1998; Leibenstein, 1950).

Table 3.1: Overview of Neoclassical Economic Theory and Modification of the Neoclassical Economic Theory

Neoclassical Economic Theory:

$u = f(Income_{ME})$	My utility is based solely on my income.

Income is a non-positional good, since my utility has nothing to do with your income.

Modification of Neoclassical Economic Theory:

$u = f(Income_{ME}, Income_{YOU})$	My utility is based on my income (+) and your income (-).
$u = f(Income_{ME}, Income_{ME} - Income_{YOU})$	My utility is based on my income (+) and the gap between my income and your income (-).
$u = f(Income_{ME}, Income_{ME} - Income_{YOU,} Income_{YOU})$	My utility is based on my income (+), the gap between my income and your income (-), and your income (-).

In each of these cases, income is a positional good, since my utility depends at least in part on my position relative to yours.

This study primarily aims to understand why individuals decide whether income is a positional or non-positional good, and more specifically to understand the role of cognition in this decision-making process. Individuals revealed their view on income as a positional or non-positional good through selection between hypothetical situations where they either had absolutely more or positionally more income. Other questions reported differences between individuals through demographic questions, earnings information, manipulations of the research question, and a measure of cognitive performance.

3.2 Primary Variables and Model Selection

The primary variable of interest is the individual's answer to the Relative Income Question: the choice between earning $50,000 while living in a society where others earn $25,000 or earning $100,000 while living in a society where others earn $250,000. A choice of the first option indicates a preference for having more than others, while a choice for the second reveals a preference for more income, regardless of anyone else's income. That is, this variable indicates an individual's preference for the positional or absolute state regarding income.

A second variable, parallel to the first, indicates an individual's preference for the absolute or positional state regarding their IQ scores. The individual is given a choice between having an IQ of 110, while others have an average IQ of 90 or having an IQ of 130, while others have an average IQ of 150. A choice of the first option indicates a preference for being more intelligent than others, while a choice for the second reveals a preference for more intelligence, regardless of anyone else's intelligence level.

Potential key determinants of an individual's view on the positional of income and intelligence include sex, race, education, income, age, order in which the absolute and positional choices are presented, length of the explanation regarding these choices, and, of key interest in this research, a measure of cognitive performance. As the dependent variables of interest – the preference between absolute or positional states – are both binary, a binary choice model is employed for analysis. The two primary options for binary choice models include a probit model or a logit model. Typically, a probit model is used when the actual event is not a binary outcome but rather a proportion while Logit is the model of choice when the dependent variable is truly binary (0-1); therefore, a logit model will be used form this analysis (Arminger et al, 1994).

3.3 Description of Data

The data used in this thesis was compiled from multiple psychology studies conducted by undergraduate Psychology students and faculty between 2008 and 2012. The studies all use online surveys and include questions testing differences between an

individual's preferences for relative or absolute income. These surveys were administered online on a variety of survey hosts.[2]

Only three of the twenty-seven surveys were constructed with the intention of understanding differences between an individual's preferences for relative or absolute income, in particular "Bailey's Income Questionnaire 1-3" ("BIQ1-3") (Rand 2008). Following Rand's initial observation of a relationship between higher cognitive scores and a preference for absolute income, the Relative Income Question along with the cognitive tests were added as a supplement question by the Union College Psychology Department to various surveys with many different primary goals – including analysis of as crime and punishment and understanding memories of recent events. This in effect allowed for the build up of a larger data set on this question. After extensive data matching and compilation, one data set was created for this study with roughly thirteen times more observations than the initial Rand study.

The Relative Income Question included in eight of these surveys is an adaptation of Solnick and Hemenway's (1998) question made by Shermer (2007). The main difference between the Solnick and Hemenway, and Shermer Relative Income Question is a slight alteration in how the absolute state is presented. Solnick and Hemenway present the second option as "earning $100,000 a year while other people earn $200,000 a year." Shermer presents the second option as "earning $100,000 a year while other people earn $250,000 a year." This modification is present in the following seven surveys: "Alex's Thesis Survey", "Baileys Income Questionnaire 1-3", and "Crime and Punishment Survey 1-3." The remaining twenty surveys use the original Solnick and Hemenway version.

Three different measures of cognition were used: a vocabulary test, an analytic test, and a Wunderlic test. Twenty-six out of the twenty-seven surveys used the vocabulary and analytic test. Only one survey ("Alex's Thesis Survey" – "ATS") used the Wunderlic test.

The vocabulary question test employed is known as "WordSum" and is part of the General Social Survey. The General Social Survey is a sociological survey used in the United States to measure demographics and assess attitudes (Davis and Smith, 1986).

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[2] Access to all survey data was provided by Professor Chabris, Psychology Department, Union College.

The analytic test employed is known as the "Cognitive Reflection" test and is adapted from the Frederick (2005) study. The surveys either presented three or five questions, with an "obvious" answer that an individual may select upon initial reading, which is actually incorrect. Selection of the correct answer would therefore indicate some "cognitive reflection," on the part of the respondent.

The Wunderlic (Personnel Test) test is a cognitive ability test used to assess aptitude for learning and problem-solving, most oftenly that of prospective employees. Pesta and Poznanski (2008) cite the Wunderlic Personnel Test manual, which reports that there exists a strong correlation between the Wunderlic Personnel Test and "other standardized IQ tests." These Wunderlic scores may then be converted to a rough estimate of the standardized IQ score by the accepted formula: $IQ = 2WPT + 60$ ("Wonderlic").

Not all responses were included as part of the final analysis. In order for a response to be part of the final analysis, the respondent must have either answered the Relative Income Question or the Relative IQ Question. If any respondents completed multiple surveys, the duplicated responses were discounted and only the first complete response was included in the final analysis. A total of twenty-seven surveys were used to perform the analysis. Information regarding total respondents, total completed responses, survey administration dates, and target audiences for each survey can be found in Appendix A**.** The exact phrasing of the questions and answers regarding demographics, manipulations of the research question, earnings information, and measure of cognitive performance can be found in Appendix B. Appendix C describes the different combinations in which these questions are presented in the twenty-seven surveys.

3.4 Variable Coding and Construction

Both dependent variables of interest are binary variables. These variables indicate an individual's preference for the absolute or positional state regarding income or IQ (Table 3.2).

The independent variables of interest were coded as either dummy variables or categorical variables (Table 3.3). The dummy variables include sex, race, order, and length. The subgroups for sex are male and female. The sub-groups for race are white and non-white; due to the variations in categories across surveys with regards to race, the non-white

category is broad including individuals who categorize themselves as Black, Spanish, Hispanic, Latino/Latina, Other, Black/African American, and Asian. The subgroups for order describe the survey as a "gain" survey or a "loss" survey; in gain surveys the positional state is presented first, and in loss surveys the absolute state is presented first. The subgroups for length are short or long, referring to the length of the Relative Income Question. The long text is as following: "Imagine that you have a choice between the two options below. Assume that the prices of goods and services would be the same regardless of the option you chose. Which would you prefer?" The short text is as following: "Imagine that you have a choice between the two options below. Which would you prefer?"

