



Subjective measures of risk aversion, fixed costs, and portfolio choice

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ABSTRACT

The paper investigates risk preferences among different types of individuals. We use several different measures of risk preferences, including questions on choices between uncertain income streams suggested by Barsky, Juster, Kimball, and Shapiro (1997) and a number of *ad hoc* measures. As in Barsky et al. (1997) and Arrondel and Calvo-Pardo (2002), we first analyze individual variation in the risk aversion measures and explain them by background characteristics (both “objective” characteristics and other subjective measures of risk preference). Next we incorporate the measured risk preferences into a household portfolio allocation model, which explains portfolio shares, while accounting for incomplete portfolios and fixed costs. Our results show that a measure based on factor analysis of answers to a number of simple risk preference questions has the most explanatory power. The Barsky et al. (1997) measure has less explanatory power than this “a-theoretical” measure, suggesting that sophisticated measures based on economic theory may exceed the financial capability of respondents. Fixed costs turn out to provide an economically and statistically highly significant explanation for incomplete portfolios.

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1. Introduction

This paper exploits direct measures of risk preferences in a model of household portfolio allocation. There are two main motivations for this. The first one is that if heterogeneity in risk preferences is important then empirical portfolio models should take this into account. The second motivation is that economic theory has a fair amount to say about how risk preferences should influence portfolio allocation. Having direct measures of risk preferences should therefore help us in better testing the validity or predictive power of economic theories of portfolio allocation.

Empirical analyses of portfolio choice of households or individuals appear to indicate that observed choices are often inconsistent with standard asset allocation models. As a consequence, several studies have focused on empirical failures of portfolio theory. The greatest failure is perhaps the fact that the majority of individuals do not hold fully diversified portfolios (Campbell, 2006), although the percentage of households holding risky assets has increased over the last decade (Haliassos & Hassapis, 2002). Potential explanations for the fact that many households do not hold stocks may be the costs of stock market participation (Vissing-Jorgensen, 2002) and peer effects (Hong, Kubik, & Stein, 2004; Christelis & Georgarakos, 2008). A more recent literature stresses the role of financial capability: unsophisticated individuals tend to avoid taking direct action over their retirement saving investment decisions (Benartzi & Thaler, 2002; Thaler & Benartzi, 2004; van Rooij, Kool, & Prast, 2007).

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The sub-optimal degree of international diversification known as “home asset bias” is potentially another empirical failure. Although the ongoing globalization and international integration processes are contributing to a lowering of its magnitude (Baele, Pungulescu, & Ter Horst, 2007), this phenomenon has been analyzed extensively (see among others French & Poterba, 1990, 1991; Cooper & Kaplanis, 1994; Glassman & Riddick, 2001; Jermann, 2002). Possible reasons for the overinvestment in domestic assets have been identified in different transaction costs between countries (Tesar & Werner, 1994, 1995; Amadi & Bergin, 2006), additional sources of risk for foreign investments (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1999; Dahlquist, Pinkowitz, Stulz, & Williamson, 2003; Stulz, 2005), informational costs and asymmetries (Ahearne, Grierer, & Warnock, 2004; Choe, Kho, & Stulz, 2005; Dvorak, 2005), transparency in international markets (Gelon & Wei, 2005), trust (Guiso, Sapienza, & Zingales, 2008), real exchange rate volatility (Fidora, Fratzscher, & Thimann, 2007), behavioral biases (Strong & Xu, 2003), and investors’ financial illiteracy (Graham, Harvey, & Huang, 2005).

A more fundamental piece of evidence against the rational model of portfolio allocation is provided by Bernartzi and Thaler (2001) who find that the allocation of investors is heavily dependent upon the choices offered to them. Roughly speaking, if they are offered n choices they tend to allocate $\frac{1}{n}$ of their investment to each of the choices offered, irrespective of the risk characteristics of the investment opportunities.

