



Self-control exertion and the expression of time preference: Experimental results from Ethiopia



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ABSTRACT

Classic economic theory assumes that time preference is a stable parameter. However, a large literature in psychology theory suggests that initial exertions of self-control affect one's ability to deploy self-control subsequently. As savings decisions require individuals to make trade-offs between immediate gratification and future rewards, the self-control literature suggests that expression of time preference is susceptible to environmental influences, a contradiction of the neoclassical stability assumption. Empirical evidence is mixed. This paper proposes that self-control use has heterogeneous effects on the expression of economic time preference. Using a Stroop task to experimentally induce self-control fatigue in university students in Northern Ethiopia, we find that treated subjects with below median finances behave more impatiently in an incentivized time preference task than do untreated subjects. By contrast, treated relatively wealthy students do not behave differently than their untreated counterparts. Our results suggest that the psychological environment does affect the expression of time preference, but self-control use does not uniformly deplete patience for all subjects. Our results are most consistent with the process model of self-control.

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1. Introduction

Classic economic theory assumes that an individual's discount rate, the preference for utility now over utility later, is stable within subjects across situations. An individual's expression of his preference in his specific choices may change with his current money holdings, expected future income, and interest rates for credit and savings, but the preference parameter itself is stable. By contrast, research in psychology has consistently demonstrated that those who are confronted with multiple tempting situations in sequence behave less patiently in later decisions than in early ones (Baumeister & Vohs, 2003; Vohs & Faber, 2007; Dewitte, Bruyneel, & Geyskens, 2009).¹ Similar research by economists studying poor populations in the United States and India suggest that economic scarcity depletes cognitive control (Mani, Mullainathan, Shafir, & Zhao, 2013; Spears, 2011), and exacerbates short-sightedness (Haushofer & Fehr, 2014). This empirical

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¹ Inzlicht and Schmeichel (2013) note that "the consistent finding that engaging in self-control at Time 1 leads to declines in performance at Time 2 has been replicated over 100 times in independent laboratories across the world.

regularity has often been described in terms of the traditional “ego-depletion” model (e.g. [Muraven & Baumeister, 2000](#)), in which self-control is viewed as a fatigable resource akin to a muscle. Behavioral economists have started to model willpower as a monotonically depletable resource ([Ozdenoren, Salant, & Silverman, 2012](#)). However, more recent work in the psychology literature has integrated the role of attention and motivation in exerting self-control across consecutive tasks (e.g. [Kurzban, Duckworth, Kable, & Myers, 2013](#); [Inzlicht & Schmeichel, 2012](#)). [Converse and DeShon \(2009\)](#) even show that under certain conditions of repeated self-control exertion, exertion can lead to *increases* in self-regulation. The literature is left with three competing theories: the classic economic view of time preference as a stable parameter, the behavioral economic model of self-control as a monotonically fatigable resource, and the new psychology view that self-control use may have heterogeneous effects on patience in later tasks.

Understanding whether the expression of time preference is influenced primarily by changing economic circumstances or instead by psychological factors cuts to the heart of the philosophy of policy-making ([Kariv & Silverman, 2013](#)): if the expression of preferences can be altered by the psychological decision-making environment, then policy makers should invest in creating behavioral nudges to encourage patience; if instead the expression of preferences is unaffected by psychological factors then we should set behavioral interventions aside and instead focus on improving economic circumstances directly. In this paper, we experimentally alter the decision-making environment by randomly subjecting individuals to a task that requires the exertion of self-control. We then test whether the self-control exertion causally affects subsequent choices made in an incentivized time-preference task, asking whether a respondent’s expression of economic patience can be altered by the previous use of self-control.

Evidence distinguishing between the classic economic conception of time preference and the behavioral and psychological models of self-control depletion is mixed. Consistent with classic economic theory, some studies find that measured preferences are correlated with economic situations in predicted ways ([Krupka & Stephens, 2013, general US population](#), [Carvalho, Meier, & Wang, 2014, low income US](#)), indicating a single stable preference parameter being expressed rationally with changing circumstances. Other studies show that expressions of time preference are highly correlated over time in populations we expect to have stable economic situations ([Harrison, Lau, & Rutström, 2005, Denmark general population](#); [Kirby, 2009, US university students](#); [Wolbert & Riedl, 2013, Denmark university students](#)), again suggesting a stable parameter. However, other studies find stable preferences in populations facing unstable (uncertain) economic situations for whom we expect the expression of their preference to change with their economic situation ([Meier & Sprenger, 2014, low income US](#); [Chuang & Schechter, 2015, Paraguay general population](#)). Some studies that look for differences in time preference after natural disasters or civil conflict find evidence of decreased patience ([Bchir & Willinger, 2013, Peru](#), [Cassar, Grosjean, & Whitt, 2011](#); [Cassar et al., 2011, Thailand](#); [Voors et al., 2012, Burundi](#)) – consistent with either a model of stable preferences expressed differently after wealth destruction or a behavioral model of depleted self-control. But others do not, finding no effect on time preference ([Willinger, Bchir, & Heitz, 2013, Indonesia](#)) or increased patience ([Callen, 2011, Sri Lanka](#)). Finally, two recent experimental studies suggest that cognitively depleting tasks may actually improve patience ([Kuhn, Kuhn, & Villeval, 2014, France university students](#); [Burger et al., 2011, US university students](#)), which is inconsistent with both the classic economic model of time preference and a model of self-control as a monotonically fatigable resource.

We enter this contested literature with new experimental evidence. We examine the relationship between self-control use and the expression of time preference among university students in Northern Ethiopia.² Setting our study in a university environment allows us to construct lab-like experimental conditions. Working with African university students, many of whom come from poor backgrounds, allows us to work with a diverse but relatively resource poor population. Half of our subjects are randomly assigned to a depleting task (an incongruent color Stroop task) while the other half complete a similar non-depleting task (a congruent color Stroop task) ([Stroop, 1935](#)). Time preference was measured with a modified Convex Time Budget allocation ([Andreoni & Sprenger, 2012](#)). We also collect survey measures of financial well-being. While not related to time preference, our work is most similar in structure to [Achtziger, Als-Ferrer, and Wagner \(2015\)](#).³

Across our full sample, the treatment slightly increased the demand for sooner payment (i.e. impatience) but the effects are small and imprecisely measured. Following [Mani et al. \(2013\)](#) and [Haushofer and Fehr \(2014\)](#), we hypothesize that wealthier students may have a different reaction to the treatment than do poorer students. When we split the sample by financial background, relatively poor students exposed to the self-control depleting task are significantly more impatient, while we observe no statistically significant effect on relatively wealthy students. Our results are not consistent with either the classic economic view of time preferences, nor a behavioral model in which self-control use is uniformly fatiguing; instead, the results are most consistent with the process model of self-control in which taxing self-control leads to attention shifts away from conflicting objectives and towards rewards and gratification.

The paper is organized as follows: [Section 2](#) describes the experimental design and setting; [Section 3](#) presents results; [Section 4](#) concludes.

² We also tested for effects on cognitive function as measured by forward and backward digit spans, time on the trail tasks, and performance on a math test, but the effect on cognitive function was jointly insignificant.

³ These authors experimentally deplete self-control and examine the impact on decisions in a dictator game. They find evidence that depleting self-control reduces any initial tendency towards pro-social behavior.

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