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Overborrowing and Undersaving: Lessons and Policy Implications from Research in Behavioral Economics

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Abstract: The U.S. household carries over \$7,500 in uncollateralized debt and likely saves at a negative rate. There is a growing body of evidence that this borrowing and saving behavior may not, as assumed by standard economics, be the product of rational financial planning. This paper discusses insights from behavioral economics on how self-control problems could play a crucial role in determining such financial outcomes. It is important to note that self-control problems, as defined in this paper, are thought of as an issue affecting all people, not just those involved in our specific research.

The paper reports results from a field study targeted to low-to-moderate income individuals conducted in Dorchester, MA. It links measured self-control to borrowing and savings outcomes taken from individual credit reports and survey questions respectively. We find that self-control problems are associated with higher borrowing, specifically on credit cards, and lower savings of income tax refunds. The paper discusses how policy prescriptions built around addressing self-control issues could prove helpful in improving financial outcomes.

Keywords: financial decisions, credit scores, savings, time preferences

JEL Classifications: D12, D14, D91, C93

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1. Overborrowing and Undersaving – The Issue

U.S. households have been saving less and borrowing more. Relatively constant prior to the 1980s (Barry Bosworth et al., 1991), private savings rates have declined steadily over the past twenty years, actually becoming negative for the first time in 2005.¹ Meanwhile, this same period has seen uncollateralized debt levels rise to record highs. Median reported credit card borrowing for households that carry some credit card debt has doubled in nominal terms over the last ten years from \$1,100 in 1997 to \$2,200 in 2006 (Brian Bucks et al., 2006, Arthur B. Kennickell et al., 1997). This self-reported figure is a lower bound for revolving debt both because individuals tend to underreport credit card debt when asked (see e.g. David Gross and Nicholas Souleles, 2002) and because revolving debt as a national aggregate also includes balances outstanding on unsecured lines of credit. Total revolving debt is closer to \$7,500 per household in 2000 dollars.² Figure 1 illustrates that never in the past thirty years has the American consumer borrowed more and saved less.³

[Figure 1 about here]

The effects of declining savings and increasing revolving debt, though important for the broader economy, are directly felt by individual consumers. Low savings eliminates buffer stocks of “rainy day” funds, leaving individuals susceptible to negative life events, such as job loss and health problems. (Elizabeth Warren, 2004). For the poor, who are more likely to be credit constrained, coping with these shocks can be particularly difficult. (Marianne Bertrand et al., 2004, 2006).⁴ While increased access to credit has many positive aspects, allowing people to smooth consumption and even cope more effectively with adverse life events, high levels of debt can increase vulnerability to these same events. Increased debt can prove burdensome for LMI individuals, leading potentially to delinquency and default. As credit bureaus gain access to this

¹ Calculated as personal savings as a fraction of disposable personal income from the Department of Commerce, Bureau of Economic Analysis, Personal Income and Outlays: Tables 1 & 7.

² Calculated as revolving credit from Board of Governors of the Federal Reserve System "Consumer Credit" G.19 (421). Deflated to 2000 dollars using Department of Labor, Bureau of Labor Statistics Consumer Price Index.

³ When accounting for alternate savings vehicles including Social Security contributions and employer-provided vesting in defined benefit pension plans, personal saving rates may not have declined as precipitously as indicated in Figure 1 (William G. Gale and John Sabelhaus, 1999). Additionally, revolving debt may be somewhat overstated as current measures include not only balances carried across periods but also “convenience charges” that may be between 5 percent and 10 percent of total balances (Kathleen Johnson, 2004).

⁴ For a discussion on whether the general population is saving enough for retirement, see John Karl Scholz et al. (2006).

information, individual credit scores naturally decline. Credit reports are now legally used in a host of financial decisions. Poor credit scores translate not only into credit rejections and higher interest rates, but also figure strongly in employment, housing, and insurance applications. Low savings and high borrowing can clearly have adverse consequences for LMI individuals.

What are the reasons for low saving and high borrowing? Economics has primarily modeled saving and borrowing outcomes as optimal products of rational decision-making processes. There is, however, a growing body of evidence that high levels of debt and low levels of savings are actually considered by the decision makers themselves as being far from ideal. These two views of personal financial decisions have far different policy implications.

A plausible view is that personal financial decisions are at times suboptimal. In this paper, we define suboptimal to mean out of line with an individual's long-run self-interest. That is, if asked beforehand to plan future financial decisions, an individual will respond in line with his or her long-run best interest. When the future actually arrives, however, and the decisions must be taken, the individual may no longer be able to stick to this plan. The resulting decisions are suboptimal with respect to long-run self-interest. Though such decisions appear to be optimal at the time they are made and are in line with the individual's immediate self-interest, they do not represent the individual's desired behavior over the long-run. Behavioral economics has attempted to extend standard economic treatment of saving and borrowing with contributions such as the importance of self-control for personal financial outcomes. The recognition of self-control problems as a primary source of suboptimal borrowing and saving leads to important policy prescriptions for improving personal financial outcomes.

This paper has three objectives. First, we want to elaborate on the importance of self-control problems for saving and borrowing decisions. We present empirical evidence from a pilot study undertaken at a Voluntary Income Tax Assistance site in Boston, which sheds light on this relationship. Though we are aware that a variety of factors can lead to the behavior highlighted, we concentrate on one relevant behavioral issue. Second, we present novel policy prescriptions based on behavioral theory and supported by our current empirical research. We discuss the sorts of interventions, both programmatic and product-oriented, that are most likely to be successful. Third and last, we point out that the research mandate for behavioral economics with respect to

saving and borrowing is in its infancy. Much more research must be done in order to strengthen our understanding of personal financial decisions and inform future policy.

The paper proceeds as follows: Section 2 provides a discussion of credit and saving decisions, highlighting key differences between standard theory and behavioral economics. Section 2 additionally discusses the differing policy implications of the traditional and behavioral views. Section 3 presents evidence on self-control problems based on a recent study of LMI individuals. Section 4 sets out policy prescriptions motivated by behavioral economics and supported by our empirical research. Section 5 concludes and provides motivation for future work.

2. What are the determinants of saving and borrowing decisions?

Household credit and savings decisions are extremely complex, based on a host of plans, motivations, beliefs about the future, and shocks. The complexity of these decision processes has led to many differing descriptions of the driving forces behind credit and savings outcomes. Economics has mainly assumed that individuals make perfectly rational decisions given their observable constraints (e.g., income). This traditional view, however, is not particularly effective at accounting for, on the one hand, empirical facts on saving and credit behavior and, on the other hand, why certain individuals make credit and savings decisions that they themselves view as suboptimal.

The growing field of behavioral economics adds to the traditional understanding of individual financial decision making with insights from psychological research. One critical contribution from behavioral economics is the importance of self-control problems for personal financial decisions. This contribution is particularly important as the relevant policy implications differ sharply from those based on traditional economics. What follows is a brief discussion of both traditional and behavioral views of personal financial decision making, highlighting the policy implications of each.

Standard Theory: Optimal Saving and Borrowing Decisions?

Standard economic theory on saving and borrowing is founded on the assumption that people make optimal decisions (see definition above). According to this view, individual credit and saving decisions are influenced by a strong preference to have smooth consumption over the life cycle. As individual income is normally low in youth, high in prime earning years, and low again in retirement, a simplified version of the standard view would predict that individuals will smooth their consumption over these periods, borrowing in youth, saving and repaying in prime earning years, and spending down savings in retirement. Saving and borrowing decisions are deliberately made to ensure smooth consumption across periods. These decisions, regardless of what an outside observer might think, are optimal given individual preferences.

The optimality of individual financial decisions in standard economic models is linked to the assumption that individuals discount future costs and future benefits exponentially (Paul A. Samuelson, 1937). This means that individuals discount costs and benefits occurring in one year's time the same way, independent of whether they are making the calculation today or planning how they would like to make the calculation ten years from now. By extension, individuals are always making decisions that are in line with their long-run self-interest. It is the constant level of discounting that generates optimal borrowing and savings decisions by standard economic theory.

Though exponential discounting may be the cornerstone of standard economic theory with respect to saving and borrowing decisions, decisions in the real world appear to be at odds with the consumption smoothing view.⁵ To begin, consumption is not smooth over individual lifetimes, but rather it tracks income through the life cycle (Christopher D. Carroll and Lawrence H. Summers, 1991). When individuals earn a lot, they spend a lot; when they earn little, they spend little. Even over short time horizons, individuals fail to smooth consumption. Welfare recipients don't smooth consumption over the benefit month, consuming much at the beginning of the month and significantly less toward the end of the benefit period (e.g. Jesse Shapiro, 2005, Melvin Stephens, 2003). Regular wage earners, as well, show evidence of consuming a lot just after receiving their paycheck, resulting in significantly lower consumption levels toward the end of their scheduled pay period (e.g. David Huffman and Matias Barenstein, 2004). Additional

⁵ The consumption smoothing hypothesis is based on a number of additional assumptions (see Angus Deaton, 1992).

empirical investigations have found that consumption is sensitive to predictable receipts, including federal tax refunds and fully expected bonuses (Tsuneo Ishikawa and Kaxuo Ueda, 1984, Nicholas S. Souleles, 1999). The logical conclusion to be drawn from this evidence is that individuals may not be perfect consumption smoothers, at times consuming too much and not saving enough – or the other way around.

It seems that individuals fail to consistently make optimal personal financial decisions. Interestingly, many individuals appear to be cognizant of their financial errors and may view their borrowing and saving levels as being suboptimal. One prime example of this recognition is the growing industry of credit counseling. Over 2 million people per year voluntarily seek credit counseling, apparently viewing their borrowing and saving levels as suboptimal (Michael S. Staten et al., 2002). From 1990 to 2000, credit counselors saw client growth of nearly 100 percent.⁶

Leaving aside the difficult resolution of empirical facts and standard theory, what are the policy implications derived from traditional theory? The answer is that there is very little one can do to improve savings and credit outcomes if one believes in a foundation of optimal decision making. Policy cannot improve outcomes that are already optimal.