The categorical variables include age, income, and education. Both age and income are coded at six different levels, whereas education was coded at five different levels. As the age, income, and education categories were not distributed evenly across the various levels, all three of these variables were converted to grouped dummy variables. The grouped dummy variable "older" refers to individuals over 30 (levels 3-6). The grouped dummy variable "richer" refers to individuals with family incomes over $40,000 (levels 3-6). The grouped dummy variable "college" refers to individuals with education levels of at least a bachelor's degree/four-year college (levels 4-5).

Three additional variables include measures of performance on the cognitive tests: vocabulary, math, and IQ; all three of these variables were used at their numerical face-value.

Table 3.2: Definitions for Independent Variables of Interest

Variable	Description
Hypothetical Income Preference	= 0 if Positional State (Earn $50,000 while other people are earning $25,000) = 1 if Absolute State (Earn $100,000 while other people are earning $250,000)
Hypothetical IQ Preference	= 0 if Positional State (Your IQ is 110; others have an average IQ of 90) = 1 if Absolute State (Your IQ is 130; others have an average IQ of 150)

Table 3.3: Definitions for Dependent Variables of Interest

Variable	Description
Sex	= 0 if Male
	= 1 if Female
Race	= 0 if White
	= 1 if Non-White
Order of research question	= 0 if Gain Survey
	= 1 if Loss Survey
Length of research question	= 0 if Short
	= 1 if Long
Age	= 1 if 18-25
	= 2 if 26-29
	= 3 if 30-39
	= 4 if 40-49
	= 5 if 50-59
	= 6 if 60 and over
Older	= 0 if 18-29
	= 1 if 30 and over
Income	= 1 if less than $20,000
	= 2 if between $20,001 and $40,000
	= 3 if between $40,001 and $60,000
	= 4 if between $60,001 and $80,000
	= 5 if between $80,001 and $100,000
	= 6 if more than $100,000
Richer	= 0 if $40,000 and below
	= 1 if $40,001 and above
Education	= 1 if less than High School
	= 2 if High School
	= 3 if Junior College/Some College
	= 4 if Bachelor's Degree/Four-Year College
	= 5 if Some Graduate School/Graduate School/ Graduate Degree
College	= 0 if Junior College/Some College and below
	= 1 if more than Bachelor's Degree/Four-Year College

3.5 Descriptive Statistics

The descriptive statistics are separated for the ATS survey, and all other surveys, due to the difference in measure of cognitive performance (Table 3.4-3.5). As mentioned earlier, the ATS survey is the only one using IQ scores as a measure of cognitive performance; the remaining twenty-six surveys all used an analytic and vocabulary test. Histograms for data from all the surveys, besides "ATS", can be viewed in Figure 3.1.

Overall, for all twenty-seven surveys, there is a majority of female respondents. This distribution of more female respondents than male respondents aligns with trends proposed by Chabris et al (2006), who state that females take online surveys more frequently than males. The predominant race of all respondents is white; this observation is interesting given the fact that a total of eight races (including "other") that were coded as the non-white category, when combined, are still less than the number of respondents who self-identified as white. The average age group for all respondents is between 18-29 years; therefore, the population of respondents is skewed toward younger individuals. For the ATS survey specifically, no income levels were reported; for the remaining surveys, on average, individuals responded having a family income between $40,000 and $60,000. For the ATS survey specifically, most respondents are in college; for the remaining surveys, the average education level is completion of at least four years of college or receipt of a bachelor's degree.

Table 3.4: Descriptive Statistics for "Alex's Thesis Survey" ("ATS")

	Average	Standard Deviation	Maximum	Minimum	Count
Income Preference	0.70	0.46	1	0	69
IQ Preference	0.28	0.45	1	0	69
IQ	107.91	10.52	132	82	69
Sex	0.60	0.50	1	0	69
Race	0.23	0.43	1	0	69
Order	0.00	0.00	0	0	69
Length	1.00	0.00	1	1	69
Age	1.00	0.00	1	1	69
Income	-	-		-	-
Education	2.36	0.77	4	2	67

Table 3.5: Descriptive Statistics for all Other Surveys (besides "ATS")

	Average	Standard Deviation	Maximum	Minimum	Count
Income Preference	0.70	0.46	1	0	1939
IQ Preference	0.33	0.47	1	0	106
Vocabulary	75.35	18.30	100	0	1939
Analytic	37.31	31.52	100	0	1933
Sex	0.58	0.50	1	0	1773
Race	0.20	0.40	1	0	1796
Order	0.24	0.43	1	0	1939
Length	0.76	0.43	1	0	1939
Age	2.40	1.40	6	1	1796
Income	3.02	1.57	6	1	1704
Education	3.50	1.00	5	1	1795
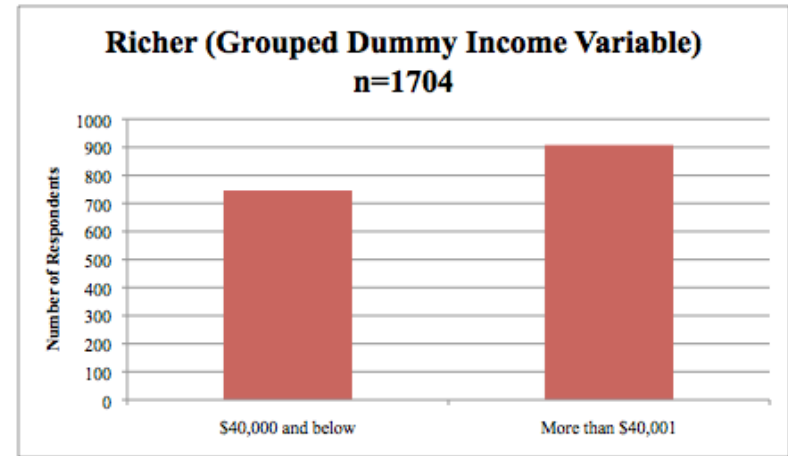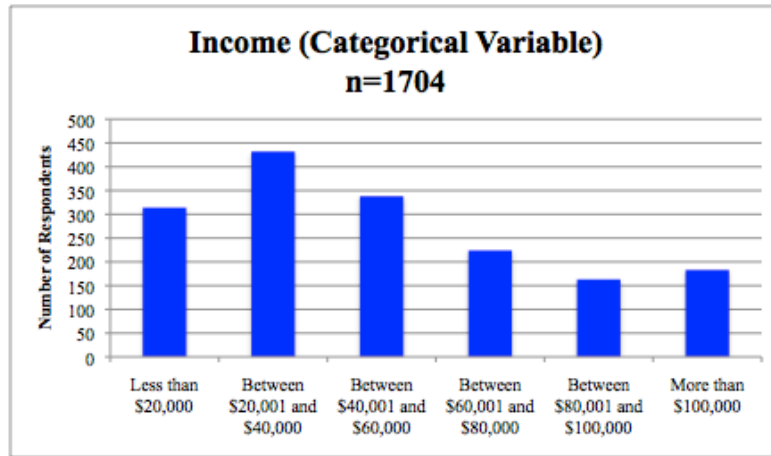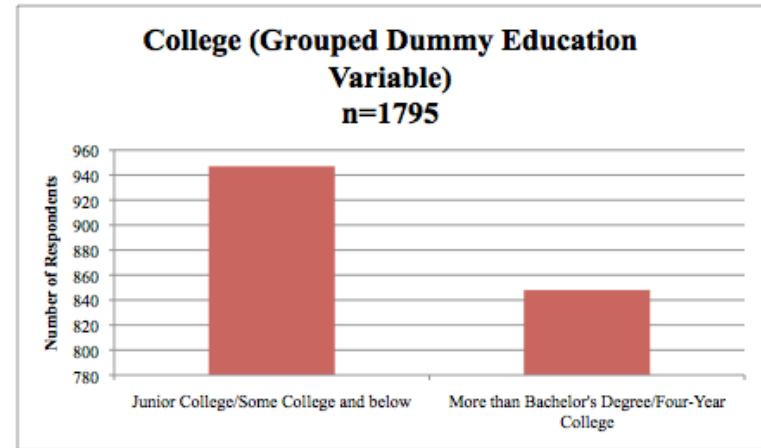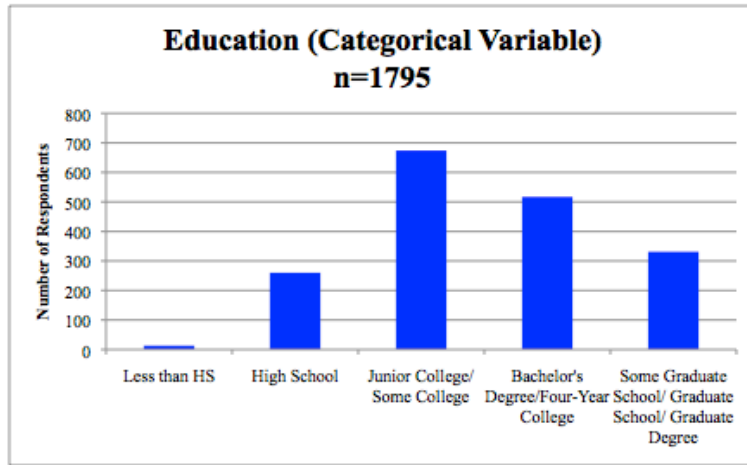
Figure 3.1: Histograms for Education, Income, Age as Categorical Variables and Grouped Dummy Variables in all other surveys (besides "ATS")