Although these findings suggest that the rational model of choice is unable to explain several empirical phenomena, it is often hard to determine in more detail what the underlying cause of disparities between theory and empirical facts may be. Part of the issue most likely is a limited financial capability of individuals and households, which makes it difficult for them to properly consider all relevant dimensions of a financial decision. Psychological aspects may be responsible for actions that deviate from theoretical predictions (Kahneman & Riepe, 1998; Rabin, 1998). A growing literature on behavioral finance has developed in order to incorporate limited financial capability in portfolio models (Shefrin & Meir, 2000; Shefrin & Statman, 2000; Siebenmorgen & Weber, 2003; Davies & Satchell, 2007).

However, financial decisions are not made in a vacuum, but rather take place in contacts with family members, friends, financial advisors and others. Thus, rules of thumb like the $\frac{1}{n}$ rule may be mitigated by conversations with others, financial advice and appropriate choice architecture. Without wanting to claim that the classical economic model of choice gives a complete description of financial behavior, for making progress in understanding behavior we need to learn more about what works and what does not. The connection between economic theory and empirical evidence is often tenuous, because too many intervening factors may explain why theoretical predictions are not borne out by data. For this reason some authors have turned to more direct, subjective evidence on preferences to reduce the distance between theory and empirical facts. A prominent example is the paper by Barsky et al. (1997) who elicit several pieces of subjective information to improve our understanding of intertemporal choice and portfolio allocation by using US data. More recently, Iezzi (2008) uses a risk aversion measure coming from a subjective question in the Bank of Italy households survey, and explicitly accounts for potential misclassification between the true and the observed risk aversion.

In this paper we also aim to exploit subjective information to construct empirical micro-models of portfolio choice. In contrast with the work by Barsky et al. (1997), and Arrondel and Calvo-Pardo (2002) who adapt the same methodology to French data, our model will be a formal structural model of portfolio choice, in which we consider several different measures of risk attitude. One measure is based on hypothetical choices between uncertain income streams in a Dutch household survey, and closely related to the aforementioned work by Barsky et al. (1997), and Arrondel and Calvo-Pardo (2002). The Barsky et al. (1997) measure has a nice direct interpretation if individuals have CRRA preferences. We will find however, that the measure also has theoretical and empirical problems. Hence we also consider alternative measures of risk attitude. We relate the different measured risk attitudes to observed portfolio choices of households. To deal with incomplete portfolios, we allow for fixed costs of ownership of certain types of assets, which can endogenously generate corner solutions in portfolio allocation. Thus, we formulate and estimate a utility consistent choice model, incorporating subjective measures of risk aversion. The model is closely related to rational portfolio theory and seems to do a reasonable job in describing differences in allocation across individuals who differ in socio-economic characteristics, wealth, and risk attitudes.

The contribution of this paper is threefold: (1) we estimate a structural model of asset choice, thus establishing a direct link between economic theory and behavior; (2) we compare different risk aversion measures and find that relatively simple approaches to eliciting risk preferences are more powerful than the more complicated theory based measure; (3) we explain incomplete portfolios by estimating the importance of fixed costs of holding certain assets.

The paper is organized as follows. In the next section we describe the theoretical framework and posit a structural model of portfolio choice in the presence of transaction costs. In Section 3 we describe the data we use in the empirical analysis. In Section 4 we present descriptive statistics on the various risk attitude measures and how they are related. Section 5 presents the empirical results for the structural model. Section 6 concludes.

2. Classical theory of portfolio choice

Our empirical model follows a simple standard model of portfolio choice (see e.g. Gollier, 2004). A consumer's choice problem is to select a vector of risky assets that maximizes expected utility. We provide the derivation of the optimal portfolio for this case. Consider a k -vector of assets, where the first asset is riskless and the remaining $(k - 1)$ assets are risky. Let μ be the $(k - 1)$ -vector of mean excess returns of the risky assets (i.e. the expected return over and above the return of the riskless asset) and Σ the variance covariance matrix of the excess returns. Let W be begin of period wealth, r is the riskfree

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