The Origins of Savings Behavior*

Henrik Cronqvist and Stephan Siegel†

There is enormous variation across individuals with respect to the wealth accumulated at retirement age, even among those with very similar lifetime incomes. Economists have found that this dispersion cannot be easily explained by asset allocation choices or socioeconomic characteristics (e.g. Venti and Wise (1998, 2000)). Instead, savings behavior, i.e., the choice by an individual to save or consume earlier in life, seems to be a much more important determinant of cross-sectional variation in wealth accumulation.[1] This evidence raises several fundamental questions: Where does an individual's savings behavior originate from? Are individuals born with a particular savings propensity, is it governed by parents instilling preferences into their children, or is it the result of individual-specific life experiences? In this paper, we address these questions.

While the determinants of individual savings behavior have been explored before (see, e.g., Browning and Lusardi (1996)), the novel approach in this paper is to empirically decompose the variation in savings behavior across individuals into separate genetic and environmental effects and to examine possible gene-environment interplay (e.g., whether specific environments moderate predisposition to a behavior). The approach to analyzing savings behavior employed in this paper thus blends economics and biology, an intersection of research disciplines recognized as potentially important by several economists (e.g., Marshall (1920), Becker (1976), Hirshleifer (1977), and Knudsen, Heckman, Cameron, and Shonkoff (2006)).

Heterogeneity in preferences is a potentially important source of heterogeneity in savings

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†Cronqvist: McMahon Family Chair in Corporate Finance, George R. Roberts Fellow, and Associate Professor of Financial Economics, Claremont McKenna College, Robert Day School of Economics and Finance (hcronqvist@cmc.edu); Siegel: Assistant Professor of Finance and Business Economics, Michael G. Foster School of Business; University of Washington (ss1110@uw.edu).

[1]Already Friedman (1953) concluded that "a large part of the existing inequality of wealth can be regarded as produced by men to satisfy their tastes" (p. 290).

behavior and wealth accumulation (see, e.g., Krusell and Smith (1998) and Hendricks (2007)). Theoretical work suggests that the existence and shape of individual preferences are the outcome of natural selection (e.g., Rogers (1994), Robson (2001), and Brennan and Lo (2009)), meaning that preferences, and therefore savings behavior, are at least partially genetic. Recently emerging empirical evidence suggests that preferences are indeed partly genetic (e.g., Kuhnen and Chiao (2009), Barnea, Cronqvist, and Siegel (2010), and Cesarini, Johannesson, Lichtenstein, Sandewall, and Wallace (2010) for risk preferences, and Eisenberg et al. (2007) and Carpenter et al. (2009) for time preferences). Others have questioned assumptions embedded in the life-cycle model, e.g., the cognitive ability to solve the consumption-savings problem and the self-control and willpower to execute the optimal savings plan (e.g., Thaler (1994) and Benartzi and Thaler (2007)). Several empirical studies have indeed found that non-standard models and "behavioral factors" explain variation in savings (or the lack of savings) across individuals (e.g., Bernheim et al. (2001a), Lusardi (2001), and Madrian and Shea (2001)). As a result, genetic variation in savings behavior may not necessarily reflect genetic risk and time preferences, but may reflect cognitive ability, self-control, or other non-standard factors being partly genetic. Others have emphasized the importance of parents' instilling behaviors into their children (e.g., Cavalli-Sforza and Feldman (1981) and Bisin and Verdier (2008)). Anecdotal evidence suggests that at least some parents exert costly effort to teach their children particular savings behavior, by providing a piggy bank, opening a savings account, and otherwise emphasizing the benefits of a frugal lifestyle. Parent-child socialization has been found to be empirically relevant for behaviors other than savings, such as religion (e.g., Bisin and Verdier (2000); Bisin et al. (2004)). Several studies have examined the effects of government-sponsored financial education programs on savings behavior (e.g., Bernheim et al. (2001b) and Bernheim and Garrett (2003)), but there is surprisingly limited empirical evidence on the effects of parenting on savings behavior.