The correlation matrix does not reveal any particularly close relationship between variables; therefore, the variables were not confounded by one another (**Table 3.6**).

Table 3.6: Correlation Matrix

	Age	College	Education	Income	Length	Analytic	Older	Order	Race	Income Preference	Richer	Sex	Vocabulary
Age	1.0000	0.1576	0.2050	0.1062	-0.0069	0.0921	0.8664	0.0496	-0.1547	0.0314	0.1309	0.1086	0.2658
College	0.1576	1.0000	0.8655	0.2470	-0.0144	0.1603	0.1422	0.0077	-0.0094	-0.0635	0.2320	0.0617	0.2091
Education	0.2050	0.8655	1.0000	0.2213	-0.0234	0.1612	0.1963	0.0268	-0.0461	-0.0481	0.2107	0.0963	0.2348
Income	0.1062	0.2470	0.2213	1.0000	-0.0175	0.1195	0.1251	-0.0171	-0.0687	-0.0180	0.8109	0.0323	0.1078
Length	-0.0069	-0.0144	-0.0234	-0.0175	1.0000	-0.0256	-0.0232	-0.4999	0.0347	-0.0229	-0.0237	0.0757	0.1066
Analytic	0.0921	0.1603	0.1612	0.1195	-0.0256	1.0000	0.0826	0.0647	-0.1404	0.0712	0.0849	-0.1311	0.3063
Older	0.8664	0.1422	0.1963	0.1251	-0.0232	0.0826	1.0000	0.0727	-0.1407	0.0421	0.1485	0.0847	0.2252
Order	0.0496	0.0077	0.0268	-0.0171	-0.4999	0.0647	0.0727	1.0000	-0.0424	-0.0148	-0.0063	-0.0286	-0.0533
Race	-0.1547	-0.0094	-0.0461	-0.0687	0.0347	-0.1404	-0.1407	-0.0424	1.0000	-0.0294	-0.0618	-0.0215	-0.1257
Income Preference	0.0314	-0.0635	-0.0481	-0.0180	-0.0229	0.0712	0.0421	-0.0148	-0.0294	1.0000	0.0051	-0.0199	0.0823
Richer	0.1309	0.2320	0.2107	0.8109	-0.0237	0.0849	0.1485	-0.0063	-0.0618	0.0051	1.0000	0.0454	0.0700
Sex	0.1086	0.0617	0.0963	0.0323	0.0757	-0.1311	0.0847	-0.0286	-0.0215	-0.0199	0.0454	1.0000	0.1316
Vocabulary	0.2658	0.2091	0.2348	0.1078	0.1066	0.3063	0.2252	-0.0533	-0.1257	0.0823	0.0700	0.1316	1.0000

Number of Observations: 1674

Note: A common sample of the above variables was used for this correlation matrix

3.6 Model Specifications

   The primary dependent variable of interest is an individual's preference for absolute or positional income. The primary independent variable of interest is performance on cognitive tests; the surveys measured cognition through an analytic and vocabulary test (measured as percentage correct) or through Wonderlic scores (converted to an IQ score). The aforementioned combination of independent and dependent variables resulted in three separate models.

   The specific combinations of dependent variables and independent variables for these three models are shown in the table below (Table 3.7). The first two models analyze an individual's income state preference relative to the percentage correct received on an analytic and vocabulary test; the difference between the two models is in the use of categorical variables or dummy variables. The third models analyze an individual's income state preference relative to performance on a Wonderlic test, using IQ scores as a measure of performance.

   Many independent variables were eliminated in the regression of the third model, which used IQ scores as a measure of cognitive performance, including: order, length, income, education, and age. Only one survey uses IQ scores as the cognitive measure ("ATS"; n=69). In this survey, the relative income question is presented in the same order and at the same length. Questions regarding income levels are not reported in this survey. All the individuals who completed this survey are a part of the same age level (Age: 18-25), and 82% of the individuals were part of the same education level (Education: High School). Including the aforementioned variables as part of the regression would not have allowed the model to converge.

Table 3.7: Model Statements

Dependent Variable	Income Preference (Absolute or Positional State)		
	Model 1	Model 2	Model 3
Independent Variables			
Race	X	X	X
Gender	X	X	X
Order	X	X	
Length	X	X	
Age Categorical Levels	X		
Income Categorical Levels	X		
Education Categorical Levels	X		
Older	X	X	
Richer	X	X	
College	X	X	
Analytic	X	X	
Vocabulary	X	X	
IQ			X

3.7 Expected Coefficients for Independent Variables

Evidence from psychology, sociology, and economics may provide insight as to how the demographic variables, earnings information, manipulations of the research question, and measure of cognitive performance may influence income preference. Potential key determinants of this behavior include sex, race, order, length, education, income, age, and performance on cognitive tests.

As per the Mujcic and Frijters (2010) study, it is observed that males cared more about rank than females – suggesting they would prefer the absolute income state. However, Mujcic and Frijters cite the Johansson-Stenman et al. (2002) and the Alpizar et al. (2005), which both state that females may be more status oriented when choosing between "bundles of numeric absolute and relative incomes" (Mujcic and Frijters, 2010). Due to evidence suggesting females may prefer both the absolute or positional income, there is no expectation for a specific sign on the sex coefficient.

