Financial Economics of Index Annuities:

An Analysis of Investor Returns

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Financial Economics of Index Annuities: An Analysis of Investor Returns

Submitted as partial fulfillment of the requirements for the degree of Doctor of Philosophy in Economics

To:

Dr. Juan C. Cachanosky, PhD

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ABSTRACT

Average investors hold their equity mutual funds slightly over three years, which significantly hinders their long-term performance. This study found that there is a statistically significant difference between the investor returns of index annuities and the investor returns of equity mutual funds for six distinct time periods starting from 1997-2011 and ending with 2002-2011. Additionally, the risk-adjusted investor returns of index annuities outperformed the risk-adjusted investor returns of equity mutual funds for the same time frame. The aforementioned outperformance was termed the "Index Annuity Investor Return Spread" (IAIRS) by the study. Investor return is often not reported nor written about in the financial press, as the media tends to focus on investment return which is defined as the geometric rate of return of a buy-and-hold investment over the long term. Conversely, investor return is defined as the long-term dollar-weighted rate of return or Internal Rate of Return (IRR) over time. The IRR factors in the timing and amount of cash flows into and out of the portfolio of the average investor.

Index annuities, through their downside protection, upside potential and temporally controlled contractual obligation often mitigate the risk of investors being affected by counterproductive, self-sabotaging investor behavior, thereby resulting in positive IAIRSs. The study is distinct from previously published index annuity studies that have compared investment returns (often formula-driven hypotheticals) of index annuities to market indices or investment returns of equity mutual funds. The implication of these findings regarding investor returns of index annuities and equity mutual funds is that individuals on a global scale now have information regarding the ability of index annuities to be a valuable component in portfolio construction and diversification.

DECLARATION

"I declare in lieu of an oath that I have written this doctoral thesis by myself, and that I did not use other sources or resources than stated for its preparation. I declare that I have clearly indicated all direct and indirect quotations, and that this thesis has not been submitted elsewhere for examination purposes or publication."

DISSERTATION COMMITTEE

We certify that we have read this dissertation and that, in our opinion, it is fully adequate in scope and quality as a doctoral thesis.

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DEDICATION

This body of work is dedicated to the individuals below that have been instrumental in my life and from whom I have gained knowledge and inspiration.

Tressa Bennett, my wife of over eighteen years, is an attorney and holder of a BSBA in Marketing from the University of Maryland and Juris Doctorate degree from the University of Baltimore Law School. Tressa was the first "Doctor" in the Bennett household. She is an ever-strong proponent of education and strong moral character with our daughter, Chloe Christina and our son, Luke Michael.

Chloe and Luke Bennett, my twins, are good-natured, loving and caring individuals with great senses of humor. I am incredibly proud of my two children. Both are excellent students, great athletes and will go as far in life as they aspire. I hope, in some small way, that my attainment of my Ph.D. will inspire them to pursue their dreams, whatever they may be.

Dee Stevens, my mother, was the first individual in her family to graduate from college whereby she received a Bachelor's degree in Education from Trenton State Teachers College. She went on to become a talented elementary school teacher who was passionate about her craft and eventually became an area administrator responsible for developing the curriculum for gifted and talented students in Fairfax County, Virginia.

My brother, Luke Bennett, has often told me how proud of me that he is, but truth be told, I am even more proud of him and what he has accomplished. He is a loving husband to his wife, Adrian (an accomplished Medical Doctor) and father of three wonderful children; Carter, Avery and Morgan. Luke is a private equity fund manager and holds a BA in Political Science from the University of Florida and a MBA from Vanderbilt – Owen Graduate School of Management.

My father, Colonel William Thomas Bennett, Jr., United States Air Force - Retired,

whom I have always admired for his dedication and service to his country. He holds a BA in Psychology from Rutgers University and a MPA in Technology Management from American University. He was a forerunner in the field of computers, has a keen sense of humor and, as an actor, has the unique ability to command the attention of any audience.