There is some room for policy if we allow imperfections into the standard decision making framework. Standard economics would assume both that individuals have access to all information necessary for making the decision at hand and that all associated risks are understood and properly evaluated. If either of these assumptions fails to hold, policy may enter the breach with efforts to improve informational environments, and change levels of insurance and overall savings. These policy efforts, however, may not have the desired effect and may be difficult to justify.

If informational environments are less than perfect, biased information can lead to suboptimal savings and credit outcomes. Individuals may not know how to save or borrow responsibly. That is, they may think they are making correct decisions, but may not fully

⁶ The National Foundation for Credit Counseling (NFCC) doubled its volume through the 1990s, counseling 400,000 new individuals in 1990 and 880,000 in 2000. Notably this increase happened before October 2005 changes in bankruptcy law required credit counseling as a precursor to Chapter 7 bankruptcy. Between 2 million and 2.5 million individuals overall seek credit counseling each year (Michael S. Staten, Gregory Elliehausen and E. Christopher Lundquist, 2002).

understand the details of their borrowing and saving contracts. Such a rationale may be the motivation for government interventions such as the Truth in Lending Act and educational efforts seeking to make credit contracts more transparent and make consumers more aware of contract details. There is indeed evidence that education on financial matters, especially for the young, increases savings (Douglas B. Bernheim and Daniel M. Garrett, 2003, Douglas B. Bernheim et al., 2001). Hilgert et al. (2003) provide a good survey of existing studies on the effects of financial education, finding that it may improve both financial knowledge and savings outcomes. However, assessments of later life educational interventions on savings and borrowing outcomes are plagued by empirical problems that make conclusions difficult (Michael Collins, 2005). This lack of convincing evidence on the positive effects of educational efforts is particularly worrying as one educational outlet, credit counseling, has effectively doubled in size in the last decade, and recent bankruptcy legislation promises even more counseling clients (Michael S. Staten, Gregory Elliehausen and E. Christopher Lundquist, 2002). In sum, information is certainly important for financial decisions but probably not sufficient to explain why individuals frequently make suboptimal decisions.⁷

Policy interventions may also be necessary if financial shocks are not fully appreciated. Individuals are sometimes hit by negative health and income shocks. It is not the shocks themselves, but the appreciation of the regularity and severity of these shocks that may lead to suboptimal financial outcomes. The failure to fully appreciate shocks may lead to a suboptimal level savings and borrowing. Take, for example, an individual who under assesses the probability of being hit by a negative shock and so carries minimal insurance and keeps little savings for a rainy day. This individual, when hit by a severe shock, may be forced by economic circumstance to exhaust his or her savings or borrow an unsupportable amount. In this case, the natural policy suggestion is to increase this individual's appreciation of shocks and so encourage greater savings and acquisition of insurance. As a general policy prescription, however, this is problematic. In the same way that individuals can under-appreciate the regularity and severity of shocks, individuals may be inclined to over-appreciate the same. In the latter cases, individuals

⁷ Taking health decisions as a primary example, many individuals are well aware of the advantages of healthier lifestyles and frequently make plans for behavioral change. These individuals, however, have huge difficulties changing their unhealthy lifestyles.

⁹ For example, individuals have difficulty maintaining plans for diet and exercise, winding up loading up on calories and procrastinating with respect to their gym attendance (e.g., Stefano DellaVigna and Ulrike Malmendier, 2006).

may carry too much insurance or save too much. Increasing insurance and savings for the already over-saving and over-insured is surely not an improvement for the individuals in question.

Overall, standard theory does not mesh well with empirical investigations into saving and borrowing. Additionally, standard theory provides little guidance for policy because financial decisions are presumed to be optimal. When allowing for the possibilities of poor information or risk assessment, opportunities for improvement are possible. However, the resultant policy prescriptions may not have the desired effect (as in the case of education) or may be hard to justify (as in the case of increased insurance and savings).

Behavioral economics takes a different tack. It suggests that suboptimal financial outcomes are not associated with informational issues but arise because individuals fail to discount exponentially. Individuals discount differently depending on whether they are making a decision involving the present or one only involving events in the future. This differential discounting, as we discuss below, is akin to saying that individuals have self-control problems. Suboptimal savings and borrowing, in the behavioral economics framework, is a direct product of these self-control problems.

Behavioral Economic Theory: Self-Control Problems

The difficulty of explaining known facts of saving and borrowing with standard theory has motivated new economic research based on psychological insights into human decision making. This new approach deviates from former assumptions of individual rationality in that it recognizes that individuals may make systematic decision-making mistakes. One of the key insights from behavioral economics focuses on self-control problems. There is a growing body of evidence that self-control plays a very important role in financial decision making. Self-control problems naturally lead to suboptimal financial outcomes, but also offer possibilities for individuals to commit to strategies to help overcome said problems.

From simple introspection, we all know that self-control can be difficult. When making a decision that involves instantaneous benefits but has costs in the future, we are tempted to undervalue the future costs and overvalue the immediate gratification. We say yes when it might be better to say no. Additionally, when making a decision that involves instantaneous costs but has benefits in the future, we are tempted to undervalue the future benefits and overvalue the

immediate, painful costs. We say no when it might be better to say yes. Yet, beforehand we often would like to say no to the immediate gratification decision and yes to the immediate cost decision. The point is we sometimes fail to act in the present as we intend or plan to act beforehand; we lack self-control. There is a strong suggestion that such self-control problems are embedded in the structure of the human brain. McClure et al. (2004) claim to have shown that the human brain has two separate systems for valuing immediate and delayed rewards. Situations arise, such as those noted above, in which both immediate and delayed rewards and costs must be evaluated. In these cases, both decision systems may be active and may come to different conclusions. It is the interplay between the two systems that gives rise, or not, to the self-control problems that we all know too well.

Self-control problems make it difficult to stick to plans and objectives that we know are beneficial in general.⁹ The problem of not sticking to plan appears to be important for financial decision making. Financial plans are highly susceptible to problems of self-control (David Laibson, 1997, Ted O'Donoghue and Matthew Rabin, 1999). Individuals appear to underweight the long-term benefits of saving in their employer-matched 401(k) plans and overweight the immediate costs of doing so, with the result that unless the default option for such plans is that of contribution, only about 20 percent of people actually contribute (James J. Choi et al., 2003).

Individuals appear to underweight the long-term costs of credit card borrowing, perhaps naïvely believing they will not be heavy borrowers (Haiyan Shui and Lawrence M. Ausubel, 2005). Teaser rates play on this naïveté; individuals regularly accept short-term teaser rates and high subsequent rates when an intermediate rate would produce lower finance costs overall. It is not just that individuals believe they won't borrow and wind up breaking this plan. Meier and Sprenger (2006) show, as will be discussed in more detail below, that individuals with self-control problems borrow more, all else being equal, than their more restrained counterparts. The importance of self-control problems for financial decision making even holds in the aggregate. Aggregate models built around consumers with self-control problems are particularly well equipped to address empirical facts on saving and borrowing (David Laibson, 1997, David Laibson et al., 2003). Individuals with self-control problems borrow more and save less than they themselves would ultimately like, given their long-term objectives.

Self-control is closely linked to procrastination. The same mechanisms that lead to overborrowing and undersaving also give rise to procrastination. This can compound problems as individuals put off until tomorrow the lower borrowing and higher saving that they could do today. Instead of signing up today for a particularly beneficial perquisite of their job, employees procrastinate in contributing to their 401(k) plans, leaving employer-matched money on the table. Instead of reducing borrowing and increasing saving today, individuals procrastinate, promising themselves reduced consumption tomorrow. Because self-control will also be a problem tomorrow, the increased saving and decreased borrowing may never happen.

Individuals know it is important not to be too impatient. They know they should not consume too much, as they will be grateful to have more resources later. But when faced with an actual consumption or saving decision, the temptation of immediate rewards grows. Suddenly, saving does not seem so attractive and consumption now seems very rewarding. Even though such behavior is not in their own assessment of their best financial interest, individuals may overconsume or undersave. This failure to align present behavior with long-term self-interest can cause serious financial problems. It is important to note that in this psychological environment, individuals are not deliberately violating their long-run plans. Instead, each day individuals make small deviations from their plan; deviations that, when aggregated, can cause serious difficulty.

Individuals are either aware of the potential for these continual deviations (“I know that I’ll probably break my promise to spend less tomorrow, just like I broke yesterday’s promise today”), or they believe that deviations are one-shot deals (“I’ll just borrow today even though I promised myself not to. Tomorrow will be different”). In either case, the individual with self-control problems will deviate tomorrow. But there exists an important difference in the policy prescription for the two types. The sophisticated individual, cognizant of the likelihood that he will deviate tomorrow, is very likely to be amenable to commitment devices. Commitment devices, such as putting the offending credit card in a freezer’s ice tray, allow sophisticated individuals to take advantage of their future patience. These individuals can effectively commit themselves today to saving more or not borrowing tomorrow. In the opinion of unsophisticated individuals, commitment devices are unnecessary; they are sure they will not have a problem tomorrow. This important difference between people will be highlighted as we discuss policy prescriptions below.

It is necessary to keep self-control issues separate from overall impatience. Overall impatience refers to the degree to which individuals care about consumption differences across any two periods. Self-control problems refer to the degree to which, given overall impatience, individuals disproportionately prefer consumption in the present. It is certainly possible for individuals to have stark differences in overall impatience without actually differing in their tendency to have self-control problems. Both factors are critical for financial decision making. Though our objective in this paper is to treat the behavioral topic of self-control we also recognize that overall impatience will play an important role in determining borrowing and savings outcomes. It is for this reason that we present results related to both overall impatience and self-control problems. Our measures for overall impatience and self-control problems are discussed below.

