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Time preference and the importance of saving for retirement

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ABSTRACT

This study models the importance respondents place on saving for retirement as a function of time preference using a sample of 6812 undergraduate and graduate students. Individual time preference is measured by comparing dollar values over time and through a combination of intertemporal behaviors that may be the most theoretically appropriate measurement of the discount rate for utility over time. Results show strong correlations among decision making domains that involve time discounting. Time preference measured by comparing dollar amounts across time proves a much weaker predictor than a combination of intertemporal behaviors measured either as a linear scale or as factors. In multivariate models, a factor of intertemporal preventive health behaviors is a stronger predictor of the importance of saving for retirement than all other explanatory variables including age, race, parental income, gender, GPA, and college major.

1. Introduction

Across all income and education levels, investors who value retirement as a savings goal are more likely to participate in 401(k) plans, more likely to hold other retirement accounts, and more likely to invest directly or indirectly in equities (Pence, 2002). Younger respondents who indicate a willingness to save and plan are far more likely to have greater wealth later in life (Hurst, 2003), and those who have thought about retirement do in fact accumulate greater wealth over time (Ameriks et al., 2002).

Retirement saving early in life is motivated by the desire to increase consumption decades in the future. This intertemporal tradeoff suggests a theoretical relation between the economic construct of time preference and a desire to save for retirement. Models of financial resource allocation over the life cycle predict an inverse relation between individual time preference and wealth accumulation (Bernheim et al., 2001). Individual time preference is an intriguing predictor of retirement savings behavior if the construct can be measured accurately. Although the time preference of an investor is difficult to estimate empirically, there is some evidence that other intertemporal behaviors that involve time preference, such as smoking and exercise, are associated with wealth accumulation over time (Lusardi, 2003).

This paper uses a large data set ($N = 6812$) of college students to test the predictive capability of four different measures of individual time preference on the willingness to save for retirement. The results provide evidence that intertemporal health behaviors are strongly related to the intention to save for retirement. Correlations between behaviors outside the domain of financial decisions can also provide insight into observed relations between financial decisions and health outcomes.

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2. Time preference

Previous theoretical research has established the importance of time preference (Grossman, 1972) as a predictor of investment in health capital (a component of human capital). The decisions to avoid cigarettes, to eat a healthy diet, and even to engage in protected sex involve a measurement of utility gained and foregone in different time periods. Future utility is discounted to some degree according to an individual's impatience, uncertainty, or even their sense of a finite lifespan. Financial resource allocation also requires an intertemporal tradeoff. In a multiperiod consumption model, savings provide a means through which consumption in early periods can be transferred to later periods in order to maximize lifetime utility. At equilibrium, the expected utility gained in the future from savings must equal the utility sacrificed in the present from deferred consumption. An individual's time preference is an important part of this equilibrium because it is used to ascribe a value to future utility. The motive to save for retirement, particularly among younger individuals, may be particularly sensitive to the rate to which future utility is discounted. A college student with a high discount rate compounded over the 40-year period until retirement will see little value in reducing consumption today in order to live better in the distant future.

There is evidence of a neurological explanation for time discounting. Decisions about outcomes in the more distant future appear to be made in the more coldly rational prefrontal cortex, while decisions with short-run outcomes are made in the more emotional limbic region of the brain (Berns et al., 2007). Our ability to resist temptation involves moderating emotional responses through cognitive effort. This dual-self model explains inconsistencies in measured time preference and the importance of self control in moderating short-run behaviors that compromise long-run goals (Fudenburg and Levine, 2006). It is plausible that behaviors that imply a high rate of discounting in the present may not correlate with implied discounting in long-run behaviors if long-run decisions involve a different cognitive process. However, repeated behaviors that provide immediate gratification at the significant cost of future utility by someone who places a low rate of discounting on future utility will motive them to limit their ability to make mistakes (in the sense that a short-run behavior which reduces expected discounted lifetime utility is a mistake). For example, someone who is forward thinking and prone to impulsive decisions may cut up their credit cards, not keep ice cream in the freezer, or save automatically in a 401(k) plan rather than relying on deliberately funding their IRA each tax year in order to avoid succumbing to short-run temptation.

Prior research provides a normative explanation for the relation between time preference and retirement saving. However, there are no studies that model time preference empirically as a predictor or retirement accumulation behavior.

3. Estimating time preference

Individual time preference, or the tendency of individuals to consistently favor utility (wellbeing) in either present or future periods, is derived from a broader economic framework known as the discounted utility model (Samuelson, 1937). The discounted utility model is a fundamental economic theory guiding rational decision making across time periods. The model recognizes that in order to make rational choices that involve outcomes in more than one time period, an individual must anticipate how increased or decreased consumption will change utility at the time the changes are expected to occur. Changes in future consumption therefore involve translating an expected change in utility according to an individual's (presumably concave) utility function, then discounted by a factor that represents the rate at which the individual is willing to exchange utility across time periods.

The discounted utility model in its basic form, in which the relative impact of intertemporal choices is measured according to both the discount factor and the expected intertemporal change in utility from consumption, describes the expected utility from consumption over time as:

$$U(c_0, \ldots, c_T) = \sum_{t=0}^{T} \beta^t u(c_t)$$

where β is used to discount future utility in year t at a rate of intertemporal substitution such that $\beta = 1/(1+\rho)$. Any investment involves an anticipated reduction in utility in the near future in order to increase expected utility in the more distant future. Thus, the decision to invest is a function of both ρ, the rate of time preference, and the marginal utility of consumption in each period. A larger discount factor or smaller marginal utility of consumption in the future (for example the expectation of a steeper earnings path) will lead to choices that favor gains in nearer rather than more distant time periods.

Holding constant the rate of interest on savings, precautionary savings motive, and perceived longevity, Bernheim et al. (2001) model the lifetime consumption profile as a function of time preference. Given that utility at time t is a function of consumption in time t and expected future utility, maximization of the utility function at time t yields the first-order condition:

$$U'(c_t) = \beta_t E_t(U'(C_{t+1}))$$

where E_t is the expectation operator. The change in current utility is thus set equal to the expected change in future utility discounted by the rate of time preference. Therefore, a higher rate of time preference implies that future consumption would need to be relatively higher for an individual to consider it equivalent to a marginal reduction in present consumption. This