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Religious-based portfolio selection

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ABSTRACT

We examine religious attendance and portfolio selection decisions for an individual with religious beliefs within a continuous-time framework. Our findings are three-fold. First, religious contributions increase with wealth capital, the degree of religious devotion, and an increase in the wage level. Second, religious attendance positively relates to wealth capital and the performance of stock investments, but negatively correlates with wage return rates. Third, participation in religious activities can result in declining demand for risky asset investments. Theoretically, this study explains how individuals' portfolio choices correlate with their religious activities.

1. Introduction

Financial scientists have determined that decision makers maximize their expected utility on the investment of financial assets by only considering both the investors' risk attitude and the assets' characteristics. (for example, Chacko & Viceira, 2005; Merton, 1971) However, numerous studies have documented that nonfinancial factors can massively affect investors' decision making. A growth of nonfinancial factor research has been fueled by the inability of pure financial theory to explain many empirical patterns. These factors include behavioral finance, culture, psychology, superstition, demography, religion, and so forth.

There is proof that religious beliefs and activities can change the decision making of investors or corporate managers. As documented by Iannaccone (1998), a person's religious beliefs can affect his or her decision behavior. Recently, Hilary and Hui's (2009) religion and corporate decision-making research documents that the religious factor has an important influence on corporate financial decisions. An early investigation studied by Stulz and Williamson (2003) shows that the religion factor predicts the cross-sectional variation in creditor rights in the investor-protection issue better than other economic and financial variables. Consequently, religion factors affect the investor's financial decisions and therefore should not be ignored in the analysis of financial issues. The financial decisions that consider religious factors might differ from those that do not consider these factors. Specifically, according to a report from Greeley (1989), Finke and Stark (1992), and Iannaccone (1998), two-fifths of Americans regularly go to church in a week and over 95% claim they believe in the existence of God or a universal ruler. Given the fact that most people have religious beliefs, regardless of whether they are Christian, Islamic, Buddhist, Jewish, or something else; the religious factor affects one's decisions on wealth management and time allocation. Because most people are religious, the decision making of investors or corporate managers also tends to relate to their religious beliefs and activities.

A number of studies have analyzed rational individuals' asset allocation from a purely financial viewpoint; however, numerous new studies also have documented the effect of nonfinancial factors on asset allocation. Markowitz (1952) highlights the mean-variance portfolio optimization that lets the individual form an asset portfolio with the highest expected return under any level of risk. Samuelson (1969) and Merton (1969, 1971) extend the financial asset-allocation problem to a continuous-time integrated consumption and portfolio-selection framework. Besides the risk and return factors, numerous studies have further examined nonfinancial factors in relation to how they change the decision making in portfolio selection or financial activities (See, Benson, Brailsfor, & Humphrey, 2006; Cohen, 2009; Ulker, 2009). For example, Cohen (2009) evaluates a loyalty effect on portfolio selection and documents that loyalty plays an important role in individual investment. Ulker (2009) studies how marital history affects the wealth holdings and portfolio choices of older individuals. Our study

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focuses on the effect of religious beliefs on the portfolio selection of personal financial investment.

The two major activities of religious followers are financial contributions and meeting attendance. Religious contributions and attendance can increase a religious follower's utility satisfaction. However, the religious contribution can crowd out worldly consumption, and religious attendance can crowd out work time. The individuals' consumption decreases as they donate more money to the church given restricted wealth capital. Moreover, the asset allocation between risky and risk-free assets changes with the religious contribution, because the religious contribution changes one's wealth capital available for investing. Thus, we can fairly say that an investor with religious beliefs should integrate the religious contribution decision into his or her financial planning in relation to asset allocation and consumption. Secondly, although religious attendance can benefit one's spiritual life and utility satisfaction, it can affect one's time available for work and thus the ability to gain income to accumulate wealth capital. Therefore, religious participation can indirectly affect an individual's financial decisions.

It is worthwhile to investigate how religious followers allocate their time between working and religious worship, and how they allocate their wealth between donating to churches and reserving resources for secular consumption. Many studies have used a variety of different samples and methodologies to investigate religious behavior. (e.g., Azzi & Ehrenberg, 1975; Karami & Hossein, 2004; Lipford & Tollison, 2003) This paper analyzes the optimal decisions of asset allocation and time distribution using a stochastic dynamic programming methodology. We attempt to solve the portfolio selection problem between risky assets, risk-free assets, consumption, and religious donation problems, as well as those of time allocations between religious participation and work. In effect, we integrate the decisions for asset allocation and consumption from financial economics and the decisions of religious attendance and contribution from religious economics into a systematic and theoretical continuous-time model.

