

Financial analysis of equity-indexed annuities

William Reichenstein, Ph.D.^{a,*}

Department of Finance, Hankamer School of Business, Baylor University, Waco, TX, USA

Abstract

This study examined historical returns on four equity index annuity (EIA) contract designs and 13 contracts for 1957–2008, the period since the S&P 500 began. None of these contracts could match returns on one-month Treasury bills. Based on alphas and Sharpe ratios, none of the contracts could produce competitive market-based returns. More important, because of their design, index annuities *must* underperform returns on similar risk portfolios of Treasury's and index funds. EIAs impose several risks that are not present in market-based investments including surrender fees and loss of return on funds withdrawn before the end of the term. This research suggests that salesmen have not satisfied and cannot satisfy SEC requirements that they perform due diligence to ensure that the indexed annuity provides competitive returns before selling them to any client. © 2009 Academy of Financial Services. All rights reserved.

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1. Introduction

Most indexed annuities promise investors part of market returns, while protecting them against market decreases. The investor shares in positive returns, while avoiding losses. The promise is alluring, but how do they perform in practice?

This study addresses this issue. Indexed annuities (IA) including equity indexed annuities (EIAs) are complex investment contracts. One goal of this study is to explain some of the complexities of IAs. Another is to discuss the regulatory issue of whether IAs offers competitive risk-adjusted returns. To address that question, this study simulates historic returns for 1957 through 2008 on popular EIA contracts. It concludes that none of these contracts offered competitive risk-adjusted returns for the period since the S&P 500 began.

* Corresponding author. Tel.: +1-254-710-6146; fax: +1-254-710-1092.

E-mail address: Bill_Reichenstein@baylor.edu

More important, because of their design, IAs *must* underperform returns on similar risk portfolios of Treasury's and index funds.

Section 2 discusses a key regulatory issue and explains terms used in the annuity industry. Section 3 presents methods used to calculate returns credited to investors' accounts. Section 4 presents the literature review. Section 5 discusses the competitiveness of IA returns. In addition, it presents data and methodology and then presents the analysis of EIAs hypothetical risk-adjusted performance. Section 6 concludes.

2. Industry background

2.1. Regulatory issue

A key regulatory issue is whether indexed annuities are suitable investments. Not surprisingly, there are gray areas when deciding whether an investment is "suitable." National Association of Securities Dealers (NASD), now part of Financial Industry Regulatory Authority (FINRA), defines certain conditions that must be met before an investment can be considered suitable. In *Notice to Members 03-71*, NASD (2003) "remind members that the sale of NCIs [nonconventional investments], like more traditional investments, requires them to:

1. Conduct appropriate due diligence with respect to these products;
2. Perform a reasonable-basis suitability analysis; ... and
6. Provide appropriate training to registered representatives that sell these products.

Given the complex and, at times, difficult-to-understand nature of NCIs, members should take particular care to assure that they are fulfilling these obligations."

Concerning the "due diligence" requirement, this *notice* says:

"A reasonable-basis suitability determination is necessary to ensure that an investment is suitable for some investors (as opposed to a customer-specific suitability determination, discussed [in the *Notice*], which is undertaken on a customer-by-customer basis). Thus, the reasonable-basis suitability analysis can only be undertaken when a member understands the investment products it sells. Accordingly, a member must perform appropriate due diligence to ensure that it understands the nature of the product, as well as the potential risks and rewards associated with the product."

Concerning the "reasonable-basis suitability" requirement, NASD (2005) *notice to members 05-59* says:

"Members should consider whether an investment in a structured product meets the reasonable basis suitability standard if the instrument is priced such that the potential yield is not an appropriate rate of return in relation to the volatility of the reference asset based upon comparable or similar investments, in terms of structure, volatility, and risk in the market as determined at the time the structured product is issued. For example, similar structured products based on reference securities that possess substantially similar vola-

tility characteristics, but which offer materially different rates of return in the note component, should call into question whether the instrument with the lower yield meets the reasonable basis suitability standard. While an exact risk/reward calibration among different instruments or investments may not be possible, NASD expects members to exercise their market expertise to recognize those situations where the materiality of difference is not in doubt and, consequently, identify that the lower yielding instrument does not represent a reasonable rate of return given the attendant risks.”

Similar statements concerning due diligence and reasonable-basis suitability requirements are established in NASD (2003) *Notices to Members* 03–07, 03–71, and 05–59.

Concerning the requirement to provide appropriate training, *notice to members* 03–71 says:

“Members must train registered persons about the characteristics, risks, and rewards of each product before they allow registered persons to sell that product to investors. ... For a variety of reasons, the need for adequate training is heightened when registered persons sell NCIs. First, because of the unique nature of these products, many investors, especially retail investors, may not understand the features of the product, and may not fully appreciate the associated risks of investing in them.”

In summary, before an agent can sell an indexed annuity he or she must ensure that the investment is suitable for some investors. That is, it must offer competitive risk-adjusted returns. Because indexed annuity salesmen must understand the products they sell, the next section discusses some of the complexities of indexed products.

2.2. *Complex features*

This subsection discusses and explains some of the features in many EIA contracts. The features discussed in this section include (1) bonus credit, (2) free withdrawal amount, (3) surrender penalties, (4) market value adjustment, (5) death benefit, and (6) complexity of annuities. In addition, I discuss the particular terms of these features in an AmerUS annuity contract signed on February 4, 2004. This contract, (henceforth, the model contract) was chosen because it is generally representative of contracts at this time and provides a specific example of several features. To greatly simplify the discussion, let’s assume the investor makes a single premium payment of \$40,000 and she is the only annuitant.

2.1.1. *Bonus credit*

Some indexed annuities offer investors a bonus credit just for signing the annuity. If there is a bonus, it is typically 1% to 7% of the initial premium. The bonus may immediately increase the account value but a higher surrender penalty may ensure that the investor will lose that bonus unless she remains in the contract for the surrender period. Moreover, even if the investor holds the annuity until the end of the surrender period, the insurance firm could extract its cost from the investor by imposing higher annual expenses in the form of lower participation rate, higher spread, or lower cap rate—terms that will be explained later.

The following excerpt comes from FINRA Investor Alert, “Variable Annuities: Beyond the Hard Sell,” May 27, 2003:

“In an attempt to attract investors, many variable annuities now offer bonus credits that can add a specified percentage to the amount invested in the variable annuity, generally ranging from 1% to 5% for each premium payment you make. Bonus credits, however, are usually not free. To fund them, insurance companies typically impose high mortality and expense charges and lengthy surrender charge periods.”

The following excerpt comes from “NASD Regulation Cautions Firms for Deficient Variable Annuity Communications,” NASD (2002).

