

WORKING PAPER

Some Consequences of Having Too Little

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Abstract

The consequences of resource scarcity are often discussed in terms of specific contexts, such as famine or poverty. As a result, the literature offers an understanding of these *contexts* rather than of scarcity itself. In this work, we examine the consequences of scarcity when it is disentangled from these contexts. Across a series of experiments, we show how scarcity leads people to borrow resources excessively and to their own detriment. We also suggest that scarcity changes how people allocate attention and focus. More broadly, this work suggests that we should reconsider whether a variety of behaviors stem from context-specific factors or, perhaps, simply from having less.

Some Consequences of Having Too Little

Poverty does not accommodate simple theories. It seems to have its own ecosystem, where behavior stems from a variety of interacting factors. There are few straightforward lessons on even the most common behaviors. Consider, for instance, the widespread use of payday loans. These loans are costly, they are disproportionately taken up by the poor, and they often exacerbate financial hardship instead of alleviating it (Bair 2005; Chin, 2004). So why do the poor borrow at such a high cost?

Answers to this question (and many like it) have examined the relationships between various possible causes, such as personality differences (Lewis, 1968), demographic influences (Spilerman & Elesh, 1971), differential access to financial services (Beck, Demirgüç-Kunt, & Levine, 2007), geographic influences (Allard, 2004), and various other factors (e.g., Bradshaw, 2007). In a sense, the literature *assumes* an ecosystem of poverty, where it is difficult to disentangle one cause from another and where answers are highly context-dependent. Our approach to answering this question differs, and it begins on more familiar ground, seemingly removed from poverty.

Many of you probably recognize the person we are about to describe. She is an academic. And naturally, she is constantly running behind. She has more demands on her time than hours in the day. Deadlines have lost meaning. She takes extensions for the most urgent deadlines, delaying work towards future deadlines, for which she must eventually also take extensions. Perhaps she is so pressed for time that she pleads with a colleague to guest lecture in her class, trading two lectures next semester in return (or three, if her colleague is shrewd).

Whether you sit across from this person in meetings or see this person staring back at you in the mirror, her life is uncomfortably familiar. Yet in these mundanities of a busy life, there

are striking parallels to a payday loan recipient. Where one person is short on time, the other is short on money. Where one faces deadlines and extensions, the other focuses on expenses and loans. And where one person consults a shrewd colleague, the other visits a loan shark.

It is fair to wonder whether these parallels gloss over the unique richness of each situation. There are surely many differences between the busy and the poor, and perhaps these differences merely produce behaviors that seem similar. But in this paper, we will suggest that these lives are bound not by mere analogy, but in fact by a shared psychology.

Ultimately, both the busy and the poor face resource scarcity. Below, we offer evidence that this simple fact is sufficient to elicit behaviors which have previously been thought to stem from complex, context-dependent factors. Specifically, our experiments disentangle scarcity from the ecosystem of the poor or the busy or any specific context. And these experiments highlight how scarcity, when distilled, leads people to borrow resources excessively and to their own detriment.

Experiment 1

This first experiment directly tests whether scarcity leads people to borrow excessively. Participants were allotted time budgets of different sizes for multiple rounds of a game. Some participants could not borrow time across rounds, while others could borrow time cheaply (i.e., without interest) or more expensively (i.e., with interest). The flexibility to borrow should give participants the ability to spend more time on rounds that seem profitable. However, we expected that participants facing scarcity would over-borrow, meaning that they would perform worse with the ability to borrow than without.

Method

Participants. One hundred forty-three participants ($M_{\text{age}} = 27.6$; 99 females, 44 males) were recruited from the Princeton University community. Participants could win \$50 gift certificates based on performance.

Procedure. Participants played *Family Feud*, where they tried to guess the five most popular responses to survey questions such as *Name things you take on a picnic*, which previously had been posed to a panel of 100 people. Participants earned one point per correct response (a maximum of five points per round). These points were converted into lottery entries for the gift certificates; chances of winning increased with points earned.

There were six between-subjects conditions that resulted from crossing two factors. The first factor was time scarcity. Participants had an overall time-budget, broken into budgets for each round. “Time Poor” participants had 300 seconds overall and 15 seconds per round. “Time Rich” participants had with 1000 seconds overall and 50 seconds per round. All participants could “bank” time by exiting a round early. The option to bank time became available after 6 seconds and 20 seconds for Time Poor and Time Rich participants, respectively. These delays were used to hold constant the maximum number of rounds possible. Banking time meant that time left over in the current round remained in the overall time budget.

