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The Equity Index Annuity: an examination of performance and regulatory concerns

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Abstract

The Equity Index Annuity (EIA) is a recent product development in the insurance industry. This paper details EIA design and interest crediting techniques, examines expected performance, and discusses possible regulatory concerns. Results indicate that the EIA is generally expected to perform better than a traditional fixed annuity for contract periods of at least five years, but is substantially below that of a similar direct equity purchase. EIA contracts are not appropriate for shorter-term investors when factors of risk and efficient markets are considered. The SEC is not currently regulating the EIA product, which should raise industry concern.

JEL classification: G00; G29

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1. Introduction

The Equity Index Annuity (EIA) is a relatively new financial alternative available from a growing list of life insurance companies across the United States. Jackson National, Conseco, and Allianz/LifeUSA are among the largest issuers of equity index products. EIAs represent investment alternatives that allow the purchaser to participate in the appreciation of a basket of equity securities. The appreciation in the deferred annuity contract is generally

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based on one of several different equity indexes, predominately the S&P 500, and is constructed with a guaranteed minimum value.

There has been expansive growth in retailing EIAs over the first few years of their existence. Since being first offered in 1995 (sales of $0.4 billion), the financial press has reported that EIA product sales in 1999 grew to $5.1 billion and have a current asset base exceeding $15 billion in force (Koco, 2000). This substantial growth has not been appropriately represented by an increase in consumer information related to the usefulness of using these instruments in personal financial planning.

Three issues are examined in this paper. The first issue is an examination of the design of common EIA contracts. The four common interest-crediting techniques examined are *Simple Point-to-Point, Point-to-Point with Annual Ratcheting, Point-to-Point with Asian-End,* and *Point-to-Point with Look Back.* Second, a bootstrapping technique is utilized to detail the expected performance (return and risk) to investors for a variety of EIA contracts based on the S&P 500 index. Actual historical data are used to create a simulation of likely outcomes over a variety of holding periods for each of the different interest crediting techniques. Finally, this paper provides a brief discussion of the regulatory status of EIAs in comparison to similar investment alternatives. The design of the EIA looks like an equity or derivative equity security, has a return based on an equity security, but faces risks that are not as great as comparable equity securities. It is the opinion of this author that this instrument should be regulated similarly to other equity-based variable life insurance products or mutual funds.

This introduction is followed by a review of the literature in Section 2 and a detailed description of the most popular EIA designs and interest-crediting techniques in Section 3. An analysis of the methodology used to analyze the risk-return relationship is provided in Section 4 while Section 5 includes a detailed discussion of the performance results. Regulatory concerns are discussed in Section 6 and concluding remarks are provided in Section 7.

2. Literature review

This unique equity-based investment has yet to generate significant product-specific literature. A basic investor introduction to stock index futures, stock index options exchange-traded index funds was recently provided by Zigler (2000) and provides an excellent description of how to hedge and invest as an alternative to index mutual funds. The EIA product has an important role for use by planners and individuals alike in regards to asset allocation and investor risk preferences. In addition, the annuity aspect of this product plays a role in after-tax returns investors receive while the complex derivation places a premium on product and investor education. This paper extends the literature by examining the performance of an EIA in relation to previously accepted research and raising concerns about the current regulatory environment for this equity-like security.

The traditional life cycle theory on investing suggests that investors should move to declining equity positions as they move closer to retirement. Edler and Rudolph (1999) include a literature review on the life cycle theory of investing. Bodie and Crane (1997) attribute this reduction in the portion of equity holdings to the increasing risk of human capital as investors approach retirement. They conclude that investors can appropriately

self-manage retirement funds given sufficient education and investment information. Yuh, Hanna and Montalto (1998) attribute a larger proportion of the population being in retirement and enjoying longer life spans as the reasons our population struggles to maintain their current spending habits into retirement. The authors recommend that "aggressive investment or savings strategies should be encouraged" by retirees. The increasing emphasis on equity investments with concern for risk tolerance is consistent with Bodie and Crane (1997) and the development of products similar to EIA contracts.

Many researchers have looked at historical performance in equity and financial markets. In 1976 Ibbotson-Sinquefield (IS) published a significant analysis of asset returns starting with 1926. Ibbotson Associates (1999) continues to update debt and equity asset class returns contained in this database. Wilson and Jones (1987) further expand the IS equity database by examining returns from the end of 1870 through 1925. The authors find that this additional set of nearly 60 years results in a geometric mean return that is 124 basis points below that of the original IS data series. This is of serious concern to investors making decisions using equity-based or derivative securities. The authors also point out that debt outperformed bonds in total for the period 1870 to 1914. This is a period that exceeds 40 years and would be defined as "long-term" to most investors and is troublesome given the plethora of information expounding the virtues of equity investing. If investor expectations exceed what broader and objective data will support, then this could lead to overestimation of performance and a failure to meet their financial goals. Jones and Wilson (1987) also clearly show the relative importance of dividend income in their early data set and capital appreciation in the IS-based data set. The authors attribute this to the advent of personal income taxes and the competitive advantage of capital gains taxation occurring near the end of their early time period.