“Bonus Credit Concerns: Some of the communications prominently discussed the bonus credit features of variable annuities, yet failed to prominently explain that fees and expenses for such contracts may be higher, and the surrender periods may be longer, than contracts that do not provide the bonus. Such an explanation is necessary to provide a sound basis for evaluating the facts with respect to the product as required by NASD Conduct Rule 2210.”

The model contract pays a 6% bonus. In addition, it has a surrender fee of up to 18% for 14 years. Based on a sample of annuities from AmerUS and affiliates, most annuities that did not include a bonus generally charged a surrender fee of up to 12% for 10 years. Thus, the 6% bonus in the model contract resulted in a 6% higher initial surrender fee and a four year longer surrender period. Therefore, if the investor surrendered the contract within 14 years, she would lose most or all the bonus through a higher surrender fee. Moreover, the insurance firm could extract this bonus from the investor by imposing higher expenses. Finally, the investor may not receive the 6% bonus if she surrenders the contract in the first 15 years. A Market Value Adjustment Endorsement applies to this contract for the first 15 years, that is, through “the last day of the first Certificate Year that does not contain Withdrawal Charges.” If she surrenders the contract within 15 years then the Guaranteed Surrender Value is the larger of two amounts, one of which excludes the bonus credit.

2.1.2. Free withdrawal amount

The “free withdrawal amount” is the amount that can be withdrawn without incurring a surrender charge. It is generally zero in the first year. After the first year, it is generally 10% of the account value on the prior certificate anniversary date. These are the contract terms in the model contract.

2.1.3. Surrender fee

In EIAs that offered no bonus credit, typical surrender charges were up to 12% for 10 years. A typical structure was 12% surrender fee in each of the first three years, 11% in the 4th, 10% in the 5th, 9% in the 6th, 8% in the 7th, 7% in the 8th, 6% in the 9th, and 5% in the 10th year. Not surprisingly, the size of the agent’s commission is related to the size of the first year’s surrender fee.

In the model contract, the surrender fee is up to 18% for the first 14 years. It is 18% in each of the first three years, 15% in the 4th, 14% in the 5th, 13% in the 6th, 12% in the 7th, 11% in the 8th, 10% in the 9th, 9% in the 10th, 7% in the 11th, 5% in the 12th, 3% in the 13th, and 1% in the 14th year. As a rule of thumb, the first year's surrender fee is about 12% plus the bonus credit, if any. Thus, the bonus is not free.

2.1.4. Market value adjustment

If an individual withdraws an amount exceeding the free withdrawal amount, the Market Value Adjustment (MVA) adjusts the account value for changes in market interest rates. The MVA applies to withdrawals exceeding the free withdrawal amount. In addition, if the contract is surrendered the MVA applies to free withdrawal amounts made during the 12 months before surrender.

To understand the reason for the MVA, note that the issuing insurance firm generally purchases bonds with maturity dates that approximate the length of the annuity's surrender period. If the investor surrenders the policy early then the insurance firm must sell the bonds. The insurance firm would realize a loss if interest rates have risen during the holding period, and vice versa. The purpose of the MVA feature is to transfer that risk to the investor. The typical MVA Factor and the MVA in the model contract is $0.50 \times (A-B) \times N/12$, where A is the beginning 10-Year Constant Maturity Treasury yield, B is the closing 10-Year Constant Maturity Treasury yield on the day before the surrender or withdrawal plus 0.25%, and N denotes the number of complete contract months remaining before the surrender period expires.

There are two reasons why the formula is biased against the investor and toward the insurance firm. First, B is the current 10-year yield *plus 0.25%*. Suppose there are 8 years remaining in the withdrawal charge period, (i.e., $N = 96$). Even if the 10-year yield is unchanged, there would be a -1% MVA, $0.50 \times (-0.0025) \times 96/12$. So, the investor would receive 1% less because of the MVA despite the fact that the 10-year yield did not change. Second, the yield curve is normally downward sloping. So, yields generally fall and bond prices generally rise as the original bonds approach maturity. Suppose the insurance firm bought 10-year bonds at par yielding 6% when the annuity was issued. The investor surrenders the contract six years later, when the original bond has a remaining maturity of four years. Suppose the 10-year yield at surrender is at 6% and the four-year yield is 5%. The four-year bond would sell at a premium to par. However, the MVA formula, which is based on the 10-year yield, would prevent this appreciation from accruing to the investor.

In the model contract, the MVA expires after 15 years, at the end of the first year when there is no surrender period. In many contracts, the MVA expires at the end of the surrender period. If an investor surrenders the model contract at the end of the sixth year, the surrender value would reflect the 13% surrender penalty and the MVA, whether positive or negative. Furthermore, the model contract's Guaranteed Surrender Value is the larger of two values, one of which is $\$31,045.36$ [$\$40,000 (0.65)(1.03)^6$] after six years, that is, 65% of the \$40,000 premium accumulating at 3% for the six years. Notice that this amount excludes the 6% bonus credit.

2.1.5. Death benefit

After days of studying the model contract dated February 4, 2004, the death benefit appears to be as follows. Since “the Annuitant is 71 or older on the Certificate Date [that is, February 2, 2004], the Death Benefit will be the Surrender Value.” For the first 15 years while the MVA Endorsement is in effect, it amends the definition of Guaranteed Surrender Value and Surrender Value. The amended definition of Surrender Value is the greater of (1) Account Value or Guaranteed Account Value (GAV) as of the date of surrender adjusted for any MVA and any withdrawal charges applicable (including any MVA and any withdrawal charges applicable to any previously free withdrawals made during the 12 prior months) and (2) the Guaranteed Surrender Value (GSV). The GSV is the greater of (1) the initial premium, \$40,000, less MVA and any withdrawal charges applicable (including any withdrawal charges applicable to any previously free withdrawal amount made during the 12 prior months) and (2) 65% of the \$40,000 premium, but not including the 6% premium, accruing at 3% per year. Even after 13 years, the latter is \$38,181.88 or $\$40,000(0.65)(1.03)^{13}$, which is less than the original investment.

If the death occurs after the MVA Endorsement has expired then the death benefit is the Surrender Value. The Surrender Value is the greater of (1) account value on that date and (2) the GSV. The GSV is the greater of (1) the GAV and (2) 65% of the \$40,000 premium, but not including the 6% premium, accruing at 3% per year.

The death benefit seldom includes interest for a partial term period. For example, suppose the individual invests in a two-year point-to-point EIA, which is discussed below, and the death occurs on January 4, 2008, 23 months into the two-year term ending February 4, 2008. The death benefit is the account value as of February 4, 2006, the end of the last two-year term; the beneficiary receives no interest for the 23 months since February 4, 2006.

Separately, suppose the death benefit as of January 4, 2008 is \$38,000. If this benefit is paid on April 4, 2008—three months after the date of death—then the insurance firm would pay interest on the \$38,000 at an interest rate set at its discretion subject to the limitation that it will not be less than 2% or the amount required by law if greater.