3. Evidence from a Study of LMI Individuals

Sound policy prescriptions have as a precondition rigorous research in support of their underlying claims. To date, there is little direct evidence linking behavioral hypotheses of self-control problems to real world borrowing and saving outcomes. One critical area requiring attention is that individuals differ in their degree of self-control. Not every individual overborrows and undersaves; some may make optimal financial decisions.¹⁰

Evidence linking self-control problems to borrowing outcomes is limited. There is some evidence from studies linking self-control to borrowing using hypothetical or self-reported borrowing (see Thomas Dohmen et al., 2006, Glenn W. Harrison et al., 2002). Self-reported measures of debt are, however, problematic as people underreport their debt when asked (David Gross and Nicholas Souleles, 2002). There is no direct evidence that self-control problems are associated with objective measures of increased borrowing or decreased saving. To our knowledge, there is also no research in this field with a focus on LMI individuals or households.

What follows is a description of the results from tests of the relationships between directly measured self-control and borrowing and saving outcomes in a study of LMI individuals in Boston. The details of measuring self-control and overall impatience as well as the results on

¹⁰ There is even some evidence that some individuals from higher income groups have the problem of under-consuming (John Ameriks et al., 2006).

borrowing outcomes can be found in Meier and Sprenger (2006). This is a step in the direction towards formulating policy based on thorough academic research.

Study Description.

Each year more than 7,000 LMI Boston residents receive assistance filing their federal and state income taxes at one of 22 Volunteer Income Tax Assistance (VITA) sites across the city. Coordinated by a citywide coalition of government and business leaders, the Boston Earned Income Tax Credit (EITC) coalition, VITA sites provide free tax preparation assistance to LMI households. Taxes are prepared by volunteers throughout the tax season, from late January to mid-April each year. In 2006 Boston's VITA sites prepared nearly 8,000 tax returns with a total refund value of \$12.8 million.

The Boston EITC coalition treats the 22 VITA sites as a launching point for asset-building efforts targeted to LMI individuals, such as the provision of bank accounts and free credit reports and advice. It is from this sample of LMI tax filers identified as targets for asset-building programs that we draw our information. Though not completely representative, either of the whole US population or even of the LMI population, we believe that the sample of individuals is useful for detecting determinants of individual heterogeneity in asset building. If asset-building policy aimed at increasing savings and reducing debt works with anyone, it may well work with these individuals.

In an effort to evaluate the relationship between self-control problems, borrowing, and saving we conducted a study with 155 LMI individuals at one VITA site linking measured impatience and self-control to objective borrowing outcomes taken from individual credit reports and self-reported tax refund savings (both intended and actual) from a companion survey. The study was very informative and has motivated an expanded effort to examine a broader base of tax-assistance recipients and further work on the relationships between self-control and saving and borrowing.

The 155 study participants have little disposable income, averaging around \$17,400 per year. Disposable income is calculated from individual tax returns as the sum of adjusted gross income and post tax government transfers, such as the Massachusetts state tax refund and the

federal tax refund.¹¹ The majority of participants were African-American women, who were around 33 years old, had no education beyond high school, and had less than one dependent (see Panel A of Table 1 for summary statistics).

[Table 1 about here]

Measuring Overall Impatience and Self-Control

In order to develop proxy measures for individuals' overall impatience and their self-control problems, participants were administered choice sets of payments over time. For a detailed explanation of these choice sets and the methodology employed, see the paper by Meier and Sprenger (2006). In effect, the methodology allows us to measure and quantify both overall impatience and an individual's preference for immediate rewards. For example, if a person were indifferent between receiving \$75 in six months instead of waiting one additional month in order to receive \$80, he or she is apparently willing to wait one month to receive \$5. This measures an individual's overall impatience. If, however, the same person would be willing to accept less than \$75 (e.g. \$70) today instead of waiting one additional month to get \$80, this person shows a particular preference for immediate gratification. When the present is involved he or she is not willing to wait the same time period (one month) to get \$5. A preference for immediate rewards, labeled time inconsistency, is an indication of self-control problems: an individual is patient in the future but impatient when the future actually arrives.

From our choice sets of payments over time we develop one proxy measure for overall impatience and one for self-control problems. For a measure of overall impatience, we generate a binary variable for being more patient than the median participant. This variable *Above Median Impatience* is 1 for individuals that in general exhibit more patience in the choice sets of payments over time. The variable is 0 for individuals who are less patient than the median, labeled *Below Median Impatience*. For our measure of self-control problems we examine whether individuals exhibit a clear pattern of preferring immediate gratification as discussed above. Individuals that do exhibit a clear pattern are assigned a value of 1 in a binary variable *Time Inconsistent* indicating self-control problems and 0 otherwise (labeled *Time Consistent*); in our

¹¹ We obtained income information for 145 individuals. The ten remaining individuals either did not file taxes at a VITA site in Greater Boston or did not have to file taxes due to their income level. For these individuals we impute their income as zero (the adjusted gross income and total refund of a nontax-filer).

sample, more than 22 percent exhibit indications of self-control problems and therefore labeled *Time Inconsistent*.

In addition to participating in the sets of choices, individuals were asked permission to match all information to their credit reports for analysis.

Borrowing Outcomes

Information on individual credit behavior comes from Trans Union & Co., one of the major United States credit bureaus. Trans Union collects detailed information on credit behavior and lists this on an individual's credit report or credit history.¹² In particular, credit reports reveal outstanding balances, how much of the available credit limit is utilized (and therefore whether people are credit constrained), past-due balances, whether accounts are in collection and, eventually, whether people have any financial public records such as bankruptcy or court orders to pay. Credit report information, in addition to payment history, is combined in the Fair Issac & Co. (FICO) credit score. The FICO score calculates individual credit risk based on this information and gives the risk a value from 300 to 850 (higher number meaning lower risk). Not every participant had a FICO score, either because their credit history was insufficiently long or because it was missing. In our sample 23 percent were unscored.

Summary statistics of participants' credit behavior are reported in Panel B of Table 1. The average nonmortgage debt level on all active accounts in our sample is \$8,557 (standard deviation \$20,697).¹³ Average revolving balances are \$1,210 (s.d. \$2,437) yielding an average revolving debt-to-income ratio of around 8 percent and a nonmortgage active account debt-to-income ratio of approximately 54 percent for the individuals with disposable incomes greater than zero (n = 144). Relative to the general population, our sample has notably high debt levels. According to the Survey of Consumer Finances, the average U.S. resident has a self-reported credit card debt-to-income ratio of 4.3 percent and a nonmortgage debt-to-income ratio of 23.5 percent (authors' calculations based on Brian Bucks, Arthur Kennickell and Kevin Moore, 2006). Payments that are past due or have gone to collection show that some of the participants are

¹² Avery et al. (2003) discuss the many details of credit reporting in the U.S.

¹³ LMI populations frequently resort to nontraditional loan products when seeking credit. For a subset of our sample (n = 131), we additionally obtained self-reported information on nontraditional loans. Adding nontraditional debt to aggregate debt does not influence the results.

unable or unwilling to service these debt levels. Average past-due payments on active accounts are \$44 (s.d. \$204), while the average individual-level balance across all accounts that have gone to collection or were closed with balances is \$2,450 (s.d. \$6,642). Low levels of repayment carry through into FICO scores for our sample. For scored individuals, the mean FICO score was 623 (s.d. 83), which is below the U.S. average of 678.¹⁴

[Figure 2 about here]

Figure 2 shows the result for the overall credit outcome, the FICO score. Figure 2a shows the relationship between individuals' overall levels of impatience and their FICO scores. Individuals are divided into two groups as noted above: the first group is composed of those who are more impatient than the median, i.e. they are less willing to wait to receive more money. The other group is composed of those individuals who are more patient than the median. The figure shows that people who are less patient, labeled *Below Median*, have significantly lower FICO scores. Individuals who are more impatient than the median have scores of 604, on average, while people who are less impatient than the median have scores of 640 (a t-test shows that this difference is statistically significant on the 95 percent level). This relationship is not driven by income, credit constraints, or other observable characteristics.¹⁵

As Figure 2b illustrates, it does not seem to be the case that individuals who exhibit self-control problems according to our definition of exhibiting greater impatience in the present than in the future have different FICO scores than do individuals with no self-control problems (for details, see Stephan Meier and Charles D. Sprenger, 2006). Both *Time Consistent* and *Time Inconsistent* individuals have fico scores around 620. That FICO scores are unrelated to self-control problems is due largely to the weight that delinquencies and defaults carry in the calculation of FICO scores. What we are primarily interested in is the relationship between borrowing behavior itself and self-control problems. Our available credit report data allow us to examine this relationship directly.

When we look at the level of unsecured debt accumulated on revolving accounts such as credit cards, individuals with self-control problems do have significantly higher balances. Figure 3b shows that people who have *Time Inconsistent* patterns in the choice sets, i.e. patterns of self-

¹⁴ From www.experian.com, 8/4/2006.

¹⁵ In a multivariate regression analysis, we control for disposable income, number of dependents, age, gender, race and college experience (Stephan Meier and Charles D. Sprenger, 2006).

control problems, have significantly higher balances on their revolving accounts. People who show indications of self-control problems, labeled *Time Inconsistent*, have revolving balances of nearly \$2,200, on average, while people who are time consistent and therefore do not exhibit any self-control problems have balances of only around \$850 (this difference is statistically significant in a t-test on the 99 percent level). This relationship is again not driven by income, credit constraints, or other observable characteristics. Figure 3a illustrates that overall impatience has little relationship with revolving balances as individuals *Above Median* and *Below Median* impatience have roughly the same levels of revolving debt.