The limiting downside risk of EIAs is a critical aspect because of the risk averse nature of investors. Risk preference has long been discussed and measured in many works. More recently, Grable and Lytton (1999) discuss methods of assessing risk tolerances of financial planners and their clients and describe previous research on investor willingness and desire to take risk.

The complicated nature of EIA contracts places a premium on investor education and knowledge. Chen and Volpe (1998) find the weakest area of personal finance understanding among college students relates to the area of investments and is greatest for those students who were younger, nonbusiness majors, female, or had little work experience. In addition, the authors find that students with more financial knowledge make fewer incorrect investment decisions at a rate of 20% versus those with a lack of financial knowledge at 48.4%. One can reasonably interpret that greater exposure by individuals to financial topics through life is likely to increase their understanding of financial topics. Edler and Rudolph (1999) find that retirement satisfaction is directly related to engaging in planning activities and that educational level does not enhance satisfaction.

The essence of an equity-indexed product is the derivative use in its creation. Gerber and Shiu (1999) examine the pricing of reset guarantees and show how it can be applied to pricing some specific EIA contracts that contain guarantee resets. The basis for the development of these models is the Black-Scholes formula. Many others have significantly expanded option research. Unfortunately, the Black-Scholes model is a bit less robust the

longer the option life which Boyle and Lin (1997) address in their valuation model for look back options. Boyle and Lin (1997) is an extension of other valuations of complex options where there is essentially a set of two or more assets from which value is derived (Boyle and Tse, 1990; and Nelken, 1996). In many EIA products, consumers have the choice of maturities that often extend for five to ten years.

A final aspect for most insurance-based assets is tax deferral as it influences investment choice. Investors often choose one alternative over another even though the performance attributes would not normally lead to this decision ignoring the tax deferral issue. In addition, equity investments have competitive advantages with regards to capital gains that may influence investor preferences. Siegel and Montgomery (1995) recommend legally avoiding taxes as they find that common stock investments are advantaged over Treasury bond investments after accounting for taxes, transaction costs, and inflation.

3. EIA design and interest crediting techniques

3.1. EIA design and vulnerability issues

EIAs are deferred annuities designed to allow the investor to participate in the appreciation of a specified equity index. For example, if the S&P 500 index rises from 1200 to 1600 over the life of the contract, the index has risen by 25%. Owners of these deferred annuity contracts will receive some proportion of this return based on the specific interest crediting technique applied to the contract. This proportion is commonly referred to as the *participation rate.* Equity index contracts will typically have a *contract period* that varies in length from 1 to 10 years and may *cap* (limit) the total appreciation over the contract period. This product design generates several potential risks. EIAs rely on the uncertain future performance of the index to generate interest credits to each contract over the contract period.

The funding of EIA instruments is accomplished with a combination of fixed return bond instruments and equity derivatives. These derivatives are usually related to the underlying index and should theoretically be able to provide a perfectly hedged portfolio that does not increase insurer risk. The reality of this situation is that each company will be unlikely to perfectly hedge this portfolio on a daily basis given somewhat random cash inflows and outflows and asset values that may move the portfolio away from a perfectly hedged situation. To complicate matters, a rising yield curve combined with falling equity markets is likely to increase volatility for index-based derivatives. The higher yield curve *and* the falling EIA equity account may entice current EIA holders to increase lapse rates. Higher lapse rates occur when the cost of exiting a poor performing contract falls and the probability an investor will receive only the guaranteed minimum rate rises. Although this is a situation that has not yet occurred in a substantial fashion, it places the insurer in a situation in which cash outflows is likely to exceed cash inflows and increase its business risk.

The most astute investor will recognize the vulnerability of investing in the EIA product because of a failure to receive dividend income in addition to any appreciation in the index. An investor who is less discerning may not understand the difference between index performance and the total return performance of a basket of individual securities that

represent the identical index. A mutual fund that represents an index will receive *both* capital appreciation and dividend income. Historically, dividend yields have ranged from 2.11% to 8.77% out of a 12.96% arithmetic mean total return on the S&P 500 based on data provided by the Ibbotson SBBI database (Ibbotson 1999). The compounding effect of dividends never received on the S&P 500 index represents a significant opportunity loss of over 25% of the possible wealth over a 5-year period and over 57% for a 10-year period.