Finally, let's compare this EIAs death benefit with other investments. If a widow dies, her beneficiary inherits the value of her accounts at brokerage firms, mutual funds, credit unions, and banks. These financial institutions would not call this a death benefit. Yet, the insurance industry insists on calling the equivalent a death benefit. For example, suppose the EIAs account value is \$42,000, \$2,000 more than the original investment. At death, the beneficiary receives this amount after a possible MVA and reduction because of the surrender penalty, and it is called a death benefit. By contrast, consider an original \$40,000 investment in another brokerage firm, mutual fund, or depository institution that is worth \$42,000 at death. Naturally, the beneficiary receives this \$42,000. These financial institutions would not call this a death benefit because it is understood that it was never their money. Yet, the insurance industry insists on calling the equivalent \$42,000 going to the beneficiary a death benefit. In short, it is not clear that an annuity's death benefit offers a benefit beyond that already provided by other investments.

2.1.6. Complexity

We begin with a selection of regulators comments about EIAs complexity and then list comments from scholars. A few of regulators' warnings follow:

“Why an alert on equity-indexed annuities?

Sales of equity-indexed annuities (EIAs) have grown considerably in recent years. Although one insurance company includes the word ‘simple’ in the name of their product, EIAs are anything but easy to understand. One of the most confusing features of an EIA is the method used to calculate the gain in the index to which the annuity is linked. To make matters worse, there is not one, but several different indexing methods. Because of the variety and complexity of the methods used to credit interest, investors will find it difficult to compare one EIA to another.”

And later in the same FINRA Investor Alert (2005), “**Caution!** Some EIAs allow the insurance company to change participation rates, cap rates, or spread/asset/margin fees either annually or at the start of the next contract term. If an insurance company subsequently lowers the participation rate or cap rate or increases the spread/asset/margin fees, this could adversely affect your return. Read your contract carefully to see if it allows the insurance company to change these features” (bold in original).

The SEC (2008) provides a similar warning:

“What are some of the contract features of equity-indexed annuities?

Equity-indexed annuities are complicated products that may contain several features that can affect your return. You should fully understand how an equity-indexed annuity computes its index-linked interest rate before you buy.”

Scholars have also commented on the complexity of EIAs. Collins, Lam, and Stampfli (2009) described EIAs as “fiendishly difficult to understand.” Fliegelman, Robinson, and Riegel (2001) entitle their study “Equity Indexed Annuities: Complexity Personified.” McCann and Luo (2006) write, “No registered rep, insurance broker, or retail investor, and precious few finance PhDs, could understand these products.”

3. Interest crediting methods

This section discusses interest crediting methods used by indexed annuities. It begins with a general model design that applies to most contracts and then proceeds to specific designs.

3.1. General model design

For most contract designs, the interest credited for a term period is the lesser of the following:

$$(part\ rate) [(I_{t+n} - I_t)/I_t - spread] \text{ or} \quad (1)$$

$$(part\ rate) [cap\ rate - spread]. \quad (2)$$

Part rate denotes the participation rate. I_t denotes the value of the index (usually the S&P 500) at the beginning of the term and I_{t+n} is a terminal value used in the returns formula. As will be discussed later, I_{t+n} may or may not be the ending index value. Spread is a cost spread, perhaps 1.5% to 5%. Cap rate denotes a cap rate that places a cap or ceiling on returns for that term period. To understand the formulas, note that $(I_{t+n} - I_t)/I_t$ is the usual formula for a return on an asset that produces no cash flows. In Eq. (1), this return is reduced by the spread. If the participation rate is less than 100% then it is further reduced. Finally, Eq. (2) restricts the upside to no more than (part rate) [cap rate – spread]. So, if the participation rate is 100%, cap rate is 8%, and spread is 3% then the maximum interest credited is 5% even if the index rises 30%. Some contracts have participation rate of 100% or spread of 0%, in which case Eqs. (1) can be simplified, or they have no cap rate in which case Eq. (2) does not apply.

The interest credited on an EIA is based on the *price* index. So, the investor may get part of the price appreciation, but she does not receive any dividends associated with the underlying stock index. The return may be further reduced based on participation rate, spread, and cap rate. Moreover, the insurance firm almost always has the ability to adjust at its discretion the participation rate, spread, or cap rate at the beginning of each term.

3.2. Specific model designs

This section is based on a sample of contracts issued by AmerUS and its affiliates from roughly 1998 through 2005. Unless otherwise stated, the interest crediting methods are similar to those found by Collins, Lam, and Stampfli (2009) and discussed by Olsen and Kitches (2009). There are four general interest crediting model designs for EIAs: one-year annual reset, two-year point to point, one-year monthly cap, and one-year averaged monthly. In addition, there is a separate design for bond indexed annuities.

3.2.1. One-year annual reset

The first model design is the one-year annual reset EIA (sometimes called one-year point to point). Each year, the interest credited is: $\text{Max}(0, \min(\text{part rate}(I_{t+1} - I_t)/I_t - \text{spread}), \text{part rate}(\text{cap rate} - \text{spread}))$, where part rate denotes the participation rate, I_t is the index level at beginning of year, I_{t+1} the index level at the end of year, spread is the spread, and cap rate places a cap on the return that year. The participation rate is always 100% and the spread is always 0%. Therefore, if the index level falls, the interest credited for the year is 0. If the index level rises the return is the lesser of the price appreciation return on the index, $(I_{t+1} - I_t)/I_t$, or the cap rate.

3.2.2. Two-year point-to-point

The model design for the two-year point-to-point EIA is identical to that of the one-year annual reset EIA, except the returns are calculated and credited based on a two-year term. The typical two-year contract had a 100% participation rate and 0% spread. If the two-year

price appreciation is negative, the two-year return is 0. If the appreciation is positive, the return is the lesser of the price appreciation or the cap rate.

3.2.3. *One-year monthly cap index*

The one-year monthly cap model design imposes a monthly cap rate in each contract year, where the cap rate can be changed at the firm's discretion at the beginning of each contract year. Suppose the monthly cap rate is 3% in a year when there are six months with 5% price appreciations, six months with 3% price depreciations, and the dividend yield is 3%. The S&P 500 would earn about 15% including dividends $[(1.05)^6 (0.97)^6 (1.03) \approx 1.15]$. The investor would earn no return this year because she does not receive dividends and, since $(1.03)^6 (0.97)^6$ is less than 1, the return would be zero. This example illustrates that, by design, monthly cap contracts limit the monthly upside return but not the monthly loss. Of course, the minimum yearly return of 0% provides downside protection.

