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Research Paper

Genetic and environmental influences on household financial distress

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ABSTRACT

Heterogeneity of household financial outcomes emerges from various individual and environmental factors, including personality, cognitive ability, and socioeconomic status (SES), among others. Using a genetically informative data set, we decompose the variation in financial management behavior into genetic, shared environmental and non-shared environmental factors. We find that about half of the variation in financial distress is genetically influenced, and personality and cognitive ability are associated with financial distress through genetic and within-family pathways. Moreover, genetic influences of financial distress are highest at the extremes of SES, which in part can be explained by neuroticism and cognitive ability being more important predictors of financial distress at low and high levels of SES, respectively.

1. Introduction

Recent studies have shown that individual differences in financial decisions, such as saving rates or portfolio allocations, are considerably heritable. For instance, between a quarter and almost half of the variability in financial behavior can be explained by variability of genetic endowment across individuals (Barnea et al., 2010; Cesarini et al., 2010; Cronqvist and Siegel, 2014, 2015). An implication of this finding is that earlier work on the determinants of household financial decisions may have overlooked possible endogeneity arising from shared genetic influences across risk factors. It has been long-established, for example, that family socioeconomic status (SES) has protective effects against adverse financial outcomes, yet it has never been tested whether such effects minimize or magnify genetic effects on financial outcomes. Moreover, the studies that have found a genetic basis for financial behavior have not identified plausible mechanisms that may explain genetic influences on financial decisions. One potential reason why financial decisions show genetic influences is that financial decisions reflect the influences of other variables that are themselves genetically influenced. For example, cognitive and non-cognitive abilities predict earnings and wealth (Duckworth and Weir, 2010) and depression predicts risk-taking behaviors (Calvet and Sodini, 2014); all of these factors have been shown to be genetically influenced in the psychology

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literature (Bouchard and McGue, 2003; McGue and Christensen, 2003). Nevertheless, such a hypothesis has not been tested in a genetically informative, multivariate analysis. Our study advances this literature by combining genetic information and financial behaviors to further investigate these relationships with special attention to the roles of SES, personality, and cognitive ability.

Our outcome of interest is the competence of household financial management, as measured by an estimate of a latent factor common to various indicators of a household's difficulty managing basic finances. We first estimate the heritability of financial distress, i.e., the portion of the variance in the latent variable that can be explained by genetic variance. We then study the genetic and environmental nature of the relation of the latent financial distress with the Big Five personality traits and cognitive ability. The Big Five personality traits reflect patterns of thoughts, feelings, and behavior that are relatively stable across time and context. Both personality and cognitive ability may be linked with financial distress through genetic and environmental pathways. Finally, we investigate the extent to which genetic and environmental influences of financial distress are similar across different environmental contexts.

Using a sample from the National Longitudinal Study of Adolescent to Adult Health (Add Health) that includes both genetic and financial information, we apply a behavior genetic decomposition to analyze financial behaviors. We identify additive genetic influences by using variation in the observed similarity of groups with different degrees of genetic relatedness: identical twins (100% genetically related), fraternal twins and full siblings (50% genetically related among segregating genetic material on average), and half siblings (25% related with a similar caveat). Beyond genetic influences, our analyses also estimate the variances due to the shared and the non-shared environments. Shared environmental influences result from between-family effects that make siblings living in the same home behave similarly, and non-shared environmental influences result from within-family effects, including idiosyncratic variances, that make siblings less similar.

The empirical results suggest that 43–55% of the variance in latent financial distress is due to genetic influences, and this result remains robust when the effects of age, sex, race/ethnicity, and family background are considered. We also investigate personality and cognitive ability as potential mediators for the genetic component of financial distress, where the Big Five personality traits are 18–41% heritable and cognitive ability is 32–45% heritable. The remaining variance in financial distress and personality are minimally associated with shared environmental effects, in contrast to substantial shared environmental effects on cognitive ability. The pathway analysis finds that conscientiousness is associated with financial distress mainly through a non-shared environmental pathway: 68% of the correlation between conscientiousness and financial distress is attributable to the non-shared environment. Neuroticism is associated with financial distress equally through the genetic pathway (52%) and non-shared environmental pathway (48%). Agreeableness is associated with financial distress solely through a genetic pathway. Finally, cognitive ability is associated with financial distress through both genetic and non-shared environmental pathways. In total, the three personality traits and cognitive ability are able to account for 21.32% of the variance in financial distress through genetic pathways and 10.01% of the variance through non-shared environmental pathways, leaving significant residual genetic (33.52%) and non-shared environmental (35.16%) variance.

Although we find minimal evidence of shared environmental influences on financial distress in our baseline model, this result could reflect the interactions between genes and shared environments. We find that the heritability of financial distress is not constant across environmental context: genetic influences account for a greater proportion of variance at extremes of the SES distribution. When this trend is not explicitly modeled, the variance contributes to estimates of genetic influences (described below and in Purcell, 2002). Evidence suggests that financial distress is associated with different risk factors at the extremes of the SES distribution, with neuroticism playing a key role at the low end and cognitive ability exerting influences at the high end. After we account for the effects of these two risk factors, the genetic influences of financial distress become similar across SES.

Our study makes three advances in understanding genetics and financial behavior. First, we employ a multivariate framework to examine multiple financial behaviors under a uniform structure. Using a latent variable approach, we identify variance common to various household financial management behaviors, which limits the effects of idiosyncratic shocks and measurement error specific to single indicators. Although day-to-day household financial management behaviors have not been the primary focus in the finance literature, the method can be applied to find a common factor among other financial behaviors such as investment and retirement saving. Second, we relate financial distress to cognitive and non-cognitive abilities through genetic and environmental pathways. Multivariate analysis suggests that the genetic components of three personality traits and cognitive ability overlap with almost half (48%) of the genetic component of the financial distress. This is evidence that these psychological characteristics could mediate the genetic influences on financial distress. As shown in an earlier study, personality can predict financial distress in addition to the effects of household income, health, and childhood experience (Xu et al., 2015). Hence, the genetic component of personality is likely to reflect the predisposition to make financial decisions in a certain pattern beyond the influences of liquidity shocks and early-life experience. Finally, we show that genetic influences are not fixed for financial distress. We highlight the moderating effects of SES in explaining the heritability of financial distress, and we identify different risk factors for populations at different distributions of SES.