As per the Pingle and Mitchell (2002) study, individuals with the highest concern for positional income are "younger, more competitive, non-Caucasian, less satisfied by how

much they are accepted by others, more satisfied with their religious fulfillment, [and] gambled often." With regards to age, from this study, it may be interpreted that the coefficient for younger age levels is more negative – indicating a preference for positional income – and the coefficient for the grouped dummy variable "older" is positive – indicating a preference for absolute income. Additionally, this study indicates that with regards to race, the "non-white" dummy variable has a negative expected coefficient, indicating a preference for positional income.

As per the Solnick and Hemenway (1998) study, a bias regarding the order the positional and absolute states were presented in is observed. Specifically, "subjects were more likely to select the posituional situation when it was presented first (the 'gain' context) rather than second" (Solnick and Hemenway, 1998). Therefore, with regards to order, the gain survey dummy variable is expected to have a negative coefficient, indicating a preference for positional income. There is no prior opinion with respect to the effects of length of a question, however, it was added a modification to parallel the order variable. The Solnick and Hemenway study also indicates that "students were more likely to make positional choices than either faculty or staff." If the term "faculty or staff" is described as any individual who has completed a minimum of four years of college (compared to "students" who would be at an education level of some college or below), these "faculty or staff" members would have been part of the grouped "college" dummy variable. Thus, the coefficient for lower education levels is expected to be more negative – indicating a preference for positional income – and the coefficient for the grouped dummy variable "college" is positive – indicating a preference for absolute income.

As per the McBride (2001) study, it is observed that "relative-income effects are much stronger at higher income levels. At low income levels, the relative-income effects appear to be smaller and income becomes more important." With regards to income, from this study, it may be interpreted that the coefficient for lower income levels is more positive – indicating a preference for absolute income – and the coefficient for the grouped dummy variable "richer" is negative – indicating a preference for positional income.

As per Zizzo's (1998) hypothesis that "revealed preference by the subject depends on cognitive processing," our intuition suggests that those with greater cognitive processing would show preference for the absolute state, which is the more economically rational

preference. Therefore, the expected coefficient for higher scores on cognitive measures is more positive – indicating a preference for absolute income.

<div align="center">

Chapter 4

Analysis of Empirical Results

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This chapter presents the findings of the empirical analysis performed, as detailed in the previous chapter. The results are presented in three separate stages: first, the results from the replication of the original Solnick and Hemenway study are introduced with an exploration of evidence for the neoclassical economic theory, or its modification; second, evidence for the presence of a cognitive influence in preferences between an absolute and positional state is shared; and finally, the differences between an individual's view on positionality of income and intelligence are discussed.

4.1 Replication of the Solnick and Hemenway Experiment and Exploration of Evidence for Neoclassical Economic Theory or Modification of Neoclassical Economic Theory

A preliminary goal of this study is to replicate and extend the findings of the original Relative Income Question experiment as performed by Solnick and Hemenway (1998). In the Solnick and Hemenway study, between 38 and 56 percent of all surveyed individuals selected the positional state with respect to income[3]. In this study, the distribution for all individuals who selected between the absolute or positional state for income (n=2008) is shown in Figure 4.1.

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[3] This range in percentage stems from a difference in ordering of the question, namely if the positional state was presented first ("gain survey:" 56%) or if the absolute state was presented first ("loss survey:" 38%).

Figure 4.1: Distribution of Relative Income Question for All Surveys

Number of Observations: 2008
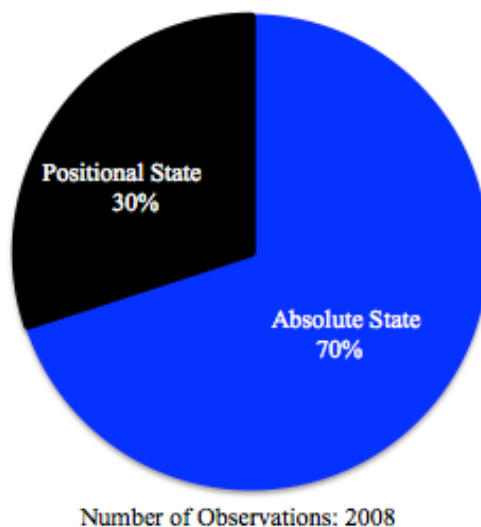
Roughly 70 percent of all respondents selected the absolute state, regardless of its presentation in a gain or loss survey. Even though 30 percent of the respondents selected the absolute state over the positional state, this still provides evidence that relative income is preferred by many people. Under the neoclassical economic theory, 100 percent of all surveyed individuals should have selected the absolute state; that is, individuals concerned only with their own well-being should always prefer more to less, independent of anyone else's position. Therefore, the standard economic theory did not universally apply in this study, and nearly one-third of all surveyed individuals were willing to decrease their purchasing power by half if they were still positionally better than others.

The Solnick and Hemenway surveyed individuals on preferences between positional and absolute states in twelve different contexts, with income as one of these twelve contexts. Three of the twenty-seven surveys also included a question regarding an individual's preference for intelligence (as measured by IQ scores). In the Solnick and Hemenway study, between 49-68 percent of all surveyed individuals selected the

positional state with respect to their own intelligence levels[4]. The distribution for all individuals who selected between the absolute or positional state for intelligence (n=175) is shown in Figure 4.2.

Figure 4.2: Distribution of Relative Intelligence Question for All Surveys

Number of Observations: 175
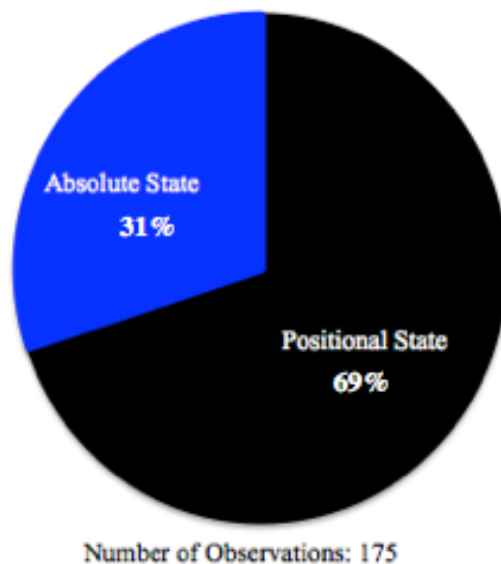
Roughly 69 percent of all surveyed individuals preferred the positional state, categorizing own intelligence as a highly positional good. In this study, the Relative IQ Question was always presented in a gain survey. This finding shows the opposite effect as to what was observed with income preferences. Additionally, this finding supports the Solnick and Hemenway proposition that positional concerns are higher for "goods that are crucial in attaining other objectives than for goods that are desirable primarily in themselves," such as intelligence or physical attractiveness. There was no significant relationship to an individual selecting the positional state for intelligence and a measure of cognitive performance (analytic and vocabulary test or IQ scores); therefore, no cognitive influence is indicated for individual intelligence preference.