The second factor was the availability of borrowing. Some participants could not borrow time. If time expired for a round, they moved to the next round. Some participants could borrow time at a 1:1 rate (i.e., “without interest”); each second spent on a round beyond the initial budget subtracted one second from their overall budget. Some participants could borrow at a 1:2 rate (i.e., “with interest”); each borrowed second subtracted two seconds from the overall budget. Borrowing began as soon as the initial budget for a round was exhausted.

Participants were always aware of their score, the time remaining for the current round, and the overall time. If participants began to borrow time, they saw a large warning which said “You are borrowing time!” Participants played until their overall time budget expired. Each round consisted of a new question, and participants saw the answers for previous rounds before new rounds began.

Results and discussion. To analyze participants’ borrowing behavior, we created a metric as follows. Each second spent beyond the initial budget for a round counted as one borrowed second, regardless of the borrowing rate. Borrowed seconds were summed across the entire game. To compare time borrowed across scarcity conditions, we conducted our analyses on the time borrowed as a proportion of the initial time budget (out of 300 seconds for the Time Poor or 1000 seconds for the Time Rich). A 2 (Scarcity) x 2 (Borrowing) ANOVA revealed a significant main effect of scarcity, $F(1, 102) = 22.39, p < .001, \eta_p^2 = .19$, where Time Poor participants borrowed a greater proportion of their budget ($M = .22, SD = .15$) than did Time Rich participants ($M = .08, SD = .15$).

Our analysis of participants’ performance was based on points earned, and we tested the relative impact of borrowing across conditions of scarcity and abundance. Because Time Rich participants earned many more points than Time Poor participants, it would be misleading to compare raw points earned. Instead, we separately standardized points earned for the Poor and for the Rich, basing our analysis on these z-scores. This is also true for Experiments 2 and 3.

A 2 (Scarcity) x 3 (Borrowing) ANOVA revealed a significant interaction on how many points participants earned, $F(1, 137) = 6.54, p = .002, \eta_p^2 = .09$ (Figure 1). Simple-effects indicated that Time Rich participants performed similarly regardless of whether they could not borrow ($M = .06, SD = 1.10$), they could borrow without interest ($M = -.31, SD = .88$), or with

interest ($M = .25$, $SD = .98$), $F(1, 137) = 2.14$, $p = .15$. However, the borrowing condition had a significant effect on performance for the Time Poor, $F(1, 137) = 7.49$, $p < .001$, $\eta_p^2 = .10$. Of Time Poor participants, those who could not borrow earned the most points ($M = .60$, $SD = 1.14$), those who could borrow without interest earned slightly less ($M = .08$, $SD = .67$), and those who could borrow with interest earned the least ($M = -.48$, $SD = .94$).

These results demonstrate how scarcity, even when created in the lab, can produce over-borrowing. It could be argued, however, that the consequences of borrowing were hardly salient in this experiment. Participants who borrowed excessively were not given any signals that their borrowing undermined their ability to earn points in later rounds. In Experiment 2, we therefore test whether the Time Poor would over-borrow even when these signals are present.

Experiment 2

Participants played a version of the game above, but where excessive borrowing would essentially place them in debt. That is, borrowing too much time for a round depleted the time budgets for future rounds. This presented participants with a choice. They could bank time to “get out of debt” or continue to borrow time, deepening their debt.

Method

Participants. One hundred eighteen participants ($M_{\text{age}} = 31.3$; 79 females, 39 males) were recruited from Amazon.com’s Mechanical Turk (MTurk) service and could win \$25 gift certificates.

Procedure. The procedure was similar to that of Experiment 1, with a few notable differences. Participants completed a maximum of 20 rounds. Any time remaining at the end of 20 rounds went unused. As before, Time Poor participants had 300 seconds overall, and Time Rich participants had 1000 seconds overall. There were two borrowing conditions: one group

could not borrow; the other group could borrow at a rate of 1:2. On each round, borrowers were budgeted the average time they had remaining (i.e., total remaining time divided by remaining number of rounds), up to the full 15 seconds for the Time Poor and 50 seconds for the Time Rich. For example, suppose a Time Rich participant had 315 seconds and 9 rounds remaining. That would allow a budget of 35 seconds ($315/9$) for the next round. Imagine the participant used 55 seconds instead – the allotted 35 plus 20 borrowed. That would incur a total cost of 75 (the 55 used plus an interest payment of 20), leaving the participant with a total of 240 with 8 rounds remaining, and an allotment of 30 at the start of the next round.