Research by Charles and Hurst (2003) and Knowles and Postlewaite (2004) suggests significant parent-child similarities in savings behavior. While similarity in income explains about half of the age-adjusted elasticity of child wealth with respect to parental wealth in Charles and Hurst (2003), the authors hypothesize that similar savings propensities among parents and their children is another

possible explanation. Both these studies suggest that parents pass on their savings propensities to their children, but they do not examine the extent to which this similarity is genetic versus the result of social transmission of behavior from parents to their children.

Analyzing a large data set of the savings behavior of 14,930 identical and fraternal twins between 2002 and 2006, we empirically decompose the variation in individuals' propensity to save into genetic and environmental components.[2] Our data on twins are from the Swedish Twin Registry, the world's largest research database of twins, and matched with income and net worth data from tax filings. We use a standard definition of an individual's savings rate, i.e., the change in net worth divided by disposable income. Due to the dual nature of housing as consumption as well as investment, we exclude value changes of the individual's home from the change in net worth. Following Venti and Wise (1998), we regress out the effects of socioeconomic characteristics and asset allocation choices, to obtain an adjusted savings rate (i.e., the residual from a regression with standard controls).

The decomposition of this adjusted savings rate into genetic and environmental factors rests on an intuitive insight: In identical twins, all genes are expressed in the same way, hence genetically identical twins are indeed identical. For fraternal twins, on the other hand, the average proportion of shared genetic expression is only 50 percent. Assume further that the similarity of the non-genetic environment is the same for identical and fraternal twins. Then, more similar savings behavior among identical than fraternal twins constitutes evidence that the propensity to save, at least to some extent, originates from an individual's genetic composition. Savings rates are indeed much more correlated among identical than fraternal twins in our data (correlations of 0.33 versus 0.16). Formally, a random effects model with three effects (one genetic, one parental or common, and one individual-specific) and a covariance structure imposed by genetic theory is estimated by maximum likelihood, as is standard in quantitative genetics research (e.g., Neale and Maes (2004)).

Our analysis produces several results. First, we find that genetic variation explains about 33 percent of the variation in savings behavior across individuals in our sample. Each individual is born with an innate genetic predisposition to a specific savings behavior, an effect that is found

[2]Several studies in economics have examined data on twins, e.g., Behrman and Taubman (1976), Taubman (1976), Ashenfelter and Krueger (1994), and Ashenfelter and Rouse (1998). Others have used adoption data to address similar questions; see, e.g., Sacerdote (2002) and Björklund, Lindahl, and Plug (2006).

not to disappear later in life. Second, the parenting effect on savings behavior (by socialization, not genes) is found to be insignificant on average, but a detailed analysis reveals that the strength of the effect varies in systematic ways. In particular, we find that parenting explains about 30 percent of the variation in savings rates for individuals around age 30, but decays significantly and attains zero starting around age 40, i.e., parenting does not have a lifelong impact on their children's savings propensities. We also find that parenting explains more of the variation in savings behavior when there were no additional siblings in the family growing up, suggesting that parenting effects on savings are smaller when time for parenting and teaching is likely to be scarcer. Third, we report evidence that the family environment when growing up (the wealth of the parents) and an individual's current socioeconomic status moderates genetic predispositions to a particular savings behavior, evidence which is consistent with theories that genetic effects are predicted to be stronger in more supportive environments. Finally, we examine why savings behavior is genetic. We find that savings behavior is correlated with income growth, smoking, and body mass index, and a formal decomposition reveals that these correlations are mainly genetic, and not environmental. This evidence suggests that the genetic component of savings behavior reflects time preferences as well as lack of self-control.

Taken together with existing twin-study evidence on income and investment choices, our results imply that variation in wealth at retirement is to some extent due to genetic variation and only to a small extent due to variation in upbringing or in other parental effects. Indeed, decomposing net worth of $11,992$ twins, age 60 to 69, at the end of 2006, reveals that genetic variation accounts for almost 40% of total variation, while parental effects, including inheritances, account for about 7% of total variation. Importantly, more than half of the variation in wealth at retirement seems to depend on other individual-specific experiences, events, and circumstances.

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