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[4] This range in percentage stems from a difference in ordering of the question, namely if the positional state was presented first ("gain survey:" 68%) or if the absolute state was presented first ("loss survey:" 49%).

4.2 Exploration of Evidence for a Cognitive Influence

The primary goal of this study was to investigate the relevance of cognition in choosing between relative income and absolute income. For this investigation, two separate logit regressions were run. The first regression incorporated the demographic variables, earnings information, manipulations of the research question, and a measure of cognitive performance, in categorical form whereas the second regression incorporated the aforementioned variables as dummy variables. Namely, the first regression included six different income levels, six different age levels, and five different education levels. The second regression converted the income, age, and education to the grouped dummy variables: "richer," "older," and "college." These two types of regression were run including one measure of cognitive performance, namely the analytic and vocabulary test. The third regression included the second of cognitive performance – the IQ scores converted from the Wunderlic test – and only race and sex, as detailed in Chapter 3.

For the regressions utilizing the analytic and vocabulary tests, a significant relationship was observed between general cognitive abilities and an individual's answer to the Relative Income Question (Tables 4.1-4.2). Individuals who scored higher on either the analytic or vocabulary portion of the intelligence tests tended to prefer the absolute state. An increase in the analytic portion of the intelligence test by 1 percent would increase the likelihood that an individual preferred absolute income by 0.4 percent. An increase in the vocabulary portion of the intelligence test by 1 percent would increase the likelihood than an individual preferred absolute income by 1 percent. The coefficients on the analytic and verbal portions of the test were significant, respectively, at the 5 percent and the 1 percent levels. These levels of significance held true for regressions where the independent variables were used as categorical dummy variables and where they were grouped as single dummy variables. These results support the Rand (2008) findings that there is a relationship between cognitive abilities and preference for absolute income.

In both these regressions, the demographic variables race, sex, order, income, and age were not found to have significant relationships with the individual's answer to the relative income question. Length of the question was found to be significant in the

regression at a level of 10 percent; this held true for both when the variables were at used as categorical variables or grouped dummy variables. The primary difference between the long and short versions of the Relative Income Question is the phrase: "Assume that the prices of goods and services would be the same regardless of the option you chose." The coefficient on the length variable was negative indicating that the more information that was provided, the more likely the individual selected the positional state of income. As mentioned in Chapter 3 there was no prior expectation for a coefficient on this variable, and this study merely used it as a control for the differences in question phrasing among the surveys.

In the regression where education is viewed as a categorical dummy variable at five different levels, there was no significant relationship found. Education as the grouped single dummy variable "college" had a very statistically significant relationship. Individuals who had completed at least four years of college exhibited a high preference for the positional state; this relationship was held true at a significance level better than 1 percent. This finding may be at odds with Solnick and Hemenway's original finding that "students were more likely to make positional choices than either faculty or staff." If the term "faculty or staff" is described as any individual who has completed a minimum of four years of college (compared to "students" who would be at an education level of some college or below), these "faculty or staff" members would have been part of the grouped "college" dummy variable. Thus, the "faculty and staff" would have selected the positional state, rather than the absolute state as suggested by Solnick and Hemenway.

Table 4.1. The Effect of Categorical Demographic Variables, Earnings Information, and Intelligence Testing (Analytic and Vocabulary Test) on Relative Income Preference

Variable	Relative Income Preference	
Analytic	0.004**	(0.002)
Vocabulary	0.010***	(0.003)
Length	-0.284*	(0.159)
Race	-0.048	(0.136)
Sex	-0.100	(0.114)
Order	-0.229	(0.154)
Income (between $20,000 and $40,000)	0.072	(0.167)
Income (between $40,001 and $60,000)	0.235	(0.178)
Income (between $60,001 and $80,000)	0.185	(0.204)
Income (between $80,001 and $100,000)	-0.213	(0.217)
Income (more than $100,000)	-0.061	(0.212)
Age (26-29)	-0.074	(0.156)
Age (30-39)	0.184	(0.156)
Age (40-49)	0.059	(0.183)
Age (50-59)	-0.113	(0.218)
Age (60 and over)	0.539	(0.441)
Education (High School)	0.486	(0.597)
Education (Junior College/Some College)	0.302	(0.590)
Education (Bachelor's Degree/Four-Year College	-0.112	(0.590)
Education (Some Graduate School/Graduate School/ Graduate Degree)	-0.013	(0.597)

Number of Observations: 1674

Note: The standard errors are presented in parentheses. The values in the table represent the coefficients for each independent variable.
*Statistically significant at the 0.10 level
**Statistically significant at the 0.05 level
***Statistically significant at the 0.01 level

Table 4.2. The Effect of Grouped Dummy Demographic Variables, Earnings Information, and Intelligence Testing (Analytic and Vocabulary Test) on Relative Income Preference

Variable	Relative Income Preference
Analytic	0.401** (0.189)
Vocabulary	0.969*** (0.324)
Length	-0.278* (0.158)
Race	-0.038 (0.135)
Sex	-0.085 (0.113)
Order	-0.226 (0.152)
Richer	0.050 (0.113)
Older	0.151 (0.115)
College	-0.428*** (0.115)
Number of Observations: 1674	

Note: The standard errors are presented in parentheses. The values in the table represent the coefficients for each independent variable.
*Statistically significant at the 0.10 level
**Statistically significant at the 0.05 level
***Statistically significant at the 0.01 level

For the regression utilizing the IQ scores converted from the Wunderlic test, a significant relationship was observed between general cognitive abilities and an individual's answer to the relative income question (Table 4.3). Individuals who preferred the absolute state scored significantly higher on the Wunderlic test, and therefore received higher IQ scores. An increase in the IQ score by 1 percent would increase the likelihood that an individual preferred absolute income by 7 percent. Specifically, individuals received higher IQ scores at a significance level of 5 percent. Again, these observations support the Rand (2008) findings that there is a relationship between cognitive abilities and preference for absolute income. In the regressions using the IQ scores as the cognitive measure, neither race nor sex was found to have significant relationships.

Therefore, as a whole, there was a significant relationship between general cognitive abilities – whether measured by an analytical and vocabulary test or IQ scores – and a preference for absolute income. Namely, individuals who preferred the absolute state had higher cognitive abilities.

Table 4.3. The Effect of Demographic Variables and Intelligence Testing (IQ Scores) on Relative Income Preference

Variable	Relative Income Preference
IQ	0.070** (0.031)

|		
Race	0.724	(0.758)
Sex	-0.128	(0.598)
Number of Observations: 64		

Note: The standard errors are presented in parentheses. The values in the table represent the coefficients for each independent variable.
*Statistically significant at the 0.10 level
**Statistically significant at the 0.05 level
***Statistically significant at the 0.01 level

4.3. Difference in Positionality for Income and Intelligence

The Solnick and Hemenway study proposes that most individuals show an absolute preference for income and a positional preference for intelligence. In this study, of all individuals who answered both the relative income and relative intelligence question (n=175), roughly 42 percent of individuals displayed the Solnick and Hemenway preferences and selected the absolute state for income and positional state for intelligence (Figure 4.3). Only 8 percent of individuals displayed the opposite preference for a positional state for income and absolute state for intelligence. Roughly 27 percent of individuals exhibited a preference for the positional state for both income and intelligence, while 23 percent of individuals exhibited a preference for the absolute state for both income and intelligence. These findings are mostly consistent with the Solnick and Hemenway theories as the majority of individuals selected the absolute income state and positional intelligence state.