[Figure 3 about here]

In sum, the study summarized above shows that for this set of LMI individuals self-control is important for individual borrowing outcomes. While the general level of impatience affects how individuals service their debts and as a consequence their FICO scores, our indicator for self-control problems is strongly associated with balances on revolving accounts. As predicted by the argument above, individuals who exhibit a preference for immediate gratification have higher levels of unsecured debts on revolving accounts like credit cards. This is, to our knowledge, the first direct evidence linking measured self-control problems to objective borrowing data.

Saving Outcomes

The VITA sites in Boston also provide an interesting opportunity to investigate the influence of self-control on savings outcomes. Each year, individuals receiving tax preparation assistance are asked, on a separate survey, what percentage of their federal tax refund they intend to save. They are additionally asked how much of their previous year's refund, if they received one, they actually saved in dollar terms. Responses to these survey questions take on a range of values, from zero percent to greater than 50 percent for intended savings and from zero dollars to greater than \$1,000 for actual savings (see Panel C of Table 1 for the survey questions).¹⁶ The

¹⁶ For both intended and actual savings we take the midpoint of the indicated range as the reported value. In order to make the two values comparable in dollar terms we multiply the reported intended savings by the actual refund value.

data on savings, both intended and actual, are interesting for exploring the relationship between self-control and savings behavior.

One indication of self-control problems is that intended and actual refund savings diverge. For nearly 1,000 individuals with bank accounts who attended VITA sites in both 2005 and 2006, we know not only their prior intentions reported in 2005, but also their later savings behavior reported in 2006. Figure 4 shows the actual amount individuals saved out of their tax refunds and the amount they intended to save. The figure shows clearly that actual and intended savings out of refund differ substantially. Individuals are systematically incorrect in predicting their actual savings. They have plans to save a certain percentage of their refund and end up saving much less. On average individuals intend to save around \$430 on total tax refunds of around \$1,800. From these same refunds individuals wind up saving significantly less, only around \$295 (the difference is statistically significant in a t-test on the 99 percent level).

There are a number of explanations for this divergence in actual and intended refund savings: for example, individuals may be systematically overoptimistic about the future. Negative shocks lead to lower actual savings than originally intended. Our preferred explanation for part of the difference between intended and actual savings out of refund, however, is self-control problems or time inconsistency. Individuals make plans for the future thinking that they will be able to put aside a part of their tax refund as saving. When the refund arrives, however, self-control problems overwhelm future planning and individuals save less than they had originally intended.

To directly examine the claim that self-control problems lead to violations of savings plans, we can use our measure for self-control problems obtained for the 155 individuals noted above. We are able to obtain intended refund savings data for 65 individuals. For 29 of these individuals we observe savings intentions in both 2005 and 2006. Using both years of data, we have 94 intended savings observations. We are able to obtain reports for actual refund savings for 61 individuals. For 30 of these individuals we observe reported savings in both 2005 and 2006. Using both years of data we have 91 actual refund savings observations.¹⁷

¹⁷ The difference in the number of intended and actual refund savings observations is due to several factors. First, individuals are not required to answer survey questions. Second, individuals who did not receive a refund in the previous year are asked to skip the section on actual refund savings. Though we would like to have both intended and

The data strongly suggest that self-control problems are a leading candidate for explaining the difference between intended and actual savings out of refund. Individuals who are *Time Inconsistent*, i.e. those with apparent self-control problems, do not differ in their intended savings from those who do not exhibit time inconsistency. As illustrated in Figure 5b, both groups intend to save around \$275, and the difference (both in dollars and in percentage of total refund) is not significant. However, individuals with self-control problems save much less than individuals without self-control problems. Figure 6b shows reported actual refund savings in dollars for individuals with and without time inconsistencies labeled as *Time Inconsistent* and *Time Consistent* respectively. Individuals who do not exhibit self-control problems report saving around \$297, close to overall intentions. Time-inconsistent individuals report saving only around \$125, significantly less than their time-consistent counterparts (the difference is statistically significant in a t-test on the 95 percent level), and far from the overall intended level. Individuals with self-control problems save more than 55 percent less than those without self-control problems even though both groups have similar refund savings intentions. A multivariate regression analysis shows that the difference in actual savings between the two groups is not driven by refund size, income, credit constraints, banking status, or other observable characteristics.¹⁸

These results support the claim that self-control problems lead individuals to violate their savings plans. More research, however, is needed for a conclusive explanation. Ultimately we would like to examine the differences among individuals with regard to their intentions to save their refunds and actual later savings behavior, similar to what is presented in Figure 4. We do not, at present, have enough data to correlate these individual level differences to our measures of self-control.

Our study on the relationships between self-control problems, saving and borrowing has proved informative. We can begin to draw stronger links between self-control and financial outcomes. These links are a step toward constructing policy efforts aimed at addressing issues of self-control and improving financial outcomes both for LMI individuals and for the broader population.

actual refund savings for the *same* individual for the *same* refund, we only observe this for a relatively few number of people in our sample of 155 individuals.

¹⁸ Results can be obtained from the authors upon request.

4. Behavioral Policy Prescriptions for Asset Building

Any policy intervention to help individuals who have self-control problems must avoid restricting the choices of those who do not. In what follows, we discuss interventions that are designed to strike that balance. Using the term “libertarian paternalism” or “asymmetrical paternalism,” various authors have discussed the advantages of such interventions (Colin Camerer et al., 2003, Cass R. Sunstein and Richard H. Thaler, 2003). Our policy prescriptions follow closely this tradition, founded on a precept of first doing no harm. It is left as an open question as to whether the government or private enterprises will provide these interventions.

As we showed above, one major deviation from rational decision making is particularly important for asset building: self-control problems. The proposed policy prescriptions below describe tangible ways in which interventions can help individuals: (1) lower borrowing by overcoming individual self-control problems and (2) increase savings by mitigating self-control problems.

Policy Prescriptions for Borrowing-Directed Interventions

There are a number of ways to lower suboptimal borrowing using techniques from behavioral economics. We discuss three possible types of interventions to decrease borrowing, particularly for low-income individuals. Our discussion identifies both positive and negative attributes of each potential policy intervention, endorsing some and not others.

1. Commitment Devices. The most important implication of the research on self-control problems and asset building (both borrowing and saving) is the functioning of commitment devices. As discussed, individuals may want to borrow less and to save more, but the temptation to deviate overwhelms best intentions when the decision arrives. This tendency, however, means that sophisticated individuals should be willing to commit to sticking to their intentions even if it involves costs to them.

The primary commitment device by which individuals avoid borrowing too much is the debit card. Debit cards force individuals not to spend more than they have in their checking account and also to have daily spending limits. These two mechanisms provide spending rules of thumb both daily and across pay periods. Another commitment device is the practice of self-

imposed credit limits. Evidence suggests that individuals have a tendency to increase their borrowing in response to an increase in credit limits (David Gross and Nicholas Souleles, 2002). Motivated by theories of buffer stocks, individuals should be able to effectively reduce their borrowing by reducing their credit limit or by refusing offers of increased limits. A last ditch commitment device is the submersion of credit products in cool water and the subsequent freezing of said credit product in a freezer's ice tray.

Commitment devices provide valuable asset-building opportunities for individuals who take them up. However, take-up depends critically on the level of sophistication. Only individuals cognizant of their self-control problems will be willing to take up a commitment device. Unsophisticated individuals will not respond to any policy intervention promoting commitment devices. It is for this reason that commitment devices alone are insufficient for widespread asset-building policy interventions.

2. *Borrow Less Tomorrow* (see, Cass R. Sunstein, 2007). Thaler and Benartzi (2004) show the great effect of this sort of intervention with respect to savings. With their product Save More Tomorrow, individuals apportion fractions of their future wage increases to savings. Save More Tomorrow (see below) is predicated on individual willingness to make costly decisions for the future, provided it costs nothing today. The same mechanism guiding increased future saving can also guide lower future borrowing. Given the evidence that individuals maintain significant levels of credit card debt while saving in illiquid assets such as retirement accounts (see, David Laibson, Andrea Repetto and Jeremy Tobacman, 2003), it is best for individuals to pay down high interest debt *before* they save more in retirement funds. Individuals could commit portions of future raises to debt reduction on existing credit cards or other credit lines. Evidence from our tax data shows that more than 20 percent of refund recipients want to use their refund for debt reduction of some sort. Providing a mechanism by which individuals could commit today to paying down debt tomorrow (when the refund or other payment arrives) could prove beneficial.

3. *Cooling-off rules in consumer law*. Individuals frequently make consumption decisions in the heat of the moment, a fact captured in the self-control problems previously discussed. Additionally, the buffering between purchase and payment created by credit cards make credit purchases particularly susceptible to self-control problems (Oren Bar-Gill, 2004, Drazen Prelec and George Loewenstein, 1998). As discussed in Camerer et al. (2003), one solution to this

problem is a cooling-off period. The suggestion is that cooling-off periods of even several days permit individuals to remove themselves from the heat of the moment, letting them evaluate a potential purchase on merit alone.

Cooling-off rules are remarkably difficult to implement. One person's impulse buy is another person's well-thought-out purchase. Requiring a ten-day wait on television purchases, for example, infringes on the television-buying freedom of many customers. There are, however, techniques by which we can simulate cooling off without violating personal freedom of consumption. The goal of cooling off is to make the actual cost of purchasing more salient, forcing individuals to fully evaluate the purchase. One way to introduce saliency into credit purchasing is to combine credit and debit payments. Standard credit arrangements require down payments, so why not everyday credit card purchases? If 10 percent of a purchase's value is paid with debit and the remainder with credit, individuals may more closely evaluate the payment. Card products combining debit and credit functions could be a way to simulate cooling off.