Results and discussion. To analyze the accumulation of debt for each participant, we first computed the budget size for each round as a proportion of the default budget (i.e., dividing by 15 for the Time Poor and by 50 for the Time Rich). For each participant, we then regressed these proportional budgets on the round numbers. Our analysis was based on the slope of these regression lines for each participant. Because assumptions of normality were violated, the analysis used nonparametric statistics. Time Poor participants accumulated significantly more debt ($M_{\text{slope}} = -.13$, $SD = .18$) than did Time Rich participants ($M_{\text{slope}} = -.01$, $SD = .01$), Mann-Whitney test, $z = 5.46$, $p < .001$. Figure 2 shows the accumulation of debt across participants.

A 2 (Scarcity) x 2 (Borrowing) ANOVA revealed a significant interaction on performance, $F(1, 114) = 12.81$, $p < .001$, $\eta_p^2 = .10$. Simple-effects analyses showed that Time Rich participants performed similarly when they could not borrow ($M = -.09$, $SD = .81$) and when they could borrow ($M = .11$, $SD = 1.20$), $F < 1$. However, Time Poor participants earned more points when they could not borrow ($M = .54$, $SD = .77$) than when they could ($M = -.49$, $SD = .94$), $F(1, 114) = 18.53$, $p < .001$, $\eta_p^2 = .14$.

These experiments strongly suggest that scarcity itself leads to over-borrowing. But it is possible that time pressure simply made it difficult to consider future rounds. Furthermore, time was spent and borrowed passively and continuously. Participants could not contemplate for very long whether they wanted to borrow or how much they wanted to borrow. In Experiments 3, we therefore replicate scarcity-induced over-borrowing with a different resource.

Experiment 3

Method

Participants. Seventy-six participants ($M_{\text{age}} = 32.7$; 50 females, 26 males) were recruited from MTurk and could win \$5 gift certificates.

Procedure. The structure of this experiment closely mirrors that of Experiment 1, but with a different game. Participants completed several rounds of a memory game. Each round began with the sequential presentation of two frames, each containing four pictures. Participants studied each frame for five seconds. During the test phase, participants were shown a probe picture and asked which three pictures shared the probe's frame. Participants were shown a grid of 21 pictures containing the three answers and 18 decoys. Participants indicated all of their guesses per round before receiving feedback. Participants earned one point per correct guess, with a maximum of three points per round.

Participants had budgets of guesses. Poor participants had 30 guesses overall (two per round) and Rich participants had 90 guesses overall (six per round). As in Experiment 1, participants could bank their guesses by exiting a round early. Poor participants could exit a round after making at least one guess; Rich participants, after three guesses. When participants exited a round, they were shown the answers and told how many points they earned. Participants

were either assigned to a condition where they could not borrow or where they could borrow with interest (again, at a 1:2 rate).

Results and discussion. Poor participants borrowed a significantly greater proportion of their budget ($M = .21$, $SD = .09$) than did Rich participants ($M = .01$, $SD = .02$), $F(1, 38) = 92.56$, $p < .001$, $\eta_p^2 = .71$. More importantly, A 2 (Scarcity) x 2 (Borrowing) ANOVA revealed a significant interaction on points earned, $F(1, 72) = 4.08$, $p < .05$, $\eta_p^2 = .05$. Rich participants had similar earnings across the No Borrowing ($M = -.10$, $SD = 1.27$) and Borrowing ($M = .07$, $SD = .78$) conditions, $F < 1$. However, Poor participants earned more points in the No Borrowing condition ($M = .36$, $SD = .90$) than in the Borrowing condition ($M = -.38$, $SD = .97$), $F(1, 72) = 6.69$, $p = .01$, $\eta_p^2 = .09$.

These experiments are far removed from the complexities of poverty or even of a busy life. Yet that is precisely where their power lies. They give a glimpse into how scarcity, when distilled across different resources, has similar and important consequences. There is certainly value in studying the uniqueness of being busy (e.g., Kaufman-Scarborough & Lindquist, 2003) or poor. But these data suggest that there is also quite a bit to learn from focusing on how resource scarcity makes these situations similar.