3.2.4. *One-year averaged monthly*

The fourth model design is the one-year averaged monthly contract. To illustrate how this contract calculates returns, assume the contract year begins January 1. The annual return is the larger of $\text{Max}(0, \{\text{average end-of-month index levels January through December} - \text{beginning index level in January}\} / \text{beginning index level in January} - \text{spread})$ and $\text{Max}(0, \text{cap rate} - \text{spread})$. For example, suppose the S&P 500 rose 10 each month from 1,200 on January 1 to 1,320 on December 31. With a 3.5% spread, the return would be $[(1,265 - 1,200)/1,200] - 0.035 = 0.019$ or 1.9%, where 1,265 is the average of the month end price indexes, (i.e., 1,210, 1,220, 1,230, through 1,320). In this example, the stock market would have earned about 13%, 3% dividend yield plus 10% price appreciation from 1,200 to 1,320. However, the investor would get only 1.9% return. She gets none of the dividend yield. The averaging feature tends to cut the price appreciation in about half, and the spread—3.5% in this example—further reduces the return. Finally, the return is further reduced by limiting the annual return to no more than (cap rate - spread).¹ Note, however, if there is a sharp decrease in stock prices at the end of the term then the averaging feature may be beneficial.

McCann and Luo (2006) modeled the returns on a one-year averaged monthly EIA. For 1975–2004, this EIA earned 9.8% of the S&P 500's cumulative total return. They also calculated the 241 separate 10-year returns spanning 1975 to 2004 on this averaged monthly EIA. On average, this EIA earned 23% of the S&P 500's cumulative 10-year return.

Collins, Lam, and Stampfli (2009) note two other EIA contract formats that they found to be popular. One is a multiyear averaged contract and the other is a high-water mark contract. In the multiyear averaged contract, the terminal value, I_{t+n} , is the average monthly index value for the last 12 months. Otherwise, it is similar to the one-year averaged monthly contract. The high-water mark contract may have a seven- to 10-year term. With a seven-year term, the terminal value, I_{t+n} , would be the highest index value at the end of any of the seven years. VanderPal (2009) reports that high-water-mark contracts represent less than 1% of sales.

Note that the investor does not receive any return on funds withdrawn from the contract

before a term is complete. Therefore, an investor who withdraws some or all of his funds 23 months into a two-year term would receive no return for that 23 months on the withdrawn funds. Moreover, the withdrawal would be subject to a surrender charge and potentially a MVA. Similarly, an investor who withdraws funds after six years of a seven-year term would not receive any return for that six years on the withdrawn funds.

4. Literature review

This section summarizes the literature that compares the returns on EIAs to returns on marketable assets and portfolios of assets. Kuhlemeyer (2000) used monthly returns and price appreciations on large-cap stocks for December 1925 through June 1998 to simulated one-, five, and nine-year returns for various point-to-point EIA contract designs. In total, he randomly drew 100,000 monthly returns with replacement to form 8,333 one-year, 1,666 five-year, and 925 nine-year simulated returns. Based on these simulated returns, he reached the following conclusions. The one-year point-to-point contracts offered mean returns “in the neighborhood of 3.6% to 4.0%.” Since Treasury bills offered 3.8% annual returns, he concluded that “it is difficult to justify very short-term EIAs in any portfolio.”

The five-year contracts offered annualized returns from 6.12% to 7.01% with a base case return of 6.14%. He wrote that “an expected return of 6.14% over a five-year period should not generate significant excitement when risk-free 3-month Treasury bills historically earn an annualized total return of 3.8% and a comparable S&P 500 investment expects to earn an annualized total return of 13.8%.” By my calculations, this suggests a beta for the base case of about 0.23 $[(6.14-3.8)/(13.8-3.8)]$. Furthermore, he said the “performance of the five-year EIA will be similar to that of a regular annuity” and slightly below the 1988–1997 returns on intermediate- and long-term Treasury bonds.

The nine-year contracts offered annualized returns between 7.41% and 8.30% with a base case of 7.6%. By my calculations, this suggests a beta for the base case of about 0.38 $[(7.6-3.8)/(13.8-3.8)]$. Of course, the insurance firm could count on some investors withdrawing funds before the end of the one-, five-, and nine-year terms in which case the investors likely lost return for the partial terms on these withdrawals.

Marrion, VanderPal, and Babbel (2009) compared five-year annualized returns on 109 EIA contracts from 1997 through 2007. The EIAs produced average returns of 5.79% compared to 5.39% for taxable bond funds and 4.73% for fixed annuities. They note several limitations to their data set including the returns were derived from carriers that chose to disclose returns, few data points, and the short time span examined. Furthermore, the comparisons ignore differences in risk. Nevertheless, for this short period, EIA returns exceeded those of these less risky investments.

McCann (2008) compared 10-year returns for 1990–1999 on S&P 500, 10-year Treasury bonds and four American Investors Life EIAs. The one-year point to point (a.k.a., one-year annual reset) with 6.5% cap earned 4.9% per year. The two-year point to point with 13% cap earned 4.9%. The one-year monthly cap with a 2.35% monthly cap earned 4.7%, while the one-year averaged monthly contract earned 4.6% per year. The S&P 500 earned 12.1% but then it was riskier. However, all four EIAs underperformed the 5.7% earned by Treasury

bonds despite the EIAs higher risk. This underperformance compared to Treasury bonds is noteworthy because the 1990s was a bull market.

Collins, Lam, and Stampfli (2009) wrote a detailed study that covers several aspects of EIAs. They examine the performance of a representative seven-year point-to-point EIA contract for seven-year periods ending December 1996 through December 2008. In their Fig. 2, they compare payoffs on this EIA to those received by investors holding the S&P 500 index “(adjusted by a reasonable factor for fees and expenses).” There were several seven-year periods where S&P 500 returns substantially exceeded returns from the EIA, and several periods when their returns were similar. Furthermore, they graph corresponding results for “six types of representative EIA contracts.” They conclude that “the EIA contract holder incurred, on average, a significant opportunity cost during the period under evaluation.” Since S&P 500 and this EIA have different risks, this analysis compares the tradeoff between risk and returns between assets with different levels of risk.

To try to compare risks and returns on assets with similar risks, Collins, Lam, and Stampfli (2009) compare 5,000 simulated seven-year returns on a representative point-to-point EIA contract with returns on portfolios of S&P 500 and Treasury bills. The comparison portfolios were 100–0% stocks-bills, 90–10%, 80–20%, 70–30%, 60–40%, and 50–50% stocks-bills with no rebalancing and assumed 0.50% in yearly fees. I discuss the results for their 50–50% portfolio because my analysis suggests that EIAs’ beta risk is usually about 0.15. Their simulations used two returns distributions: one for a bull market and another for a bear market, with the computer generating regime switches. They conclude that the EIAs guaranteed cumulative return exceeded the return on the 50–50% stocks-bills portfolio 16.1% of the time, while the EIAs maximum feasible return was less than the return on the 50–50% portfolio 42.0% of the time. If this EIAs’ beta is 0.15 then the risk-appropriate benchmark portfolio is 15–85% stocks-bills. In short, Collins et al., appropriately compared the returns on EIAs to stocks-bills portfolios. However, my results suggest that even their most conservative portfolio contained too much beta risk.