Policy Prescriptions for Savings-Directed Interventions

As with methods to decrease borrowing, there are a number of ways to increase savings. Below we integrate lessons learned from self-control problems to discuss four possible techniques to increase savings, particularly for low-income individuals. Our discussion identifies both positive and negative attributes of each potential policy intervention, endorsing some and not others.

1. Commitment devices. The most famous savings commitment devices are Christmas Clubs: zero interest savings vehicles with costly withdrawal. For individuals who possess self-control Christmas clubs are simply restrictive savings products. For individuals with self-control problems, however, the clubs act as a mechanism through which people can assure themselves of sufficient funds for holiday purchases. Building upon this base, Ashraf et al. (2006) implement a field experiment offering a savings commitment device to low-income individuals in the Philippines. Time inconsistent individuals seem willing to restrict their access to their own savings and, in fact, save more because of this restriction. Other commitment devices include retirement funds with penalized withdrawal.

Although beneficial, all of these commitment devices are subject to the caveat that they only work for those who know they have self-control problems. Individuals who are not aware of their tendency to save too little might not take up savings commitment devices such as Christmas clubs.

2. *Front-loaded saving products.* Along the lines of commitment devices are front-loaded savings devices. Saving is a difficult process involving pain in the present and payoffs in the future. One way to make the decision easier and more attractive to individuals with self-control problems is to separate the decision from the costs. With Thaler and Benartzi's (2004) product Save More Tomorrow, individuals commit portions of their future wage increases to savings. Interestingly, both individuals who recognize their self-control problem and individuals who do not should be willing to use Save More Tomorrow. The decision is pain free because the individual does not have to give up any current consumption and the future cost is undervalued. Front-loaded saving products should be made much more widespread. Interventions should be made to front-load the savings of not only wage increases but also things like the first paycheck for new workers, tax refunds, and reimbursements from tax escrow accounts on mortgage payments.

3. *Defaults.* Unlike optional programs for commitment of funds, the question of defaults addresses not only commitment but also issues of procrastination. As noted above, individuals with self-control problems also have a tendency to procrastinate taking actions that may incur immediate costs but have long-term benefits. Individuals, for example, procrastinate heavily in signing up for their employee thrift plans, leaving significant amounts of employer matching money on the table. In effect, the default contribution rate is zero. That is, individuals must opt in to contributing. What if the default were a contribution rate of 6 percent, forcing individuals to opt out of contributing if they so wish? Following this line, Choi et al.(2003) find tremendous effects of positive contribution rates on plan participation and total plan savings when the default requires opting out. If the default is to contribute, individuals contribute at the default rate and continue to do so for long periods of time. It is important to note that such a change in policy does not change the options of employees as they can choose easily to contribute different amounts or to not contribute at all. Defaults, as a mechanism to promote savings, are very promising, but it is too early to say that individuals do not end up spending money from other savings if a default pushes them to make higher contributions.

One very attractive policy prescription is the default commitment of tax refunds to retirement accounts for LMI individuals qualifying for the Federal Savers Credit. The Savers Credit matches up to 50 percent of retirement savings (maximum, \$1,000 for individuals with less than \$50,000 in income). By not committing funds to retirement accounts during the year, low-income individuals leave tax credit money on the table. Take-up of the Savers Credit is remarkably low. Examining our tax data, we find that 85 percent of our sample would qualify for the Federal Savers Credit. Of the more than 8,500 qualifiers, only around 7 percent take advantage of government matching, and most of those do not use the full extent of the credit. The average amount of forgone credit for qualifiers in our sample is \$988 of the \$1,000 maximum. If some of a given year's tax refund could be apportioned to retirement savings, the next year's tax refund would be higher (or tax liability lower) by the matched amount.¹⁹ Defaulting a fixed percent contribution is particularly attractive in this case because the idea is not initially clear. That is, contributing to an employer savings plan is a relatively obvious idea. Contributing a percentage of this year's tax refund to retirement savings in order to get a higher refund next year and have higher retirement savings in the long run is not an obvious idea. Even with explicit, immediate matching of refund retirement savings of the same magnitude as the Savers Credit, Duflo et al. (2006) do not find extremely high levels of participation.²⁰ Additionally, there exist certain complications to navigating the tax code and setting up retirement accounts. Setting the default to a given percentage of the tax refund and having the mechanisms in place for account setup could generate retirement savings for many LMI people.

4. Promote bank accounts and direct deposit. More than 20 million Americans do not have a traditional banking relationship. Formal saving is positively correlated with this critical asset-building behavior. Individuals who save in a savings account are more likely to have other types of financial accounts such as certificates of deposit and insurance contracts. They are more likely to own homes and cars, and they are also more likely to use formal sources of credit (Ellen Seidman et al., 2005). Individuals without bank accounts (the "unbanked"), on the other hand, are forced to use unconventional savings methods if they wish to save at all. These unconventional savings methods, such as keeping cash or jewelry at home, offer no return and leave individuals

¹⁹ Of course, if one could develop short-term loan products aimed at this space, the retirement savings contribution could be done in advance, allowing individuals to increase their current tax year refund and save for the future.

²⁰ However, the participation for individuals with matching is higher than for those without matching.

more susceptible to theft than formal saving channels (Anne Stuhldreher and Jennifer Tescher, 2005).

Interestingly, unbanked individuals themselves suggest that a bank account is important for facilitating saving in general (Ellen Seidman et al., 2005). If saving is the right thing to do, individuals may be conscious of the positive effects of savings accounts but be unwilling either through procrastination or intimidation to actually get accounts. Behavioral literature also suggests that direct deposit may help improve savings outcomes as funds are deposited into accounts without the temptation of celebration spending (Marianne Bertrand, Sendhil Mullainathan and Eldar Shafir, 2004, 2006). Because the provision of bank accounts and direct deposit of paychecks should increase total saving, we strongly support interventions focused on banking the unbanked.²¹

5. Future Research and Conclusion

The decisions to borrow and to save are determined by a number of factors. This paper discusses the importance of a single behavioral factor, self-control problems, for the understanding of borrowing and savings decisions. The paper shows that for a sample of LMI individuals, self-control problems can explain borrowing and savings outcomes. Individuals who appear to have more self-control problems, according to our measure, borrow more and save less.

Though our study focused on LMI individuals, our intention is not to suggest that low-income individuals have more self-control problems than their higher-income counterparts. Self-control problems are part of being human, likely embedded into the structure of our brains. While many people have self-control problems, LMI individuals are more vulnerable to their adverse consequences. First, small financial mistakes for the poor have more severe effects than the same mistakes made by wealthier individuals because the poor have fewer resources available for repairing such errors. Second, wealthier individuals are able to compensate for their self-control problems by purchasing commitment devices which help them stick to their financial plans - for example, bank accounts, direct deposit, and automatic retirement savings withdrawals..

²¹ Being banked might increase access to credit and eventually affect borrowing rates.

Our seven policy prescriptions target suboptimal financial decisions, overborrowing and undersaving, as they relate to self-control problems. Among the most promising are products to help people make decisions today that incur no present costs. Additionally, defaults and simulated cooling-off mechanisms could be quite beneficial. It is important to know, however, that the decision-making processes concerned are not yet fully understood. There is still a significant amount of research to be done before we can be confident that interventions based upon the recognition of self-control problems will be successful.

Much of our thinking on the relationship between borrowing, saving, and self-control is based on our existing study of 155 low-income individuals. That is, 155 individuals likely selecting on their desire to receive tax assistance, report savings behavior, and understand their own credit report. These individuals may not be those needing the most help. An expanded study of LMI individuals along with a more representative sample would add value and weight to our ideas.

This paper presented preliminary results on and policy implications for one factor leading to overborrowing and undersaving, self-control problems. We believe that our first empirical tests will have a significant impact on the understanding of both undersaving and overborrowing. There is a tremendous need for future research to better understand the impact of behavioral factors on financial decisions.

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Figure 1:

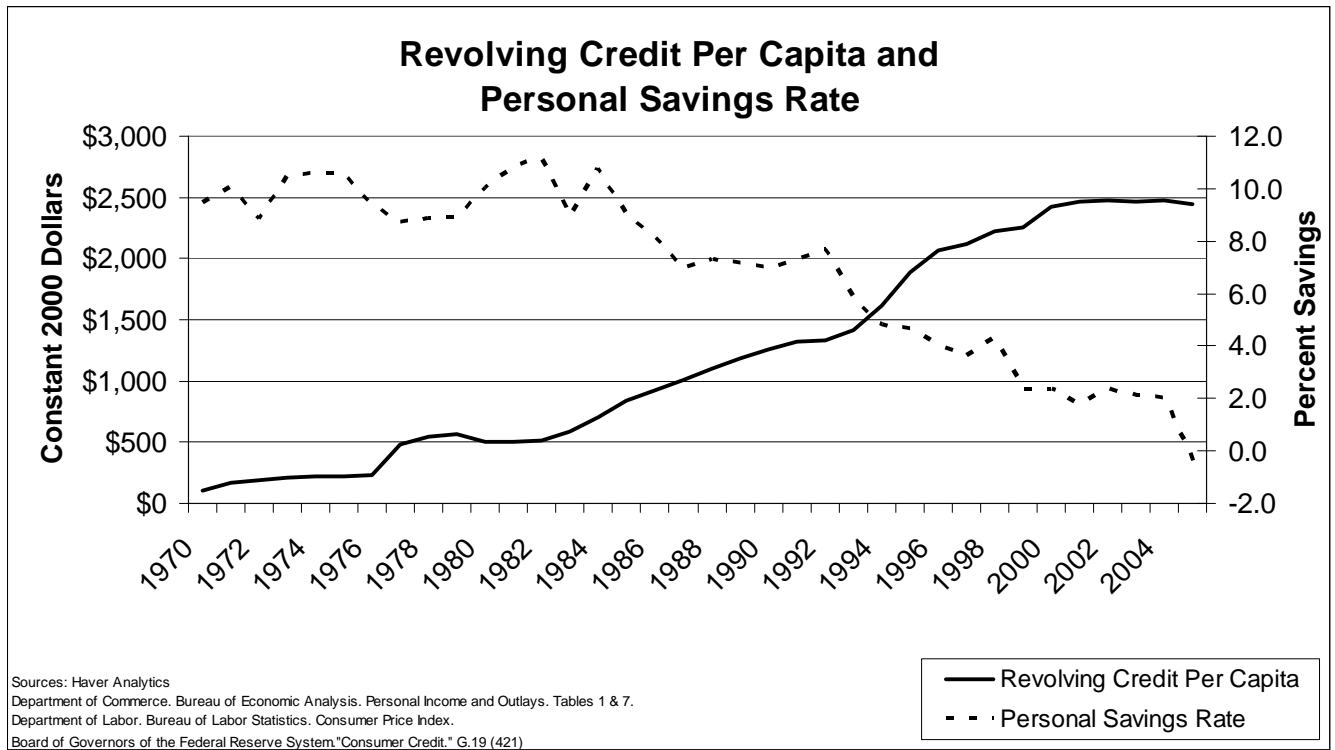


Table 1:

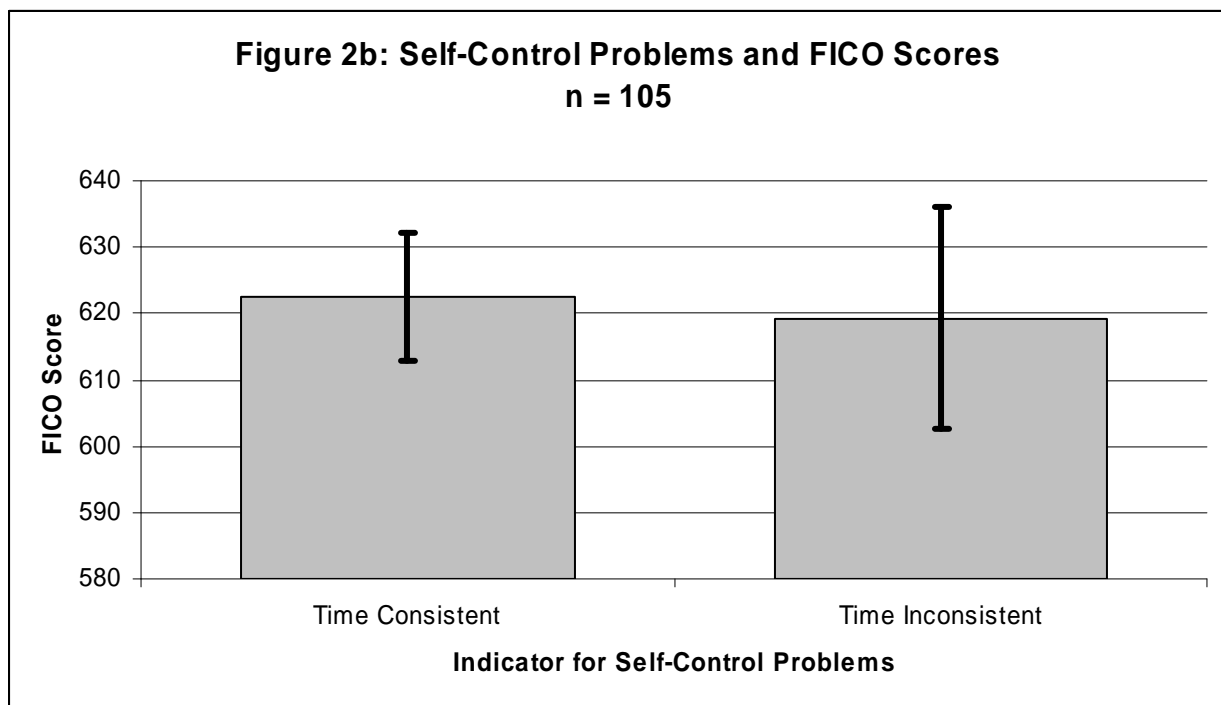
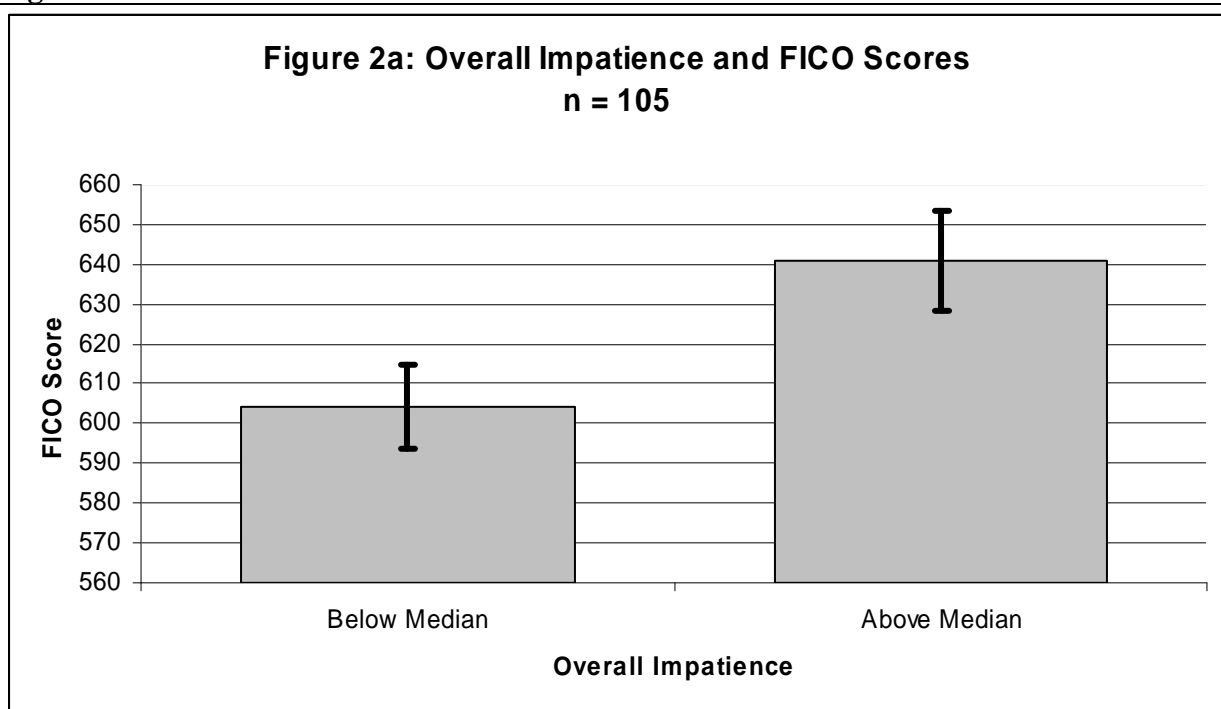
	Mean	Standard Deviation	N
<i>Panel A: Socio-Demographics</i>			
Disposable Income	\$17,384.96	\$13,105.93	155
Number of dependents	0.47	0.82	155
Age	32.26	11.58	155
Male (= 1)	0.33	0.47	155
Black (= 1)	0.86	0.35	155
College experience (= 1)	0.44	0.5	155
Self-control problems proxy (=1)	0.22	0.42	138
Panel A Notes: Statistics calculated from all 155 valid experiment participants, regardless of time preferences with the exception of self-control proxy calculated for individuals with valid time preferences.			
<i>Panel B: Borrowing Behavior</i>			
FICO Score	622.86	83.13	120
Balance on All Active Accounts	\$8,557.54	\$20,697.01	155
Balance on Revolving Accounts	\$1,209.90	\$2,437.26	155
Past Due Balances on All Accounts	\$43.51	\$203.62	155
Collection and Closed Account Balances	\$2,450.24	\$6,642.30	155
Revolving Credit Limit	\$5,615.36	\$12,896.94	155
Panel B Notes: Statistics calculated from all 155 valid experiment participants, regardless of time preferences.			
<i>Panel C: Savings Behavior</i>			
Intended Savings (Full Sample, 2005)*	\$428.50	\$647.55	956
Actual Savings (Full Sample, 2006)**	\$294.91	\$360.48	956
Intended Savings (Study Sample, 2005 & 2006)*	\$278.60	\$455.96	94
Actual Savings (Study Sample, 2005 & 2006)**	\$260.99	\$345.83	91

Panel C Notes: Full sample statistics refer to the same refund. Intentions were recorded in 2005 while actual savings were recorded in 2006. Full sample statistics calculated for 956 returning individuals with bank accounts in either 2005 or 2006. Study sample statistics calculated for individuals with valid time preferences. Years are pooled for study sample participants such that intended and actual savings do not refer to the same refund.

* Question: How much of this year's refund will you put in a savings account? 0, <10%, 10-25%, 35-50%, >50%.