The results above show that scarcity can make people borrow excessively, but they do not explain why this is so. What are the features of scarcity that elicit these results? We suggest that there are two important consequences of scarcity. The first is environmental: scarcity leaves less room for error. A \$20 budgeting error is far more costly when one's overall budget is \$100 instead of \$10,000. More importantly, the second consequence is psychological. We suggest that the psychology of scarcity is characterized by *constraint focus*, or the tendency to shift attention towards a limiting resource. In focusing too greatly on a particular constraint, we

inevitably neglect others. To cover an overdue phone bill or the cost of groceries, we might mistakenly use money needed for rent. Or we may borrow from the future to alleviate today's constraint.

Perhaps the experiments above speak more to the environmental consequences of scarcity than the psychological consequences. For instance, it is possible that the rich and the poor borrowed more than they should have, but that poor participants' mistakes were compounded by the severity of having fewer resources. The question therefore remains whether scarcity actually leads people to adopt a constraint focus. Furthermore, the above experiments have all been limited to intertemporal decisions, where the scarcity in the present moment is more salient than scarcity in the future. In the final experiment, we test for evidence of constraint focus and also move beyond the intertemporal paradigms used thus far.

Experiment 4

Participants played a game where each round consisted of two simultaneous memory tests. These memory tests differed slightly from those used in Experiment 3, but scarcity again depended on the number of guesses. Scarcity was manipulated within-subjects. On some rounds, scarcity was symmetric: participants were given one guess on each memory test. On other rounds, scarcity was asymmetric: participants were given one guess on one test and 3 guesses on the other test. We expected participants to overly focus on the test where they perceived scarcity and to neglect the test where they perceived abundance. This constraint focus would lead participants to perform worse on asymmetric rounds even though those rounds were objectively easier.

Method

Participants. Thirty-four participants ($M_{\text{age}} = 31.4$; 18 females, 16 males) were recruited from MTurk and could win \$10 gift certificate.

Method. Participants completed ten rounds of a memory game. On each round, participants were given fifteen seconds to study two simultaneously presented grids which contained six pictures each. The grids were then masked, and participants guessed the location of an image in each grid (e.g., a truck on the left, a bear on the right).

Half of the rounds were symmetric: participants had one guess per grid during the memory test. Half of the rounds were asymmetric: participants had one guess for one of the grids and three guesses for the other. For the one-guess grids, finding the target earned 20 points. For the three-guess grids, finding the target on the first, second or third try earned 20 points, 3 points, and 2 points, respectively. Thus, the three-guess grids (and the asymmetric rounds, more generally) offered more opportunities to earn points. Prior to and during the study phase, participants were told how many guesses they would have for each grid. We expected that participants would earn fewer points on asymmetric rounds because they would shift too much attention away from the three-guess grid to the one-guess grid.

Results and discussion. One participant was removed as an outlier for performing more than 2.5 standard deviations below the mean. Including this participant in the analyses does not change the pattern of results.

A paired t-test showed that participants earned more points on symmetric rounds ($M = 149.70$, $SD = 51.02$) than on asymmetric rounds ($M = 140.06$, $SD = 49.15$), $t(32) = 2.05$, $p < .05$, Cohen's $d = .36$. Furthermore, for asymmetric rounds, participants earned more points on one-guess grids ($M = 75.15$, $SD = 29.59$) than on three-guess grids ($M = 64.91$, $SD = 27.75$), $t(32) = 1.99$, $p < .06$, Cohen's $d = .35$.

Just as participants over-borrowed time and guesses in the previous studies, here they appeared to over-borrow attention during asymmetric rounds. They behaved as if shifting attention away from three-guess grids and toward one-guess grids. But notice that participants appeared to shift too much attention, failing to improve their performance on the one-guess grids in the asymmetric rounds relative to the symmetric rounds. Instead, the primary consequence of this shift was a severe loss of points on the three-guess grids. These results provide direct evidence for the notion of constraint focus, where people focus on limited resources and neglect areas of perceived abundance.

General Discussion

We rarely encounter scarcity in an abstract form. Instead, we might face shortages of money, time, food, or other resources. Each of these situations is fairly vivid and feels unique. But in focusing on the various contexts in which we encounter scarcity, we might overlook the similarity between these situations: people have less.