In another study, McCann and Luo (2006) compare the returns on a seven-year point-to-point EIA to that of a portfolio containing 60% Treasuries and 40% in an S&P 500 index fund. They conclude that the 60–40% market-based portfolio outperformed the EIA 96.9% of the time. McCann and Luo appropriately compare the returns on EIAs to stocks-bills portfolios, but my results suggest that the risk-appropriate benchmark portfolio should be more conservative. They conclude that investors buying an EIA do not receive fair value for their investment.

In another study, Edwards and Swidler (2005) examined the competitiveness of equity-linked certificates of deposit (ELCDs). The payoffs on ELCDs are similar to those on EIAs with a guaranteed minimum return and the possibility of market-linked returns. They compared historical returns on ELCDs if they had been around since 1981 to those on five-year Treasuries, S&P 500, and synthetic ELCDs, where the latter are risk-equivalent investments to ELCDs. For 1981–2004, they conclude that the ELDCs slightly underperformed five-year Treasuries, underperformed S&P 500, and, most importantly, underperformed the risk-equivalent synthetic ELCDs by 5% per year. Since the synthetic ELCDs have the same call-option return characteristics and systematic risk as ELCDs, these results

Table 1 Spreads on AmerUS annuities

Year	2000	2001	2002	2003	2004	2005	2006	Average
Product spread	2.03%	2.00	2.04	2.12	2.23	2.11	2.31	2.12%

Sources: Various SEC financial filings by AmerUS Group.

The 2006 number is for the rolling four quarters ending September 30, 2006.

imply that the ELCDs offer returns that are lower than market-based returns available on similar risk assets.

Finally, McCann and Luo (2006) used sophisticated models to estimate the value of a 10-year point-to-point EIA. They conclude that the EIA has a “fair” value of 84% of the EIAs investment premium. Therefore, when someone invests \$10,000 in an EIA, she effectively immediately transfers to the insurance firm and broker about \$1,600.

5. Competitiveness of indexed annuity returns

As regulators emphasize, before an insurance agent can sell an annuity, he or she must perform due diligence to ensure that the investment offered ex ante competitive returns. Therefore, it is appropriate to compare the net returns available in an EIA to those available on similar-risk investments held outside an annuity.

5.1. Indexed annuities’ structure ensures non-competitive returns

Because of their structure, *all* indexed annuities *must* produce below market, risk-adjusted returns. Since they have been regulated as fixed annuities, IA contracts do not reveal expense ratios in the annuity contracts. However, Table 1 presents average product spreads by year from AmerUS Group’s financial statements as filed with SEC for 2000–2006. From AmerUS Group financial statements, “Product spread is a key driver of our business as it measures the difference between the income earned on our invested assets and the rate which we credit to policyowners, with the difference reflected as segment operating income. We actively manage product spreads in response to changes in our investment portfolio yields by adjusting liability crediting rates while considering our competitive strategies.” For this period, the average product spread was 2.12%.²

To understand why this spread ensures that the annuity will offers noncompetitive risk-adjusted returns, it is important to understand how an insurance firm would hedge the investment risk in an indexed annuity. Suppose one-year yields on high-grade bonds are 6%. In the one-year annual reset strategy, per \$100 premium, the insurance firm would invest about \$94.26 in high-grade bonds [$\$100/(1.03)^2$, where 1.03 is one plus the semiannual yield]. Of the remaining \$5.74, the insurance firm may take \$2.12 to pay for commissions, other expenses and to provide a profit margin, and invest the remaining \$3.62 in options. Suppose the S&P 500 index is at 1000. The insurance firm may set the cap rate at 4% in a one-year annual reset model. The 4% would be selected because, based on option prices, the insurance firm would be able to use the \$3.62 to buy enough at-the-money call options and

sell enough call options with a 1040 exercise price to offer a 100% participation rate. Thus, the investor receives up to 4% price appreciation, but is assured against a loss. Because interest rates and options' implied volatilities change, the insurance firm almost always retains the right to set at its discretion at least one of the following: participation rate, spread, and cap rate.

Because of their design, managers of indexed annuities cannot add value through security selection; they buy Treasury securities and index options, but do not engage in individual security selection. The risk-appropriate benchmark portfolio for an index annuity contains $(1-b)\text{Treasury} + b\text{Index}$, where b denotes the IAs beta. By design, the IA will produce returns that trail this benchmark portfolio's returns by the average spread. Stated differently, the hedging strategies ensure that the individuals buying EIAs will bear essentially all the risks. Consequently, *all* IAs *must* produce risk-adjusted returns that trail those offered by readily available marketable securities by their spread, that is, by their expenses including transaction costs.

This is the same argument used by Sharpe (1993) and Fama and French (2009) to explain why the average return for passive investors must exceed the average return for active investors. Fama and French write, “[A] question commonly asked by academicians and practitioners is whether active investors as a group produce superior returns [compared to passive investors]. ... The arithmetic of equilibrium accounting says we do not need empirical tests to answer this question. ... [Since] the fees and expenses of active investors are higher than those of passive investors, active investors must in aggregate lose to passive investors.” Of course, some active investors may be able to add enough value through security selection to more than offset their higher expenses. Consequently, most, but not all, active investors produce below market risk-adjusted returns.

For the indexed annuities, the question is whether they offer competitive risk-adjusted returns. On average, their returns must trail those of the risk-appropriate benchmark portfolio of Treasuries and index fund by their average expense. Since, by design, indexed annuities cannot add value through security selection, *all* indexed annuities *must* produce risk-adjusted returns that trail those available on the risk-appropriate portfolio. Paraphrasing Fama and French, we do not need empirical tests to state definitively that indexed annuities do not offer competitive risk-adjusted returns. Their structure ensures this outcome.

5.2. Returns and risks on market-based assets

This section models hypothetical long-run returns on EIA contracts at AmerUS and its affiliates. The data base of contracts came from 1998 to 2005. The top half of Table 2 summarizes the returns, risk, and risk-adjusted performance on S&P 500, five-year Treasury notes, six-month CDs,³ and one-month Treasury bills for 1957–2008. The 1957 beginning date was chosen because before March 1957 the S&P Composite consisted of 90 stocks, while the EIA contracts are based on the S&P 500. Returns for one-month Treasury bills and S&P 500 (i.e., large-cap stocks) come from Morningstar (2009).