Figure 4.3: Distribution of Relative Income and Relative Intelligence Question for All Surveys
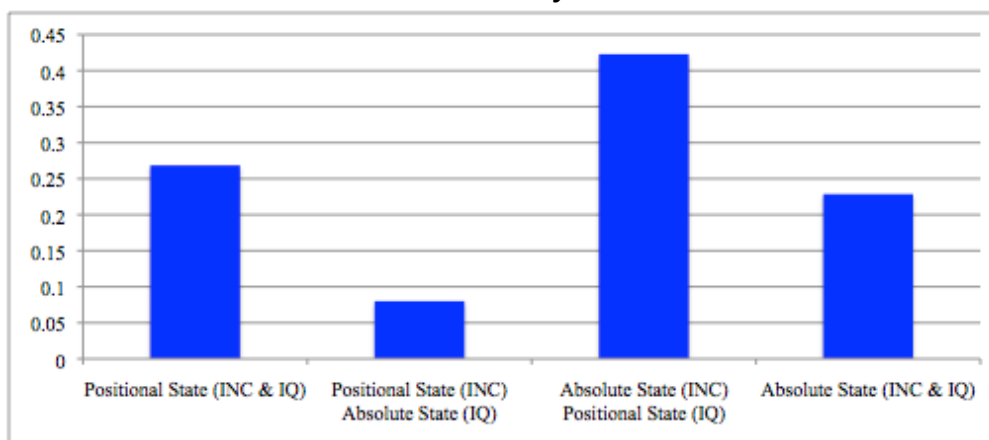
Number of Observations: 175

Chapter 5

Conclusions

The conclusion first briefly summarizes the main results, followed by a discussion of research limitations and suggestions for future research, and finally explores real world implications of the findings.

5.1 Summary of Findings

Utility maximization is a concept at the core of the neoclassical economic theory, where each rational individual is assumed to engage in independent utility maximizing behaviors. This standard theory leads to the conclusion that private market behavior equates with efficient allocation of resources, and has been a core economic driver for many public policies. A recent modification of this theory opens the door for a relative income term, where utility maximizing behaviors may be influenced by more than just the individual's behavior.

Based on data compiled from twenty-seven psychology surveys administered online, support for the aforementioned modification of the neoclassical economic theory may be garnered. Approximately only 70 percent of all respondents showed a preference for the absolute state of income (i.e., preferences based *only* on their own income level), whereas the standard economic theory assumes that 100 percent of all respondents would choose this state. Conversely, approximately 69 percent of all respondents showed a preference for the *positional* state of IQ. These two findings are consistent with the original Solnick and Hemenway (1998) experiment that first proposed the Relative Income Hypothesis Question. The Solnick and Hemenway study indicates that faculty and staff were less likely to have positional preferences when compared to students. Though this study did not categorize respondents as students versus faculty and staff, if the term "faculty or staff" is generalized to describe any individual who completed a minimum of four years in college, it was found that these individuals exhibited a preference for the positional state of income. Thus a finding in this study, which may be inconsistent with the Solnick and Hemenway's, indicates that faculty and staff may prefer positional state for income, as opposed to the suggested preference for absolute state for income.

A relationship is observed between answering the longer version of the Relative Income Question and a preference for positional income. There was no prior expectation of such a relationship, and this study used the length variable as a control.

A strong and significant relationship is evident between a high score on a test of cognitive measure and a preference for absolute income. This finding supports the initial observation by Rand (2008).

5.2 Limitations of Study

This study was based on data compilation from multiple surveys with alternate primary goals, where the Relative Income Question was simply added as a supplemental question. Additionally, as the primary question of interest was hypothetical in nature, individuals may not have completely revealed all realistic preferences that the study hypothesizes.

A major limitation of this study may be that the preferences for absolute income – and thus the justification of the standard economic theory – may have been over expressed in

the study. The main justification behind choosing the absolute income preferences is that the individual is solely concerned about their own income level, and that this individual income level is the only factor in the utility function. However, individuals who are altruistic in nature – that is, they are willing to sacrifice for the benefit of those around them – would have also selected this absolute state. The positional state preference is a world where an individual makes $50,000 while those around make $25,000; namely, the individual would be richer in a poorer world. The absolute state preference is a world where an individual makes $100,000 while those around make $250,000 (or $200,000); namely the individual would be poorer in a richer world. An altruistic person would opt to select this world because they would be willing to give up their status as "richer" and accept a "poorer" status if it allowed others to be considered "rich." Thus, the relative income effect may potentially be under expressed in the study. Future studies may plan to incorporate independent variables that may account how altruistic an individual may be.

5.3 Suggestions for Future Research

The primary suggestion for future research is to broaden the surveyed population to ensure a larger demographic of individuals, as well as ensure these individuals are participating in a survey specifically designed to understand the relationship between cognition and preference for absolute or positional income. The various demographic and earnings information related questions were slightly varied across the twenty-five surveys; a future study may include standard categories across surveys for these independent variables.

Other studies that paralleled the original Solnick and Hemenway experiment have used a spectrum of additional explanatory variables to understand an individual's preference for absolute versus positional income including: competitiveness of the individual, personal satisfaction with how much they are accepted by others, religious fulfillment, and gambling habits. Future studies may include such variables that may capture additional potential affects beyond the scope of this study. Additionally future studies may aim to explain how and why the length of the Relative Income Question may impact an individual's choice, as a significant relationship between the two was noted in this study.

Three separate measures of cognition were used to perform this analysis, all which aim to give some insight to presence of higher thinking processes by respondents – namely, the operational definition for cognition in this study. A future study may develop a more precise operational definition of and measure for cognition. Additionally, performance on the vocabulary test was shown to have a stronger relationship with absolute income preference than the performance on the analytic test. A future study may explore the difference in cognition as determined by a vocabulary test versus an analytic test.

Some studies (Frank, 1993) have indicated that increased knowledge of economics may promote behaviors that are more in line with the standard economic theory. Johansson-Stenman et al. (2002) observed a significant relationship between students of economics and a tendency to prefer absolute income; they explain this observation by stating that economic students may be taught in their course of study that relative income is irrational and should not matter, or that less positional students were over-represented among economics students surveyed. A future study may pose the Relative Income Question to students an Introduction to Economics class on the first and last day or between the first day of Introduction to Economics and the last day of Senior Thesis to build on these studies, and analyze for a stronger preference for absolute income with higher economics education.

This study was based largely on respondents answering a hypothetical question, which may be linked to realistic preferences between absolute and positional states. A future study may aim to develop a more realistic survey or scenario to increase the credibility of the findings.

5.4 Real World Implications

Many economists have shared ideas about various real world and policy implications if a substantial portion of the population operated under premise of the relative income theory.

Pingle and Mitchell (2002) proposed an incentive scheme that would reward for relative performance; if worker's incomes were based on individual performance rank, each worker would be motivated to work harder to earn a high ranking to ensure a higher income.

