Journal of Financial Economics 113 (2014) 215–234

Contents lists available at ScienceDirect

Journal of Financial Economics

journal homepage: www.elsevier.com/locate/jfec

The genetics of investment biases ☆

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ARTICLE INFO

Article history:
Received 15 October 2012
Received in revised form
21 August 2013
Accepted 9 September 2013
Available online 29 April 2014

JEL classification:
D10
D31
G11

Keywords:
Investment biases
Behavioral genetics
Portfolio choice

ABSTRACT

For a long list of investment "biases," including lack of diversification, excessive trading, and the disposition effect, we find that genetic differences explain up to 45% of the remaining variation across individual investors, after controlling for observable individual characteristics. The evidence is consistent with a view that investment biases are manifestations of innate and evolutionary ancient features of human behavior. We find that work experience with finance reduces genetic predispositions to investment biases. Finally, we find that even genetically identical investors, who grew up in the same family environment, often differ substantially in their investment behaviors due to individual-specific experiences or events.

☆ A previous version of this paper was circulated as "Why Do Individuals Exhibit Investment Biases?" We are thankful for comments from an anonymous referee as well as from seminar participants at Aalto University, Arizona State University Sonoran Winter Conference, Australian National University, BI – Norwegian Business School, California State University – Fullerton (Psychology Department), China Europe International Business School, China International Conference in Finance, 14th Congress of the International Society of Twin Studies, Copenhagen Business School, Erasmus University, Florida State University SunTrust Conference, HKUST Symposium on Household Finance, 1st Linde Institute Conference at Caltech, Maastricht University, Nanyang Technological University, NBER Conference on Household Finance at Saïd Business School at University of Oxford, National Taiwan University International Conference on Finance, Singapore Management University, Swedish Institute for Financial Research (SIFR), Tilburg University, University of Luxembourg, University of Mannheim, University of Michigan – Dearborn, University of New South Wales, University of Sydney, University of Technology Sydney, Washington University in St. Louis, Warwick Business School, Western Finance Association and for discussions with Julie Agnew, Brad Barber, Peter Bossaerts, Alon Brav, John Campbell, Colin Camerer, Peter Cziraki, Jack Goldberg, David Hirshleifer, Arvid Hoffmann, Søren Hvidkjær, Zoran Ivković, Danling Jiang, Markku Kaustia, Matti Keloharju, Samuli Knüpfer, Kevin Kobelsky, Lisa Kramer, Harald Kullmann, Andy Lo, Annamaria Lusardi, Alexandra Niessen, Lasse Pedersen, Robert Plomin, Thomas Post, Manjari Quintanar-Solares, Stefan Ruenzi, Raghu Rau, Mark Seasholes, Nancy Segal, Hersh Shefrin, Paolo Sodini, Elvira Sojli, Oliver Spalt, Per Stromberg, Meir Statman, Martin Weber, Mike Weisbach, Frank Yu, and Paul Zak. We acknowledge generous research funding from the 2011–12 Faculty Research Award of the Betty F. Elliott Initiative for Academic Excellence, College of Business, The University of Michigan – Dearborn. We thank Florian Münkel, Lucas Perin, Lew Thorson, and Nancy Yao for excellent research assistance. This project was pursued in part when Cronqvist was Olof Stenhammar Visiting Professor at SIFR, which he thanks for its support, and while Siegel was visiting W.P. Carey School of Business at Arizona State University, which he thanks for their hospitality. Statistics Sweden and the Swedish Twin Registry (STR) provided the data for this study. STR is supported by grants from the Swedish Research Council, the Ministry of Higher Education, AstraZeneca, and the National Institute of Health (Grants AG08724, DK066134, and CA085739). Any errors or omissions are our own.