My stepmother, Deanna Bennett, is a retired United States Federal Government System Acquisition Manager. Deanna is an academic, worldly and widely read individual who holds a BA in Economics from the University of Chicago, a MA in Political Science from the University of Wisconsin as well as a MPA from Harvard University. She is a published author and actor and has always taken an interest in my life, particularly with respect to my professional and advanced educational pursuits.

CHAPTER 1: OVERVIEW

Introduction

The title of the study includes the term "financial economics", a sub-discipline of economics, the researcher's Ph.D. concentration. Financial economics is apropos for inclusion in the title of the dissertation as the term encompasses areas directly related to the topic of the study such as portfolio management, risk and return, the financial decisions of individuals, and their attitudes toward risk and investment choices (AEA, 2011). Financial economics utilizes microeconomic theory to address challenges and problems encountered in the discipline of finance (Eichberger & Harper, 1997) – or the interface that links finance to economics (Hens & Rieger, 2010). The title addresses the key issue of the study – analyzing investor returns of index annuities. The study will analyze and compare investor returns of index annuities to investor returns of equity mutual funds to determine if there are statistically significant differences. Additionally, the study will ascertain if the risk-adjusted investor returns of index annuities have outperformed the risk-adjusted investor returns of equity mutual funds.

Individual investors have a multitude of choices in which to invest. From mutual funds, individual equities and bonds to hedge funds, private equity, options contracts, managed futures contracts, and fixed, variable and index annuities among others. The primary commonality of the aforementioned investments for the end investor is the potential for the instrument to provide a rate of return for a given level of risk undertaken by the investor. The rate of return provided by an investment vehicle over the long-term is what is known as the investment return, which is defined as the geometric average of buy-and-hold returns (Dichev, 2007). The geometric average assumes equal weighting of cash flows over time. The investment return is what is commonly referred to in the media when rates of return are discussed. Mutual fund investment

returns are often reported without mentioning investor returns. For example, the following quote is from CNN Money magazine online: "a fund that meets our standards typically ends up delivering above-average (investment) returns - over the past five years, 73 percent of the actively managed funds on our roster outperformed their category average" (CNNMoney, 2012). Noticeably and commonly absent is any information regarding investor returns.

Investor return is defined as the long-term dollar-weighted rate of return (or Internal Rate of Return, IRR) over time (Dalbar, Inc., 2012). The IRR factors in the timing and amount of cash flows into and out of the portfolio of the average investor. "The average investor refers to the universe of all mutual fund investors whose actions and financial results are restated to represent a single investor" (Dalbar, Inc., 2012). The Dalbar Quantitative Analysis of Investor Behavior Report (2012) provides an approach for defining the average investor return that enables all mutual fund investors to be utilized as a statistical sample which warrants conclusive dependability.

Narrowing the previous list to apply more directly to the average investor, one finds that mutual funds, individual equities, bonds and fixed, variable and index annuities are appropriate. The reason for this is that these types of investments are more easily accessible to the average investor, as hedge funds and private equity often require prohibitive account minimums for average investors or accredited investor status. Additionally, options contracts and managed futures, although accessible to average investors, are esoteric instruments in which the average investor frequently lacks the necessary acumen to invest.

Tightening the list even further, the study focused on equity mutual funds and index annuities. The purpose for this emphasis is twofold. First, mutual funds have gained global

acceptance as the investment of choice for the average investor, as there are were over $24.7 trillion invested in mutual funds globally at the end of 2010 (ICI, 2011). In fact, 44% of households and over 90 million individuals in the United States owned mutual funds at the end of 2010 (ICI, 2011). Second, index annuities provide upside potential and downside protection, all the while, lowering the expected volatility in the average investor's overall investment portfolio. As a testament to their increasing popularity, sales of index annuities have grown significantly over the past fifteen years. In fact, indexannuity.org reports in Table 1 that index annuity sales have steadily increased in volume since 1997 (indexannuity.org, 2012).