Many authors have introduced the concept of progressive taxation, where the tax rate increases as the taxable base increases. Tax theory, in general, dictates that the optimal tax

will maximize social welfare under a governmental budgetary constraint (Diamond 2011). Carlsson et al. (2007) and Alpizar et al. (2005) propose that goods that are viewed as more positional should be subject to higher and/or progressive taxes. In the case of the relative income theory, income is viewed as a positional good and would then be subject to progressive taxes where the higher one's income, the higher the income tax. Carlsson et al. (2007) explain the basis for such a tax:

> Since relative concerns imply that an increased income or consumption level of each individual imposes negative externalities on the others, one can also argue in favour of policy interventions in response to an over-consumption of goods consumed primarily to demonstrate wealth – positional goods.

The idea is that the increased tax on the rich would influence other groups to lower their consumption (Johansson-Stenman, 2002). Such a progressive tax may allow for redistribution of wealth, and allow for a more equal national economic state.

The relative income hypothesis would also explain why individuals would be opposed to tax cuts for high-income earners. Theoretically a cut in the capital gains tax would only help the rich, and not hurt the poor; however, under the relative income hypothesis a benefit to the rich would hurt the poor (Solnick and Hemenway, 1998). If there is diminishing marginal utility of income and income is positional, "overall utility can be increased via transfers from the rich to the poor," allowing for decreased wealth inequality overall (Mujcic and Frijters, 2010).

The findings of this study suggest that the pursuit of policies supported by the relative income hypothesis is not preferred by the majority of respondents, in particular those individuals who scored higher on cognitive tests. Therefore, the majority prefers the absolute income state, which abides by the neoclassical economic theory. This notion of preferring the absolute state is extremely prevalent in corporate America, where businesses operate using the efficiency argument for profit maximization. Under this notion, corporations are expected engage in profit maximizing behaviors as it allows for the most welfare maximization (Hussain, 2012). Under profit maximization, these corporations operate as individual firms solely interested in their own absolute income level. Such principals allow for the ever-growing presence of large corporations that threaten the existence of small mom-and-pop businesses.

The American society seems to have become one that is defined by absolutists, as indicated in this finding with the majority of all respondents (70 percent) preferring absolute income. One reason for the prevalence of such absolutist thought may stem from the body primarily tasked with policy-making for the country, Congress. The median net worth of American families is $120,000 whereas the median net worth for members of Congress is $912,000; this means that the odds of an American family of being a millionaire is 1 in 22 whereas for a member of Congress it is nearly 1 in 2. Additionally, the 10 richest members of Congress all voted unanimously to extend the Bush tax cuts (Gilson and Perot, 2011). The American society is inherently guided by absolutist thought, which may primarily propagate the large wealth inequality, where the top fifth is approximately 8.5 times richer than the bottom fifth (Wilkinson, 2011). Perhaps those with higher cognitive abilities are the ones who are most influential in such policy making (i.e. Congress), resulting in policies that abide by neoclassical theory. In order for the American societies to have a real chance of reaching economic equality, the first steps may be to develop and implement policies that engage the relative income theory.

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Appendix A

Survey Specifications

Survey Name	Total Respondents	Total Completed Responses	Survey Administration Date	Target Audience
Alex's Thesis Survey (ATS)	69	69	04/05/2011 – 5/30/2011	Union College
Bailey's Income Questionnaire 1 (BIQ1)	106	106	04/03/2008 – 5/14/2008	Craiglist.com
Bailey's Income Questionnaire 2 (BIQ2)	69	68	5/22/2008 – 06/05/2008	Craiglist.com
Bailey's Income Questionnaire 3 (BIQ3)	39	39	01/11/2011 – 05/25/2011	Craiglist.com
Crime and Punishment Survey 1 (CPS1)	103	100	03/18/2011 – 03/19/2011	Mechanical Turk
Crime and Punishment Survey 2 (CPS2)	228	215	03/24/2011 – 03/25/2011	Mechanical Turk

Crime and Punishment Survey 3 (CPS3)	498	482	05/06/2011 – 05/11/2011	Mechanical Turk
Memories of Recent Events (MRE)	77	69	05/05/2011	Mechanical Turk
Energy Drink/Pain Reliever Survey #1 MT (EDPRSMT1)	237	194	04/29/2012 – 05/02/2012	Mechanical Turk
Energy Drink/Pain Reliever Survey #2 MT (EDPRSMT2)	65	53	04/30/2012 – 04/30/2012	Mechanical Turk
Energy Drink/Pain Reliever Survey #3 MT (EDPRSMT3)	55	24	04/30/2012 – 04/30/2012	Mechanical Turk
Energy Drink/Pain Reliever Survey #4 MT (EDPRSMT4)	70	27	04/30/2012 – 04/30/2012	Mechanical Turk
Energy Drink/Pain Reliever Survey #1 PSY (EDPRSPSY1)	22	18	04/27/2012 – 05/17/2012	Union College
Energy Drink/Pain Reliever Survey #2 PSY (EDPRSPSY2)	15	12	05/02/2012 – 05/15/2012	Union College
Energy Drink/Pain Reliever Survey #3 PSY (EDPRSPSY3)	13	3	04/27/2012 – 05/17/2012	Union College
Energy Drink/Pain Reliever Survey #4 PSY (EDPRSPSY4)	13	12	04/27/2012 – 05/11/2012	Union College
Final Data Comprehension Survey v1 (FDCS1)	105	81	04/26/2012 – 05/06/2012	Mechanical Turk
Final Data Comprehension Survey v2 (FDCS2)	101	71	04/26/2012 – 05/06/2012	Mechanical Turk
Final Data Comprehension Survey v3 (FDCS3)	106	69	04/26/2012 – 05/06/2012	Mechanical Turk
Final Data Comprehension Survey v4 (FDCS4)	86	69	04/24/2012 – 05/06/2012	Mechanical Turk
Final Data Comprehension Survey v5 (FDCS5)	79	59	04/26/2012 – 05/06/2012	Mechanical Turk
Final Data Comprehension Survey v6 (FDCS6)	94	66	04/27/2012 – 05/06/2012	Mechanical Turk
Data Comprehension Survey v1 (DCS1)	25	23	02/22/2012 – 02/22/2012	Mechanical Turk
Data Comprehension Survey v2 (DCS2)	24	17	02/22/2012 – 02/23/2012	Mechanical Turk

Data Comprehension Survey v3 (DCS3)	24	20	02/26/2012 – 04/02/2012	Mechanical Turk
Data Comprehension Survey v4 (DCS4)	27	21	02/27/2012 – 03/30/2012	Mechanical Turk
Data Comprehension Survey v5 (DCS5)	33	20	03/13/2012 – 03/30/2012	Mechanical Turk
TOTAL	2383	2008	04/03/2008 – 05/17/2012	