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http://dx.doi.org/10.1016/j.jfineco.2014.04.004
0304-405X/

1. Introduction

The list of investment "biases" that individual investors exhibit is long. Many investors lack diversification and have a preference for familiar investments (French and Poterba, 1991; Huberman, 2001), trade too much (Odean, 1999), are reluctant to realize their losses (Odean, 1998; Dhar and Zhu, 2006), extrapolate recent superior returns (Benartzi, 2001), and have a preference for skewness and lottery-type investments (Kumar, 2009). These behaviors have been partially attributed to various psychological mechanisms: Ambiguity aversion and familiarity for lack of diversification (Ellsberg, 1961; Heath and Tversky, 1991), overconfidence and sensation-seeking for excessive trading (Griffin and Tversky, 1992), loss aversion and mental accounting for the reluctance to realize losses (Kahneman and Tversky, 1979; Thaler, 1985), representativeness and the hot hands fallacy for excessive extrapolation of past returns (Tversky and Kahneman, 1974), and cumulative prospect theory for skewness preferences (Tversky and Kahneman, 1992).[1]

While the referenced studies have shown that individual investors, on average, exhibit these investment biases, little research has been devoted to uncovering the origins of these investment biases and the differences across investors. Are investors genetically endowed with certain predispositions that manifest themselves as investment biases? Or do investors exhibit biases as a result of parenting or individual-specific experiences or events? Distinguishing between genetic and environmental sources of investment biases has potentially important implications for the extent to which education and market incentives may be expected to reduce investment biases as well as for the design of public policy (Bernheim, 2009).[2] Evidence of a significant genetic component would also provide empirical support for recent models proposing that behavioral biases could be the outcome of natural selection e.g., Rayo and Becker (2007) and Brennan and Lo (2011), a mechanism that requires that behaviors are at least partly genetically determined.

We use empirical methodology adopted from quantitative behavioral genetics research (Neale and Maes, 2004), which has recently been used also in finance research (e.g., Cesarini, Dawes, Johannesson, Lichtenstein, and Wallace, 2009a; Barnea, Cronqvist, and Siegel, 2010; Cesarini, Johannesson, Lichtenstein, Sandewall, and Wallace, 2010). Our data set from the world's largest twin registry, the Swedish Twin Registry (STR), matched with detailed data on the twins' investment behaviors, enables us to decompose differences across individuals into genetic versus environmental components. This decomposition is based on an intuitive insight: Identical twins share 100% of their genes, while the average proportion of shared genes is only 50% for fraternal twins. If identical twins exhibit more similarity with respect to these investment biases than do fraternal twins, then there is evidence that these behaviors are influenced, at least in part, by genetic factors.

We can summarize our results as follows. First, for a long list of investment biases, we find that genetic differences explain up to 45% of the remaining variation across individual investors, after controlling for observable individual characteristics. Consistent with a view that investment biases are manifestations of innate and evolutionary ancient features of human behavior, we find that the genetic factors that influence investment biases also affect behaviors in other, non-investment, domains. For example, we show that the correlation between a preference for familiar stocks and familiarity preferences in other domains is due to shared genetic influences. While our results are consistent with several behavioral genetic studies that have shown significant heritability of human behavior, they provide the first direct evidence from real-world, non-experimental data that persistent investment biases are to a significant extent determined by genetic endowments. Such evidence provides support for evolutionary arguments that behaviors which manifest themselves as investment biases in today's financial markets have survived because they were advantageous in evolutionary ancient times (e.g., Rayo and Becker, 2007; Brennan and Lo, 2011).

The relative importance of genetic relative to environmental factors is found to vary across different investors. Most importantly, among investors with work experience with finance, we find a significant reduction of the relative amount of genetic variation, which is consistent with practical experience in finance moderating genetic predispositions. We cannot rule out, though, that the selection of profession reduces the relevant genetic variation in this subsample. Controlling for selection, we also investigate the role of general education, measured as years of education, in moderating the relative importance of genetic factors. We do not find that general education reduces the relative importance of genetic factors in explaining investment biases.

Finally, we find that even genetically identical investors who grew up in the same family environment differ substantially in terms of their investment behaviors. Individual-specific environments, experiences, or events must therefore play an important role in shaping individuals' investment behaviors. Examining differences between investment biases of genetically identical investors, we show how genetically informed data, such as twin data used in this study, can be used to better establish the causal impact of individual-specific factors, such as education.

The paper is organized as follows. Section 2 is an overview of related research. Section 3 describes our data sources, reports summary statistics, and defines our measures of investment biases. Section 4 describes our empirical methodology. Sections 5 and 6 report our results and robustness checks. Section 7 concludes and Section 8 outlines some possible directions for future research.

[1] Throughout the paper, we will refer to these behaviors as "biases" because they constitute non-standard preferences and beliefs from the perspective of standard models used in financial economics.

[2] It is beyond the scope of this paper to provide estimates of the potential welfare losses attributed to any of these behaviors. Some of the referenced papers provide such estimates.