This paper is organized into the following sections: In Section 2, we provide a literature discussion while Section 3 presents a description of the economic system for optimal decisions. Section 4 gives numerical examples, and we conclude in Section 5.

2. Religion activity and financial decisions

Studies on religion economics have been a developing field up to now. Azzi and Ehrenberg (1975) presented the first systematical analysis for determining religious participation in which they developed a multi-period utility maximization model of household time allocation to discuss the participation determinants in church-related activities. The results indicate that individuals shift toward less time-intensive forms of religious activities as wages grow over time and wealth increases, but attendance declines with declining wages and wealth.

Numerous studies have discussed the relationships between religious factors, work, and income. (e.g., Karami & Hossein, 2004; Lehrer, 2004; Lipford & Tollison, 2003; McCleary, 2008; Schwadel, McCarthy, & Nelsen, 2009) Lipford and Tollison (2003) empirically analyze the link between religious participation and income and make a simultaneous estimation for the effects of religious participation on income and income on religious participation. Karami and Hossein (2004) consider three factors that affect time allocation. The first is the desire to earn one's living expenditures through working. The second is the importance of work in the individual's mind; and, the third, is the role of the motivation of those who are committed to the next world. They find that wage changes can influence the amount of time given to religious activities. Specifically, Schwadel et al. (2009) observe the relevance of family incomes for religious participation in U.S. society and find that low-income white Catholics attend church less often than other white Catholics. They also document that the effects of income on church participation is greatest for younger white Catholics.

Turning to religious contributions, Hrung (2004) finds that religious contribution is increasingly a function of income. Morgan, Dye, and Hybels (1977) and Hrung further find that religious donations decrease as a percentage of total giving as income increases. Blomberg, Deleire, and Hess (2006) develop the afterlife cycle theory of religious contributions to study how individuals allocate resources between religious contributions and other consumption expenditures. Other related literature reviewing religion economics also exist, such as studies from Keister (2003), Liu (2001), Jackson and Fleischer (2007), and Iannaccone (1990, 1995, 1998).

In addition, numerous recent studies have examined whether religion matters in financial decisions (see, Hilary & Hui, 2009; Naughton & Naughton, 2000; Stulz & Williamson, 2003). Hilary and Hui (2009) discuss how religious factors influence corporate decision marking and find that firms located in counties with higher levels of religious activity exhibit lower investment rates and less growth but have a higher profit rate. Stulz and Williamson (2003) suggest that the religion factor plays a role in why investor protection differs across countries. Moreover, the predictive ability of religion factors in the cross-sectional variation of creditor rights is better than other factors.

3. Theoretical framework

This section presents a financial-decision model for a representative investor with religious beliefs. We first consider a continuous-time economy with a finite time span [0, T] in which the financial market consists of one risk-free asset and a representative risky asset. The risk-free asset continuously pays fixed interests to the investor. The $r \geq 0$ denotes an instantaneous interest rate. Assume that the following governs the dynamic process of a risk-free asset price ($M(t)$):

$$dM(t) = rM(t)dt, \quad M(0) \equiv 1 \tag{1}$$

In the financial market, there is also another asset: the risky asset that can be represented by a non-dividend paying stock. The dynamic process of a risky asset price $P(t)$, follows a geometric Brownian motion and is written as follows:

$$dP(t) = \alpha P(t)dt + \sigma P(t)dZ_P(t), \quad P(0) \equiv P_0; \tag{2}$$

where α and σ denote the expected instantaneous return and volatility rate of the risky asset. Assume that both parameters for the risky assets are exogenously given and constant over time. The dZ_P is an increment of a geometric Brownian motion and satisfies the filtered probability space $\{\Omega, \Im, P\}$, where Ω is the possible state set, and $\Im$ is the natural filtration of P-augment measures. For the purpose of friendly analysis, such as the work of Merton (1969, 1971, 1990) and Samuelson (1969), this study assumes that the financial market is perfect; and that the financial assets can be continuously traded without extra costs and taxes and can also be infinitesimally divisible.

Assume that a representative individual is an on-the-job investor with labor income $Y(t)$. The underlying process of wage income can be written as follows:

$$dY(t) = mY(t)dt + nY(t)dZ_Y(t), \quad Y(0) \equiv Y_0; \tag{3}$$

where m and n are the expected instantaneous growth and volatility rates of the wage income that are assumed to be constant over time. The dZ_Y is also the increment of the geometric Brownian motion. The