Table 1

Index Annuity Sales Statistics

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sales in Billions	3.000	4.200	5.000	5.500	6.800	11.800	14.020	23.100	27.260	25.300	25.200	26.752	30.114	32.436	32.978
% Change		40.00%	19.05%	10.00%	23.64%	73.53%	18.81%	64.76%	18.01%	-7.19%	-0.40%	6.16%	12.57%	7.71%	1.67%

*Source: indexannuity.org, 2012.

Statement of the Problem

A limited number of investors have the expertise to attain consistent, sustainable superior long-term investment performance (Cocks, 2009). The average individual lacks the investment acumen to properly evaluate the difference between investor returns and investment returns. Individual investors are bombarded by the press and the media with investment return information, but the importance of investor return data is generally not emphasized. This has exacerbated the confusion regarding evaluating investor returns and investment returns and led to what Richards (2012) termed the "Behavior Gap". Counterproductive investor behavior has consistently led to subpar results (Richards, 2012). Investors have historically allowed psychological factors to influence their behavior and actions regarding their investments, which

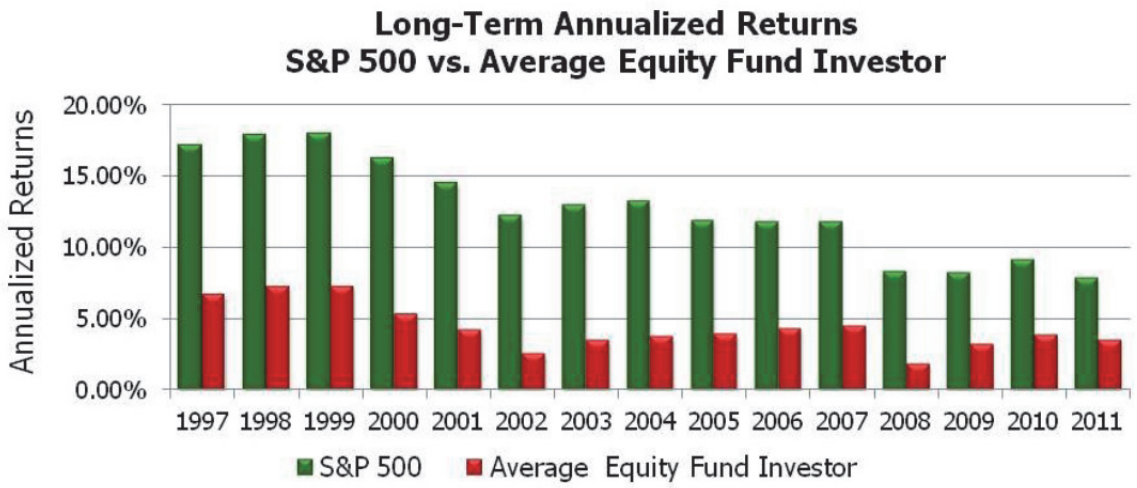
have negatively impacted their investor returns (Dalbar, Inc., 2012; Dichev, 2007). Investors typically suffer from poor timing decisions and inadequate planning (Morningstar, 2006). Interestingly, investors often understand the concept of diversification, but stray from the idea because they place too large an emphasis on past performance and "return chasing". Investors fall victim to counterproductive behavior by regularly buying the wrong fund instead of basing their purchases on their specific risk tolerance, objectives and time horizon. This frequently manifests itself by investors buying a fund too late or selling too early (Morningstar, 2006).

Investment return measures the geometric average buy-and-hold return of an investment, and the investment typically referenced is a broad-based benchmark index such as the Standard and Poor's 500 (Dichev, 2007). Information on rates of return published by mutual fund companies is typically investment return data (i.e. buy-and-hold strategy). Conversely, investor returns measure the experience of the average investor in an equity mutual fund (Morningstar, Inc., 2006) or other security. Investor returns are predicated on the returns of the investments that an individual owns and the timing and magnitude of their inbound and outbound capital flows, or in other words, their dollar-weighted return or internal rate of return (IRR) (Dichev, 2007). To be certain, investor returns in aggregate do not measure an individual's rate of return; instead investor return measures the return earned when all investors' experiences are aggregated over a specified period of time.