Appendix B

Question Breakdown Per Survey

	Relative Income Question	Relative IQ Question	Sex	Race	Age	Income	Education	All 10 Vocabulary Questions	Analytic Questions 1-3	Analytic Questions 4-5	Wonderlic Test
Alex's Thesis Survey	X	X	X	X	X		X				X
Bailey's Income Questionnaire (BIQ1)	X		X	X	X	X	X	X	X		
Bailey's Income Questionnaire (BIQ2-3)	X	X	X	X	X	X	X	X	X		
Crime and Punishment Survey 1-3 (CPS1-3)	X		X	X	X	X	X	X	X	X	
Memories of Recent Events (MRE)	X		X	X	X	X	X	X	X	X	
Energy Drink/Pain Reliever Survey #1-4 MT (EDPRSMT1-4)	X		X	X	X	X	X	X	X	X	
Energy Drink/Pain Reliever Survey #1-4 PSY (EDPRSPSY1-4)	X		X	X	X	X	X	X	X	X	
Final Data Comprehension Survey v1-6 (FDCS1-6)	X		X	X	X	X	X	X	X	X	
Data Comprehension Survey v1-5 (DCS1-5)	X		X	X	X	X	X	X	X	X	

Question and Answer Phrasing Per Survey

Variable	Surveys	Question	Answer Options
Relative Income Question	ATS BIQ1-3 CPS1-3	Imagine that you have a choice between options A and B below. Assume that the prices of goods and services would be the same regardless of the option you chose. Which would you prefer?	A. Earning $50,00 year while other people are earning $25,000 a year. B. Earning $100,0 year while other people are earning $250,000 a year.
	MRE	Imagine that you have a choice between options A and B below. Assume that the prices of goods and services would be the same regardless of the option you chose. Which would you prefer?	A. Earning $50,00 year while other people are earning $25,000 a year. B. Earning $100,0 year while other people are earning $200,000 a year.
	EDPRSMT 1-4 EDPRSPSY1-4 FDCS1-6 DCS1-5	Imagine that you have a choice between the two options below. Assume that the prices of goods and services would be the same regardless of the option you chose. Which would you prefer? OR Imagine that you have a choice between the two options below. Which would you prefer? OR Imagine that you have a choice between the	Earning $100,000 year while other people are earning $200,000 a year. Earning $50,000 a year while other people are earning $25,000 a year. OR Earning $50,000 a year while other people are earning $25,000 a year. Earning $100,000 year while other people are earning $200,000 a year.

		two options below. Assume that the prices of goods and services would be the same regardless of the option you chose. Which would you prefer? Imagine that you have a choice between the two options below. Which would you prefer?	
Relative IQ Question	ATS BIQ2-3	Assume intelligence can be fairly described by the scores people achieve on current IQ tests. Which would you prefer?	Your IQ is 110; all other people have average IQ of 90 Your IQ is 130; all other people have average IQ of 150
Sex	All	SEX	Male Female
Race	ATS BIQ1-3	What RACE do you consider yourself?	Black White Spanish Hispanic Latino/Latina
	CPS1-3 MRE EDPRSMT 1-4 EDPRSPSY1-4 FDCS1-6 DCS1-5	What RACE do you consider yourself?	Black/African-American Hispanic White Asian Other
Age	ATS BIQ1-3	AGE	18-25 25-29 30-39 40-49 50-59 60-69 70-79 80 and over
	CPS1-3 MRE EDPRSMT 1-4	What is your AGE in years?	Open-ended

EDPRSPSY1-4
FDCS1-6
DCS1-5

Income	BIQ 1-3	Family Income	Open-ended
	CPS1-3 MRE EDPRSMT 1-4 EDPRSPSY1-4 FDCS1-6 DCS1-5	What is the total annual income from everyone in your household?	Less than $20,000 Between $20,000 and $40,000 Between $40,000 and $60,000 Between $60,000 and $80,000 Between $80,000 and $100,000 More than $100,000
Education	ATS BIQ1-3	What was the highest DEGREE you earned?	Less than HS High School Junior College Bachelor's Degree Graduate School
	CPS1-3 MRE EDPRSMT 1-4 EDPRSPSY1-4 FDCS1-6 DCS1-5	What is the highest level of EDUCATION you have achieved?	Less than HS High School Some College Four-Year College Some Graduate Graduate Degree
All 10 Vocabulary Questions	BIQ1-3 CPS1-3 MRE EDPRSMT 1-4 EDPRSPSY1-4 FDCS1-6 DCS1-5	1. SPACE	School Noon Captain **Room** Board
	BIQ1-3 CPS1-3 MRE EDPRSMT 1-4 EDPRSPSY1-4 FDCS1-6 DCS1-5	2. BROADEN	Efface Make level Elapse Embroider **Widen**
	BIQ1-3 CPS1-3 MRE EDPRSMT 1-4 EDPRSPSY1-4 FDCS1-6	3. EMANATE	Populate Free Prominent Rival **Come**

DCS1-5		
BIQ1-3	4. EDIBLE	Auspicious
CPS1-3		Eligible
MRE		**Fit to eat**
EDPRSMT 1-4		Sagacious
EDPRSPSY1-4		Able to speak
FDCS1-6		
DCS1-5		
BIQ1-3	5. ANIMOSITY	**Hatred**
CPS1-3		Animation
MRE		Disobedience
EDPRSMT 1-4		Diversity
EDPRSPSY1-4		Friendship
FDCS1-6		
DCS1-5		
BIQ1-3	6. PACT	Puissance
CPS1-3		Remonstrance
MRE		**Agreement**
EDPRSMT 1-4		Skillet
EDPRSPSY1-4		Pressure
FDCS1-6		
DCS1-5		
BIQ1-3	7. CLOISTERED	Miniature
CPS1-3		Bunched
MRE		Arched
EDPRSMT 1-4		Malady
EDPRSPSY1-4		**Secluded**
FDCS1-6		
DCS1-5		
BIQ1-3	8. CAPRICE	Value
CPS1-3		A Star
MRE		Grimace
EDPRSMT 1-4		**Whim**
EDPRSPSY1-4		Inducement
FDCS1-6		
DCS1-5		
BIQ1-3	9. ACCUSTOM	Disappoint
CPS1-3		Customary
MRE		Encounter
EDPRSMT 1-4		**Get used to**
EDPRSPSY1-4		Business
FDCS1-6		
DCS1-5		
BIQ1-3	10. Allusion	**Reference**
CPS1-3		Dream
MRE		Eulogy

	EDPRSMT 1-4 EDPRSPSY1-4 FDCS1-6 DCS1-5		Illusion Aria
Analytic Questions 1-3	BIQ1-3 CPS1-3 MRE EDPRSMT 1-4 EDPRSPSY1-4 FDCS1-6 DCS1-5	A bat and a ball cost $1.10 in total. The bat costs a dollar more than the ball. How much does the ball cost?	Open-ended Correct Answer: 5 cents
		If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?	Open-ended Correct Answer: 5 minutes
		In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?	Open Ended Correct Answer: 47 days
Analytic Questions 4-5	CPS1-3 MRE EDPRSMT 1-4 EDPRSPSY1-4 FDCS1-6 DCS1-5	A cube made of white plastic is spray painted black and cut into 27 identical sized cubes. How many have exactly two black sides?	Open Ended Correct Answer: 12 cubes
		If John can drink one barrel of water in 6 days, and Mary can drink one barrel of water in 12 days, how long would it take them to drink one barrel of water together?	Open Ended Correct Answer: 4 days
Wonderlic Test	ATS	Available at Request (Professor Chabris, Pychology Dept)	Available at Request (Professor Chabris, Pychology Dept)