To ensure that an investment offers *ex ante* competitive returns, an agent should determine that the product would have produced competitive returns over long horizons. In investments, long-horizon returns are used to assess expected returns. Actual returns for short

Table 2 Comparison of market-based returns and S&P 500-linked EIA returns, 1957–2008

Asset	Geometric average annual return	Ending wealth	Standard deviation	Sharpe ratio	Alpha*	Beta
Market-based returns						
S&P 500	9.33%	\$103.43	17.74%	0.31	0.0%	1.00
Five-year Treasury notes	7.00	\$33.79	6.02	0.31		
Six-month CDs	6.20	\$22.80	0.81	1.16		
Treasury bills	5.27	\$14.45	0	0		
EIA returns						
1 Yr annual reset (7%/7%)	4.29%	\$8.88	4.41%	-0.22	-1.92%	0.17
1 Yr Annual Reset (7%/6%)	3.73	6.70	4.05	-0.38	-2.37	0.15
1 Yr annual reset (7%/5%)	3.16	5.04	3.73	-0.57	-2.82	0.13
1 Yr annual reset (7%/4%)	2.58	3.77	3.45	-0.79	-3.27	0.10
2 Yr PTP (13%/13%)	4.17	8.39	5.71	-0.28	-2.27	0.19
2 Yr PTP (13%/11%)	3.67	6.53	5.38	-0.44	-2.64	0.16
2 Yr PTP (13%/8%)	2.90	4.43	5.03	-0.70	-3.22	0.12
1 Yr Mo Cap (2.8%/2.8%)	5.14	13.54	7.82	0.00	-1.73	0.30
1 Yr Mo Cap (2.8%/2%)	3.17	5.06	6.34	-0.32	-3.17	0.19
1 Yr Mo Cap (2.8%/1.5%)	1.97	2.76	5.23	-0.63	-4.04	0.13
1 Yr Avg Mo (11%/3.5%)	3.10	4.89	4.32	-0.50	-3.15	0.17
1 Yr Avg Mo (11%/5%)	2.33	3.32	3.82	-0.77	-3.74	0.14
1 Yr Avg Mo (8%/3.5%)	2.12	2.97	3.49	-0.91	-3.84	0.11

For the one-year annual reset contracts, the numbers (7%/6%) denote a 7% initial cap rate and 6% cap rate in subsequent years. The notation for the two-year point-to-point contracts is the same. For the monthly cap contracts, (x%/y%) denotes an x% monthly cap rate in the first year and a y% cap rate in subsequent years. For the averaged monthly contracts with a cap rate, the initial cap rate and spread are 11% and 3.5% and (x,y) denotes cap rate of x% and spread of y% each year thereafter. The participation rate is 100% in each contract.

Sources: Return data for S&P 500, Treasury notes and bills came from *Stocks, Bonds, Bills, and Inflation, 2009 Yearbook*, Morningstar.

Returns for six-month CDs (WCD6M, weekly, first observation in January and July of each year) and one-year Treasuries (GS1, average rate in January of each year) came from Federal Reserve Bank of St. Louis.

*All alphas were significant at better than the 1% level, except the alpha of -1.73 was significant at the 5% level.

periods may be well below or well above average because of factors specific to that period. For example, Morningstar (2009) uses average annual returns on cash (i.e., one-month Treasury bills), bonds (e.g., five-year Treasury notes), and stocks (e.g., large-cap US) since 1926 to project future returns. Separately, Sharpe (1990) writes, "While fairly recent historic data can provide useful estimates of asset risks and correlations, recent history is typically of little (if any) use when predicting expected returns. Instead, the analyst must both (1) rely on experience over very long periods and (2) take into account reasonable relationships among expected returns, risks, and correlations."

For 1957–2008, the S&P 500 produced a geometric average annual return of 9.33%. Assuming an initial investment of \$1, the ending wealth was \$103.43. The standard deviation of annual excess returns was 17.74%, where excess return is returns in excess of returns on one-month Treasury bills. The Sharpe ratio was 0.31, where the Sharpe ratio for an asset is

defined as average/standard deviation of excess return on that asset. By definition, the alpha and beta for the S&P 500 were 0 and 1, where alphas and betas come from regressions using excess returns on the investment and S&P 500.

The five-year Treasury note produced a geometric average annual return of 7.00%. Assuming an initial investment of \$1, the ending wealth was \$33.79. The standard deviation was 6.02% and the Sharpe ratio was 0.31.

The six-month CD produced a geometric average annual return of 6.20% and an ending wealth of \$22.80. The standard deviation was 0.81% and the Sharpe ratio was 1.16.

The one-month Treasury bill produced a geometric average annual return of 5.27% and an ending wealth of \$14.45. Because one-month Treasury bills are the risk-free asset, its standard deviation of excess returns and Sharpe ratios are, by definition, zero.

As expected, the long-run returns on these market-based assets rise with the risk of the asset. The six-month CD strategy offered, on average, 0.93% more than Treasury bills, the Treasury notes offered 1.73% more, while the S&P 500 produced 4.06% more than Treasury bills.

Also as expected, the Sharpe ratios indicate that long-run risk-adjusted returns on six-month CDs, Treasury notes, and S&P 500 are positive. They each offered higher average returns than Treasury bills, but at the cost of higher risk as measured by standard deviation.

5.3. Risk-adjusted returns on EIA contracts

This section examines the risk-adjusted returns on 13 hypothetical S&P 500-linked EIA contracts for 1957–2008. It is important to compare the EIAs returns to those available on market-based investments with similar risks. I use Sharpe ratios and alphas to examine risk-adjusted returns. The alphas compare EIAs returns to those available from portfolios with the same level of systematic risk. To the best of my knowledge, this is the first study to use the Capital Asset Pricing Model to measure EIA performance. By design, EIA strategies cannot add or lose value through security selection. So, the CAPM is an ideal method for evaluating these EIAs competitiveness; that is, it is clear that the CAPM one-factor model is appropriate as opposed to a multifactor model, and it is clear that the S&P 500 should be the market proxy. Obviously, the returns are hypothetical since EIA contracts have not been around since 1957. Moreover, as previously noted, in practice the insurance firm would change cap rate, spread or another interest crediting parameter each year with levels of interest rates and options' implied volatility. Therefore, it is impossible to simulate actual returns that would have existed since index options have not been around since 1957. However, I model returns on four contract designs and several specific contracts per design to provide an indication of likely returns. The specific terms—such as 7% initial cap rate in the one-year annual reset contract—are similar to specific terms used by McCann (2008) to represent American Investors Life's EIAs. Moreover, these American Investors Life EIAs had the same four designs as those modeled in this study. The 13 EIA contracts follow one of four designs: one-year annual reset, two-year point to point, one-year monthly cap, or one-year averaged monthly.

The first four contracts are one-year annual reset EIAs. The typical contract had a 100% participation rate, 0% spread, 7% initial cap rate, and 4% minimum cap rate in subsequent

years, which is set at the firm's discretion. I modeled the long-run return on contracts with a 7% initial year cap rate and cap rates in subsequent years of, respectively, 7%, 6%, 5%, and 4%.