The existing theory regarding investor returns has focused on comparing investor returns to investment returns (Dichev, 2007; Morningstar, 2006; Friesen & Sapp, 2007; Barber, Odean, & Zheng, 2000; Dalbar, 2012). The aforementioned studies have concluded that long-term investor returns lag investment returns by 1% to 10% annually (see Figure 1). Long-term

investor return has been defined as the dollar-weighted, internal rate of return (IRR), whereas long-term investment return is the geometric average rate of return (Dichev, 2007; QFinance, 2012). The geometric average assumes equal weighting of cash flows over time. Conversely, the IRR factors in the timing and magnitude of cash flows into and out of the portfolio during the period measured. The phenomenon of underperformance by investors has occurred across multiple asset classes, including, domestic equities, international equities, U.S. fixed income and international fixed income (Dichev, 2007).

Figure 1



*Source: "Quantitative Analysis of Investor Behavior, 2012," DALBAR, Inc.

Investment Returns vs. Investor Returns: An Example

Dichev (2007) and Morningstar, Inc. (2006) provided similar examples that compared investment returns (geometric average buy-and-hold) and investor returns (dollar-weighted or IRR). For instance; suppose an investor purchases $1,000 worth of equity mutual fund XYZ on January 1, 2012. The price per share or net asset value is $100; therefore the investor holds 10 shares of XYZ fund. On December 31, 2012, the share price doubles to $200 and the investor

invests $1,000 more in XYZ fund. At this point the investor now owns 15 shares of XYZ fund. On December 31, 2013, the share price declines to $100 at which time, the investors sells all 15 shares of XYZ fund. The investment return can be derived by utilizing the geometric average buy-and-hold return (GABHR) where the rate of return for each period (R) is compounded over time period (n).

$$GABHR = [(1+R1)*(1+R2) \ldots (1+R_n)]^{1/n} - 1$$

Therefore, in the example above:

$$GABHR = [(1+R1)*(1+R2)]^{1/2} - 1$$

$$GABHR = [(1+100\%)*(1-50\%)]^{1/2} - 1$$

$$GABHR = 0\%$$

As shown above, the GABHR of the fund over the aforementioned two year period is 0%. This is logical, as the fund price was identical at the beginning of 2012 and the end of 2013 and as such, no return was earned.

Conversely, the investor return for the above mentioned fact-set yields an entirely different result, as the investor contributed a total of $2,000, but only received $1,500 when he sold his shares of XYZ fund at the end of 2013. There is a $500 economic loss for the investor, although the investment return of 0% does not recognize this fact, due to the timing of the cash flows. The actual investor return can be derived by utilizing an IRR calculation. The IRR is the rate which equates the Net Present Value (NPV) of a series of cash flows with zero (Dichev, 2007; Saunders, 2011). To calculate IRR, the cash flows (CF) for each period are utilized. Each CF is entered by taking the difference between assets at the beginning of the year and assets at the end of the year that are not a result of the return (IRR) (Morningstar, 2006). The IRR

formula is as follows:

$$CF_0 + CF_1*(1+IRR)^{-1} + CF_2*(1+IRR)^{-2} + \ldots + CF_t*(1+IRR)^{-t} = 0$$

When inserting the numbers from the fact pattern presented above, the formula provides the following:

$$-1{,}000 - 1{,}000*(1+IRR)^{-1} + 1{,}500*(1+IRR)^{-2} = 0$$

$$IRR = -17.71\%$$

The return of -17.71% listed above represents the dollar-weighted return over a two year period. This is significantly different than the 0% investment return calculation for the same period. The study contends that utilizing dollar-weighted (IRR) returns produces a more accurate measurement of an individual investor's experience. This is due to the fact that IRR takes into account the timing and magnitude of all cash flows. After all, if an individual investor where told that his return was 0% for fund XYZ (i.e. the published investment return of the fund), he would likely contest this conclusion, as he can easily ascertain that he actually lost $500 over the course of the two year holding period. This is why investor return is a more apropos metric than investment return for individual investors to measure their portfolio performance over the long term.