In this paper, we have suggested that there are core consequences of having less. Across experiments, participants facing scarcity often had less room for error. In Experiment 2, for example, poor participants who over-borrowed were more likely to face a cascading cycle of debt. Meanwhile, Experiment 4 provides some evidence of a psychological consequence of scarcity, namely that people shift their focus towards areas of perceived scarcity. Perhaps excessive borrowing is symptomatic of attending to some problems at the expense of others.

These demonstrations of over-borrowing are particularly meaningful because of their simplicity. Stripped of context and complexity, these experiments showed that when people had less, their behavior resembled what is observed in the world. Excessive borrowing by those facing financial scarcity is well-documented. Short-term, high-interest loans are available in

numerous forms (Bair, 2005). For example, people might pay over 100% annualized interest to expedite tax refunds by a mere eight to ten days (Elliehausen, 2005). Many take loans until their next paydays at well over 500% interest (The Annie E. Casey Foundation, 2004). And payday loans are typically renewed up to 12 times within a year, accruing greater interest and creating a cycle of debt (Chin, 2004).

In the experiments above, participants borrowed expensively and to their own detriment. They ended up in debt-traps. These patterns replicated for a variety of resources. And in these experiments, it was only scarcity that separated those from who behaved “wisely” from those who behaved “unwisely.”

In a separate set of experiments, we tested whether scarcity might also lead people to under-save resources, just as they over-borrowed in the experiments above. Participants in those experiments again completed rounds of *Family Feud*. Some participants were given consistent budgets, where they had the same amount of time for each round. Other participants were given the occasional “windfall,” a surplus of time for a certain rounds (while holding the total time budget constant within the Time Poor or Time Rich conditions). Time Rich participants were immune to the type of budget they had, they did equally well regardless. Time Poor participants, however, did significantly better with consistent budgets than with the occasional windfall. Moreover, Time Rich participants saved a much greater proportion of their windfalls than did Time Poor participants. These results parallel how inconsistent income adversely affects the poor.

It is possible that our results merely parallel effects in the real world, but stem from a different mechanism. Still, we believe that the psychological mechanism suggested here—constraint focus—likely operates even in more complex environments. Future work will assess

whether this mechanism is as general as we believe. It is also worth noting that although we have emphasized the downside of constraint focus, it can carry many positives with it. By focusing on a constraint, people might better manage certain aspects of scarcity or they might gain productivity in other ways. For instance, we found that the Time Poor made more attempts at answering *Family Feud* questions per second than did the Time Rich. That is, they appeared to be more engaged in the problems they faced. Unfortunately, this engagement may have also led them to neglect future questions and to over-borrow.

The study of scarcity is not new. It has long been central to fields like economics, sociology, and political science. Yet much of our understanding of scarcity is perhaps better characterized as an understanding of the *contexts* in which scarcity arises. People who lack money, time, or food are rarely described in the broad sense as “people who have less.” Instead they are described specifically as “poor,” “busy,” or “hungry.” In focusing on the context, it may be that we are missing a study of *scarcity* itself. This work offers a glimpse into a psychology of scarcity and its consequences. Through this lens, we can perhaps consider the kernel of experience which is the same across disparate contexts. And this may provide an understanding of what it simply means to have less.