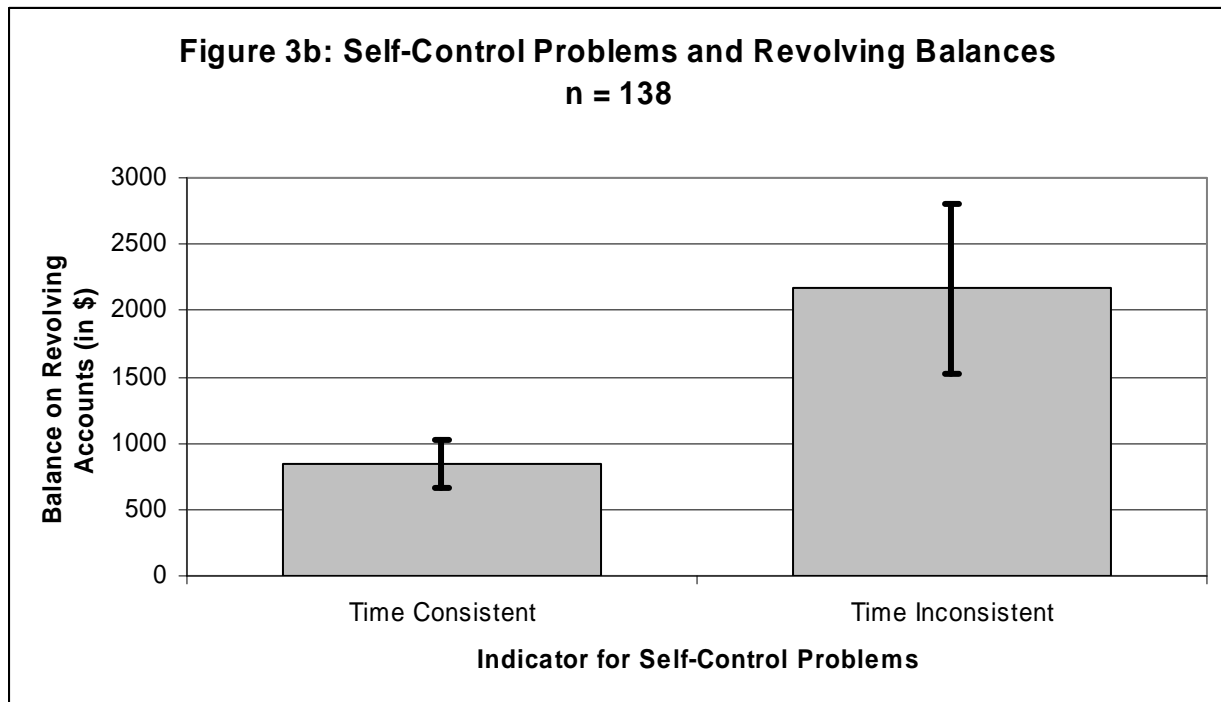
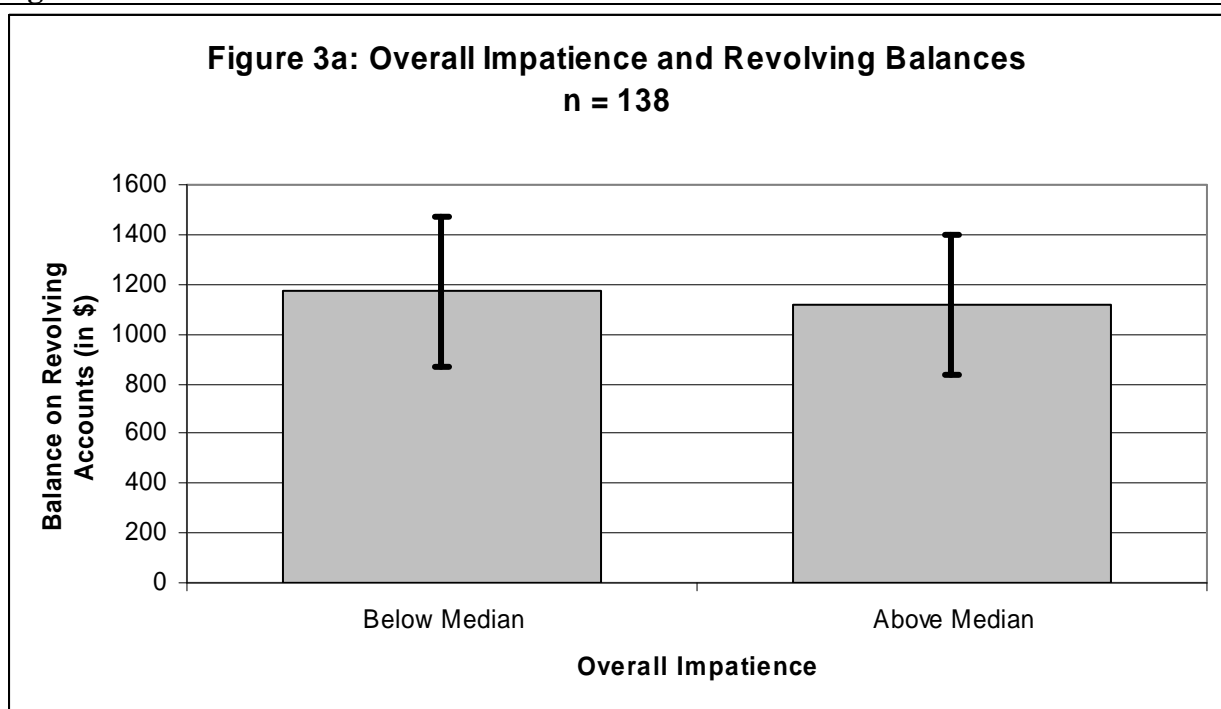
** Question: How Much of last year's refund did you put into savings? 0, 0-\$100, \$100-\$500, \$500-\$1,000, >\$1,000.

Figure 2:



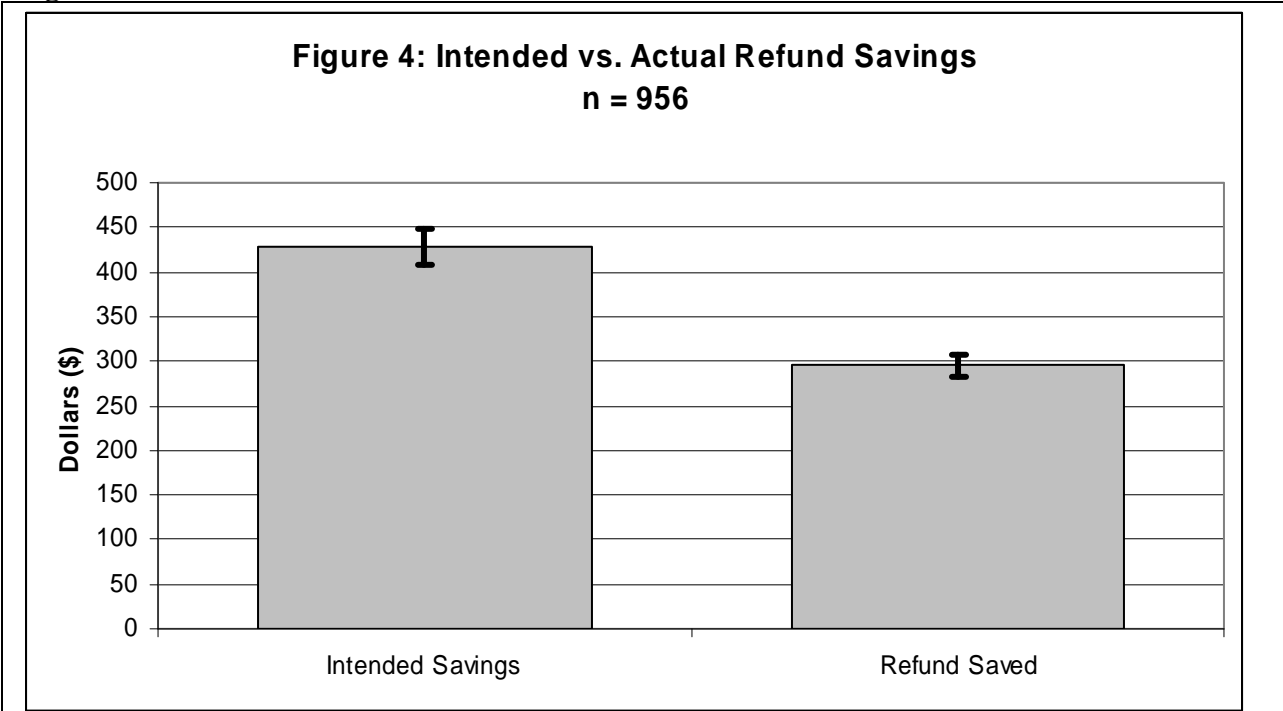
Notes: error bars of standard errors of the means

Figure 3:



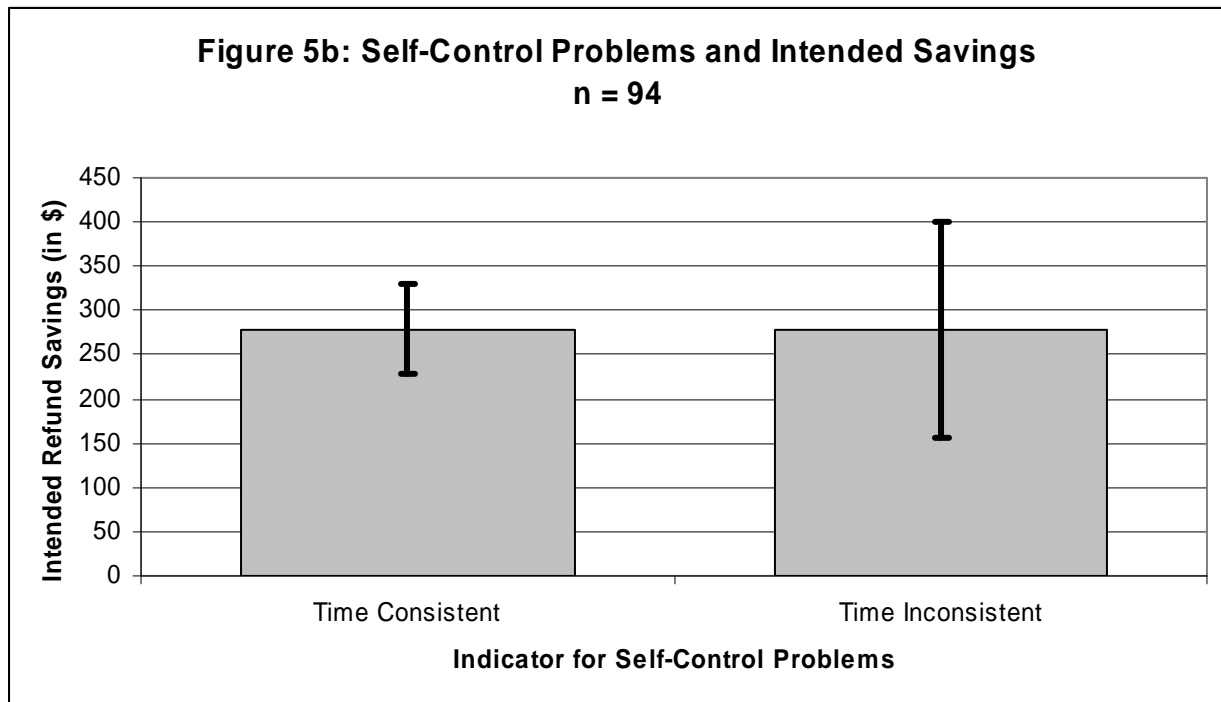
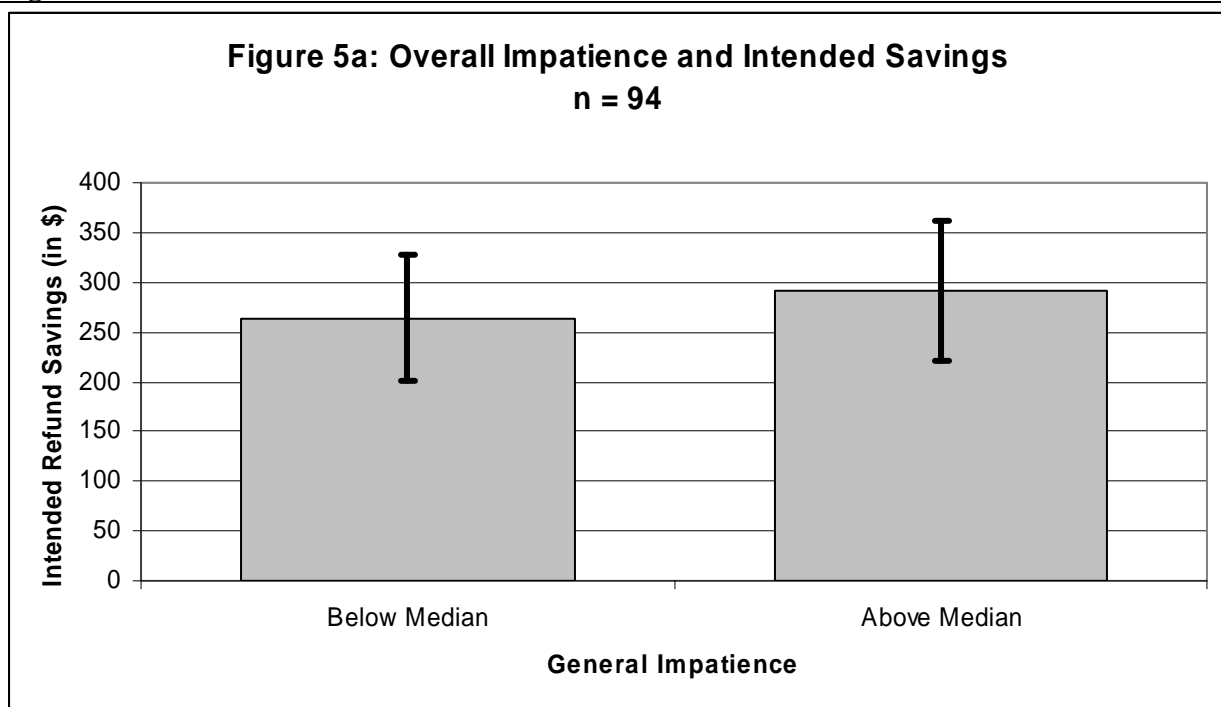
Notes: error bars of standard errors of the means

Figure 4:



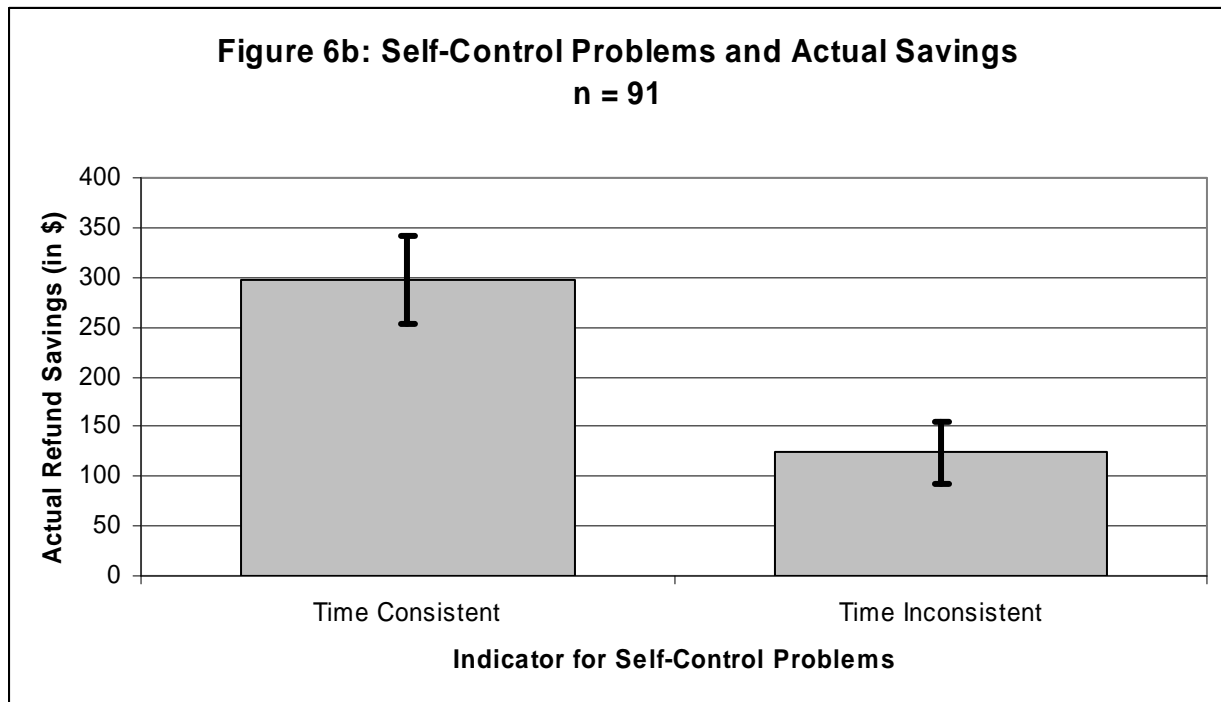
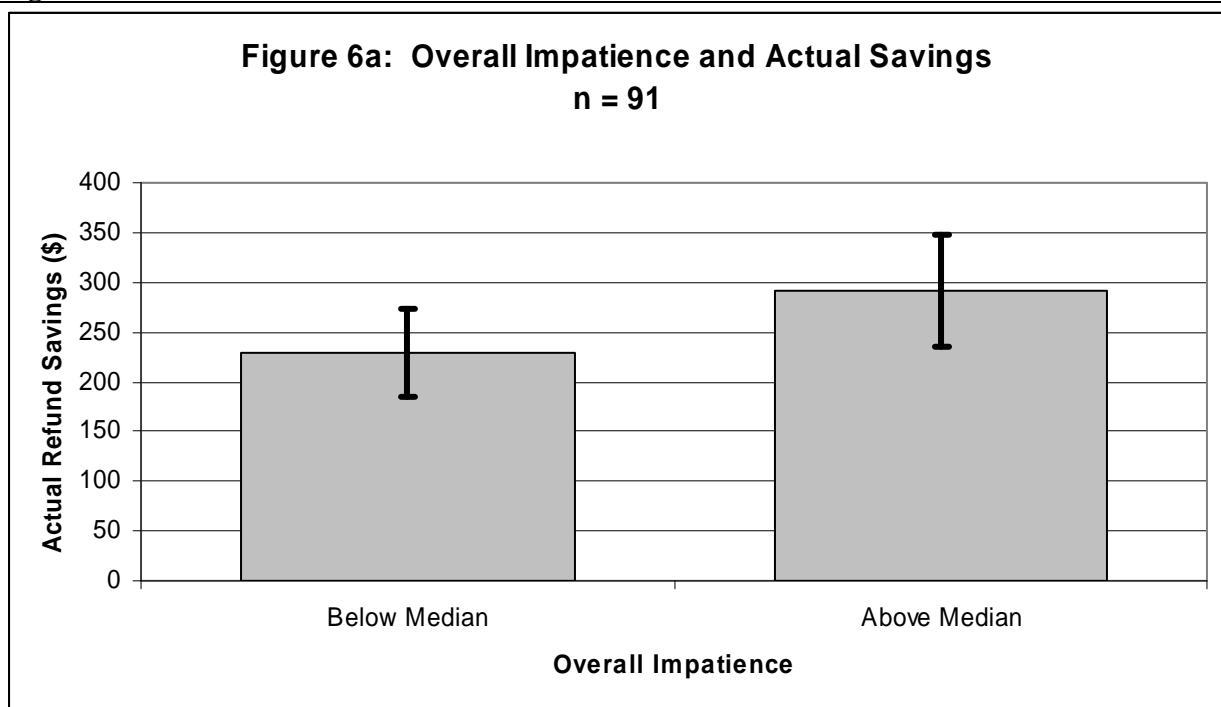
Notes: error bars of standard errors of the means

Figure 5:



Notes: error bars of standard errors of the means

Figure 6:



Notes: error bars of standard errors of the means