The first contract has a 7% initial cap rate and 7% cap rate each year thereafter. Its geometric average annual return was 4.29% and the ending wealth was \$8.88. The standard deviation of excess returns was 4.41% and the Sharpe ratio was -0.22 , which indicates that it produced a lower return than Treasury bills despite its higher level of risk. The alpha was -1.92% and the beta was 0.17. Therefore, this EIA underperformed a 17% S&P 500 to 83% Treasury bill portfolio by, on average, 1.92% per year. Whether measured by Sharpe ratio or alpha, this EIA underperformed the market on a risk-adjusted basis.

The second contract has a 7% initial cap rate and 6% cap rate each year thereafter. Its geometric average annual return was 3.73% and the ending wealth was \$6.70. The standard deviation was 4.05% and the Sharpe ratio was -0.38 . The alpha was -2.37% and the beta was 0.15.

The third contract has a 7% cap rate in the first year and a 5% cap rate each year thereafter. The geometric average annual return was 3.16% and the ending wealth was \$5.04. The standard deviation was 3.73% and the Sharpe ratio was -0.57 . Its alpha was -2.82% and its beta was 0.13.

The fourth contract has a 7% cap rate in the first year and a 4% cap rate each year thereafter. The geometric average annual return was 2.58% and the ending wealth was \$3.77. The standard deviation was 3.45% and the Sharpe ratio was -0.79 . Its alpha was -3.27% and its beta 0.10. In short, whether measured by Sharpe ratio or alpha, all four one-year annual reset EIA contracts underperformed Treasury bills despite their higher levels of risk and underperformed the market on a risk-adjusted basis.

The next three contracts are two-year point-to-point EIAs. I modeled two-year contracts with a 100% participation rate, 0% spread, 13% cap rate for the first two years with the firm setting the cap rate for subsequent two-year periods at its discretion subject to a minimum rate of 8%. I modeled three versions of this contract. Each had a 13% initial cap rate with the cap rate in subsequent periods set at, respectively, 13%, 11%, and 8%.

The 13%/13% contract produced a 4.17% average annual return with an ending wealth of \$8.39. The standard deviation of two-year cumulative excess returns was 8.07%, which corresponds to an annual standard deviation of 5.71%. The Sharpe ratio was -0.28 . The annual alpha was -2.27% , while the beta was 0.19.⁴

The 13%/11% contract produced a 3.67% average return and an ending wealth of \$6.53. The annual standard deviation was 5.38% and the Sharpe ratio was -0.44 . The annual alpha was -2.64% , while the beta was 0.16.

The 13%/8% contract produced a 2.90% average return and an ending wealth of \$4.43. The annual standard deviation was 5.03% and the Sharpe ratio was -0.70 . The annual alpha was -3.22% , while the beta was 0.12. In short, none of the two-year point-to-point contracts could match the returns on Treasury bills despite their lack of liquidity—that is, surrender penalties and loss of interest for withdrawals within the two-year term—and higher levels of risk. Whether measured by Sharpe ratio or alpha, all four EIAs underperformed the market on a risk-adjusted basis.

The next three EIAs are one-year contracts with monthly cap rates. The typical contract

had a monthly cap rate in the initial year of 2.8% with a guaranteed minimum monthly cap rate of 1% each year thereafter as determined by the insurance firm. I model returns on three contracts: a 2.8% monthly cap rate each year (2.8/2.8), a 2.8% initial monthly cap rate followed by a 2% cap rate each year thereafter (2.8/2), and a 2.8% initial cap rate followed by a 1.5% cap rate each year thereafter (2.8/1.5).

The 2.8/2.8 monthly cap rate contract produced a geometric average annual return of 5.14% and its ending wealth was \$13.54. Its standard deviation was 7.82% and its Sharpe ratio was 0. Its alpha was -1.73% and its beta was 0.30.

The 2.8/2 monthly cap rate contract produced a geometric average annual return of 3.17% and its ending wealth was \$5.06. Its standard deviation was 6.34% and its Sharpe ratio was -0.32 . Its alpha was -3.17% and its beta was 0.19.

The 2.8/1.5 monthly cap rate produced a geometric average annual return of 1.97% and its ending wealth was \$2.76. Its standard deviation was 5.23% and its Sharpe ratio was -0.63 . Its alpha was -4.04% and its beta was 0.13. In short, all three monthly cap EIAs produced lower returns than risk-free Treasury bills. All three Sharpe ratios imply market underperformance, and all three alphas are negative, which imply market underperformance on a risk-adjusted basis.

The last three EIAs are for one-year averaged monthly contracts. The typical contract had a cap rate of 11% and spread of 3.5% in the initial year with minimum cap rate of 8% and maximum spread of 5% in subsequent years set at the discretion of the insurance firm. I modeled the returns on three contracts. The 11/3.5 contract had an 11% cap rate and 3.5% spread in each year. The 11/5 contract had an 11% cap rate and 3.5% spread in the first year and 11% cap rate and 5% spread in subsequent years. The 8/3.5 contract had an 11% cap rate and 3.5% spread in the first year and 8% cap rate and 3.5% spread in subsequent years.

The 11/3.5 contract produced an annual return of 3.10% and an ending wealth of \$4.89. The standard deviation was 4.32% and the Sharpe ratio was -0.50 . The alpha was -3.15% and its beta was 0.17.

The 11/5 contract produced an annual return of 2.33% and an ending wealth of \$3.32. The standard deviation was 3.82% and the Sharpe ratio was -0.77 . The alpha was -3.74% and its beta was 0.14.

The 8/3.5 contract had a cap rate of 8% and spread of 3.5% after the first year. Its annual return was 2.12% with an ending wealth of \$2.97. Standard deviation was 3.49% and the Sharpe ratio was -0.91 . Its alpha was -3.84% and its beta was 0.11. In short, all three averaged monthly contracts produced lower returns than risk-free Treasury bills and underperformed the market on a risk-adjusted basis.

I now discuss the design of an index annuities tied to Barclays Aggregate (previously Lehman Brothers Aggregate) bond index. The interest credited is $\text{Max}(0, ((\text{Index}_{t+n}/\text{Index}_t)^{1/n} - \text{average spread})^n)$, where n is the length of the investment horizon, Index_t is the initial value of the index, Index_{t+n} is the value of the index n years hence and it reflects interest payments, and average spread is the average spread for the n years. $(\text{Index}_{t+n}/\text{Index}_t)^{1/n}$ is 1 plus the geometric average annual total return on the underlying index. Therefore, ignoring surrender charges, the investor's returns will fall short of the index's returns by the average spread. The spread in this contract is usually 2.5% in the initial year with a usual maximum spread of 3% or 3.5% each year thereafter set at the firm's discretion.