This rationale can also be applied in aggregate across the universe of all equity mutual fund investors to reach the same conclusion. Essentially, investment return (or geometric buy-and-hold) is a satisfactory barometer to measure the performance of equity mutual funds over time, but investor return (IRR or dollar-weighted return) is a more accurate method for capturing the actual returns of average investors' long term (Dichev, 2007; Morningstar, 2006). In fact, investor returns are of greatest use over longer periods of time (10 years or more) as they provide

representative data points spanning a broader range of economic cycles and equities markets.

Additionally, existing theory puts forth the concept of risk-adjusted return when evaluating different investment vehicles (Reichenstein, 2009). Risk-adjusted returns measure how much an investment returned in relation to the risk that was undertaken to achieve the return (QFinance, 2012). The Capital Asset Pricing Model (CAPM) is one method that was used in this study to derive risk-adjusted return. The CAPM is the lynchpin of modern financial economics (Bode, Kane & Marcus, 2009). CAPM was created by William Sharpe in 1964 after Henry Markowitz and James Tobin provided the initial groundwork on the topic (Litzenberger, 1991). The CAPM provides an accurate prediction of the relationship observed between the risk of an asset and its expected return (Bode, Kane & Marcus, 2009). The CAPM also results in a benchmark rate of return for assessing potential investment vehicles. For the purposes of this study, the CAPM will be utilized to measure index annuity and equity mutual fund risk-adjusted performance. The CAPM formula is as follows:

$R_i = R_f + ß_i*[(R_m) – R_f]$

Where:

R_i = Expected Return of an Investment

R_m = Expected Return of the Market

R_f = Risk Free Rate of Return

$ß_i$ = Beta of the Investment

Risk-adjusted return is often measured by the Sharpe Ratio:

Sharpe Ratio = $(R_P – R_f)/StdevR_P$

Where:

R_P = Portfolio Return

R_f = Risk-Free Return

$StdevR_p$ = Standard Deviation Portfolio Return

The higher the Sharpe ratio, the better the historical risk-adjusted performance, and the greater the return per unit of risk (QFinance, 2012).

This study has provided the necessary infrastructural framework regarding the appropriate return measurement to employ which most accurately calculates average investor performance; dollar-weighted returns measured by IRR. The study calculated the "Index Annuity Investor Return Spread" (IAIRS), a term developed by the researcher that provides a measurement of the difference between risk-adjusted *investor* returns of index annuities and the risk-adjusted *investor* returns of equity mutual funds calculated over the same periods of time. The IAIRS is calculated by subtracting the absolute value of the risk-adjusted investor rate of return for equity mutual funds from the risk-adjusted investor rate of return for index annuities and or: $R_{IA} - [abs(R_{EMF})] = IAIRS$. The risk-adjusted returns were derived by using CAPM and the Sharpe Ratio. The IAIRS provides a method of comparing, in an "apples to apples" fashion, how index annuities investors performed versus equity mutual fund investors, factoring in risk.

The study has attempted to fill a knowledge gap as it endeavored to determine whether there is a statistically significant difference between the investor returns of index annuities and the investor returns of equity mutual funds for the period from 1997-2011. Due to the non-normality of the distributions of investment and investor returns (Babbel, 2008), the study utilized a non-parametric test, the Mann-Whitney U Test, in order to test for statistical significance. Nonparametric tests were used because parametric tests, such as the T-test, are