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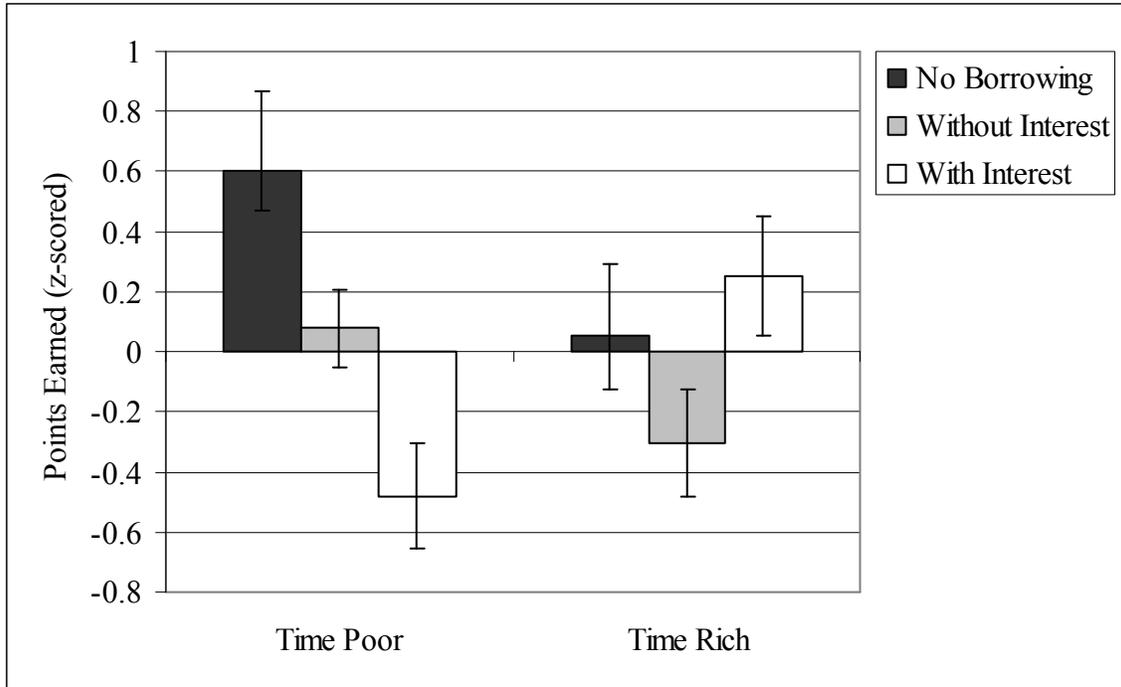


Figure 1. Performance in Experiment 1, defined by standardized points earned as a function of scarcity and borrowing conditions. Error bars represent standard error of the mean. *Note:* $N = 143$.

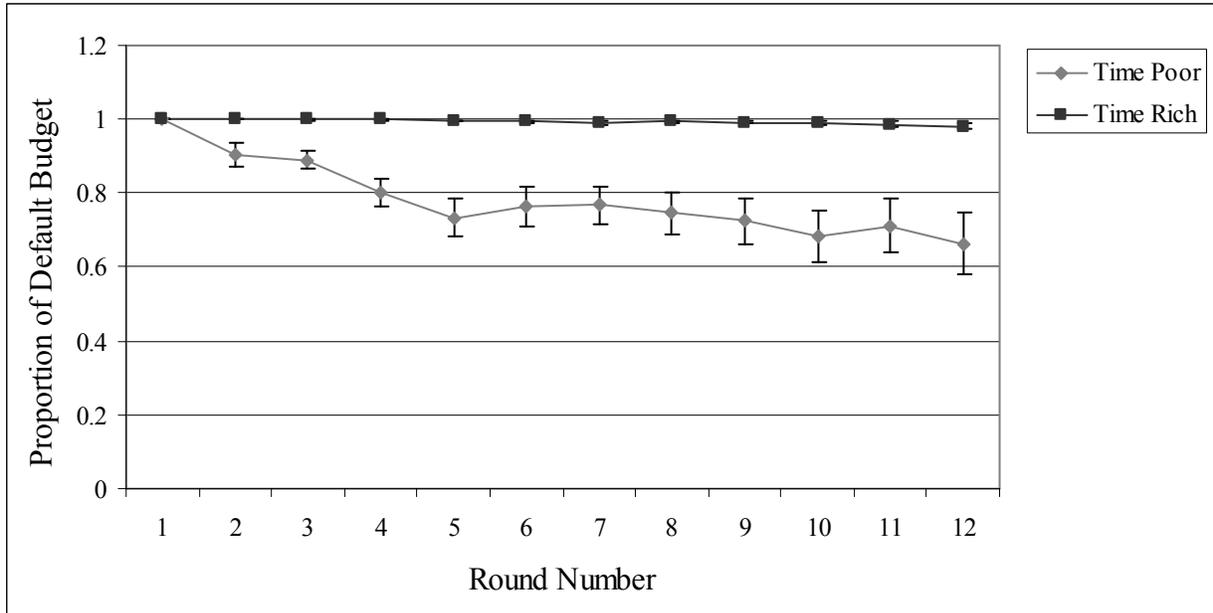


Figure 2. The accumulation of debt in Experiment 2. The budget for each round is shown as a proportion of the budget for the first round. Errors bars represent standard error of the mean. *Note:* Data are shown only for the median number of rounds completed by *all* participants.