Table 3 Comparison of investments in highest-return EIA and six-month CDs, 1957–2008

	EIA	Six-month CDs
Geometric average return	5.14%	6.20%
Standard deviation	7.81%	0.81%
Sharpe ratio	0.00	1.16
Surrender period	14 years	None
Interest for partial year	no	Usually
Years with 0% returns	22	0
Default risk	Baa3 or higher	U.S. government guarantee
Waiting period upon liquidation	Up to 6 months	None

So, long-horizon returns on these contracts are guaranteed to trail the index's returns by about the average spread, which could exceed 3%. Like EIAs, bond index annuities' design ensures that they offer long-run noncompetitive returns.

Even an index fund offers a slightly lower return than the index because of costs. For the 15 years ending November 2008, the Vanguard 500 Index (Investor shares) produced returns that averaged -0.09% per year below those of the S&P 500, while the Vanguard Total Bond Index Fund (Investor shares) produced returns that averaged -0.20% per year below those of the Barclays Aggregate Index. These results suggest that the risk-appropriate benchmark portfolio of 85% Treasury bills and 15% S&P 500 is about 0.01% too high compared to returns available with the 15% S&P 500 to 85% Treasury bill benchmark portfolio, and the LB aggregate is about 0.20% too high. On the other hand, I used one-month Treasury bills as the risk-free asset, while in contracts with one-year terms insurance firms would usually buy one-year bonds. Domian, Maness, and Reichenstein (1998) conclude that "for 1952–1994, the average term premiums peak at about 1.3% on three-year to fifteen-year bonds. ... [but] most of the reward to extending maturity probably occurs by the time maturity reaches one year." Thus, my models underestimated returns available on portfolios containing one-year Treasury securities and an index fund. The two potential biases discussed in this paragraph would be partially offsetting. In summary, I examined the 1957–2008 hypothetical returns on 13 S&P 500-linked EIA contracts for the period since the S&P 500 began, and I examined the design of a bond indexed annuity. All 13 EIAs produced returns below those available on risk-free Treasury bills. In addition, their returns were substantially below returns available from the strategies of rolling over six-month CDs and buying five-year Treasury securities. Based on Sharpe ratios, none of the EIA contracts could produce risk-adjusted returns that were competitive with returns available on Treasury bills, CDs, or Treasury notes despite having higher risks. Finally, the alphas for the 13 EIA contracts were all statistically significantly negative at the 5% level implying that the EIAs underperformed the market on a risk-adjusted basis by at least 1.73% per year, and the average underperformance was about 2.9% per year.

In terms of competitiveness, none of the EIA contracts could match the returns of risk-free Treasury bills. The average EIA return of 3.26% was 2.01% lower than the return on Treasury bills and 2.94% lower than the return from the virtually riskless strategy of rolling over six-month bank CDs. For the 52-year period, the best performing EIA contract had a long-term return that was 1.06% below returns available on six-month bank CDs. Table 3

compares the risks on this one-year 2.8% monthly cap EIA contract and six-month CDs. The EIA had almost 10 times the standard deviation of the six-month CDs. In addition, this EIA subjected the investor to a 14-year surrender period, while the six-month CDs have no such restriction. Withdrawals from this EIA before the end of the one-year term receive no return, while the individual invested in the CD receives penalty-free interest after six months. This EIA produced a 0% return in 22 years, while the CD produced a positive return in each six-month period. The EIA has default risk because it is guaranteed by an insurance firm with a credit rating from Moody's as low as Baa3, while the CD is backed by FDIC insurance up to \$250,000. If the individual decides to liquidate the investment, this annuity contract allows the insurance firm to delay payment for up to six months, while the CDs impose no such delays. In summary, compared to returns available from six-month CDs, the highest-returning EIA contract produced lower returns, had higher standard deviation of returns, lower Sharpe ratio, and subjected claimants to liquidity risk, default risk, and other risks.

My simulations of hypothetical EIA returns suggest that EIAs typically have a beta risk of about 0.15 and that their long-run returns will trail those offered by Treasury bills. But the conclusion that IAs offer noncompetitive returns compared to those available on marketable securities is primarily based on the simple logic expressed by Nobel Laureate Sharpe and Fama and French.

Other authors reached the same conclusion. McCann and Luo (2006) studied EIAs and conclude that the "net result of equity-indexed annuities' complex formulas and hidden costs is that they survive as the most confiscatory investments sold to retail investors." Similarly, in *The Only Guide to Alternative Investments You'll Ever Need*, Swedroe and Kizer (2008) separate alternatives into good, flawed, bad, and ugly. Equity indexed annuities lead off their section on ugly alternative assets. They conclude that "EIAs are the 'poster children' for products that are too good to be true. In most cases, EIAs are sold because they provide the seller with far greater commissions than they receive through the sale of mutual funds."

6. Conclusions

To repeat an earlier quote, "NASD expects members to exercise their market expertise to recognize those situations where the materiality of difference is not in doubt and, consequently, identify that the lower yielding instrument does not represent a reasonable rate of return given the attendant risks." The designs of equity index annuities (EIAs) and bond indexed annuities ensure that they *must* offer below-market risk-adjusted returns compared with those available on portfolios of Treasuries and index funds. Therefore, this research implies that indexed annuity salesmen have not satisfied and cannot satisfy SEC requirements that they perform due diligence to ensure that the indexed annuity provides competitive returns before selling them to any client.

Separately, I modeled hypothetical returns on 13 EIA contracts for 1957–2008, the period since the S&P 500 began. The average beta on these contracts was about 0.15. None of these contracts could match returns available on one-month Treasury bills. Based on alphas and Sharpe ratios, none of the contracts could produce competitive market-based returns. Moreover, EIAs impose several risks that are not present in market-based investments including

surrender fees, loss of return on funds withdrawn before the end of the term, and default risk. The evidence suggests that these index-linked EIAs would have produced long-run returns that would have failed to match returns available on competitive market-based assets. Given the substantial costs built into these contracts and the inability of indexed annuities to add value through security selection, this conclusion is inevitable.

Notes

1. Some averaging contracts base returns on the daily average index level throughout the year instead of the average for the last 12 month ends in the term. Since markets rise on average, the use of the closing index levels in January through December is a more favorable formula for the annuity investor than one based on average daily index levels. So, the long-run returns on these one-year averaged monthly EIAs should be higher than the long-run returns available on EIAs that use daily average index levels.
2. McCann (2008) reports the average “investment spread” for 2002–2007 on index annuities at American Equity was 2.81% as reported in their 10-K filings with the SEC. American Equity is a publicly traded firm with one product line—EIAs. So, the 2.12% spread for AmerUS does not appear to be beyond the industry’s standard spread.
3. The six-month CD series began in mid-1964. Consequently, I used the average rate on one-year Treasuries in January of each year to represent CD returns for 1957–1964.
4. The regression was based on two-year cumulative excess returns. The alpha was divided by 2 to convert it to an annual alpha.

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