3.2. Interest-crediting techniques

A variety of interest crediting techniques are employed in EIA contracts and this paper focuses on four primary interest indexing methods: *Simple Point-to-Point, Point-to-Point with Annual Ratcheting, Point-to-Point with Asian-End,* and *Point-to-Point with Look Back.* Competition is increasing within the EIA market but insurers appear to realize that the uniqueness and complication of the interest crediting method can create barriers to entry and minimize the competition between (or comparison of) near commodity-like products. The interest credited to any specific contract will generally depend on the choice of equity index, contract period, participation rate, indexing method, and contract guarantees. It should be noted that annuity contract features such as issue age, transfers, withdraws, surrender charges, death benefits, and other special features are ignored. These features may cause a consumer to choose one product over another, but have no direct bearing on the interest credited to an annuity held to contract maturity for a consumer that is preretirement. In addition, the products are deferred annuities and provide contract owners with tax deferability not available with many alternative investments.

For explanatory purposes during the remainder of this section, let us assume that the S&P 500 index has the closing values listed below over the next five years. The total index return, ignoring dividends, is calculated simply as S&P 500 $\text{Index}_{(t)}$ /S&P 500 $\text{Index}_{(t=0)}$ for a contract period of t periods.

Time	S&P 500 Index	Index Total Return	EIA Return
t=0	1,600		
t=1	1,800		
t=2	1,680		
t=3	1,810		
t=4	1,770		
t=5	2,300	43.75%	30.63%

The *Simple Point-to-Point* (PTP) contract is generally based on the anniversary date of the contract. Assume a consumer at t=0 purchases a five-year EIA annuity on July 1st (anniversary/contract date) using a simple PTP technique based on the S&P 500 index. In addition, this contract has a 70% participation rate and a guarantee period of five years during which the entire principal (100%) is guaranteed at 3% annually. The contract interest guarantee provides that, at a minimum, the example EIA contract owner will earn 15.93% over the five-year period as defined by Eq. (1).

$$\{(1 + i)^n - 1\} \times \rho \quad (1)$$

In Eq. (1), i is the annual guaranteed rate of return, n is the number of years of the contract, and ρ is the proportion of the principal that is guaranteed to earn the rate i. The investor purchases the contract with an expectation that the return will exceed the minimum value with some probability. The actual EIA return calculation is described in Eq. (2).

$$\{I_{t=n}/I_{t=0} - 1\} \times \gamma \quad (2)$$

$I_{t=n}$ represents the index value on the nth anniversary date, $I_{t=0}$ represents the index value on the contract date, n is the number of contract years, and γ is the participation rate over the contract period.

If index returns match those described above, the five-year annuity will be credited with a 30.63% return based on a participation rate of 70% given the total index return of nearly 44%. The variations to this interest crediting technique are numerous and most tend to involve a ratchet or annual reset. The ratchet version uses the same basic methodology, but credits interest on each anniversary date. Thus, in a five-year contract the owner may receive the minimum guarantee one-year and a return based on the index the next year. In contrast, the simple PTP considers only the entire contract period. This obviously increases the return possibility for the consumer and is generally associated with a lower participation rate or guaranteed interest rate. An additional variation calculates interest on the calendar year rather than the anniversary date. Midyear contract dates, like the above example, will earn a pro-rata share of the annual interest credit for the initial and concluding calendar years. In some EIA contracts the minimum rate of return may be additive rather than compounded thereby allowing the issuer to increase participation rates all else equal.

Assume again that there is an annuitant who purchases a five-year annuity on July 1st using simple *PTP with annual ratcheting* (PTP-R) on each anniversary date. This contract has a reduced participation rate of 45%, but 100% of the principal at the beginning of each one-year period is guaranteed to earn a 3% return and capped with an annual maximum return of 12% per period. Contract returns are compound rather than additive in nature.

Time	S&P 500 Index	Index Return	EIA Return
t=0	1,600		
t=1	1,800	12.50%	5.63%
t=2	1,680	−6.67%	3.00%*
t=3	1,810	7.74%	3.48%
t=4	1,770	−2.21%	3.00%*
t=5	2,300	29.94%	12.00%*

The annuitant would earn a total of 29.88% over the entire five year with years two and four receiving the minimum return and the last year capped at the maximum annual return. Notice that the *PTP-R* technique is characterized by much lower participation rates than the simple PTP example, but the total contract return is nearly identical.

Investor concerns occur with the longer-term simple PTP and the PTP-R methodology as

the interest credited is dependent on only two points in time–the beginning and ending time periods. Index values can vary dramatically over a short period of time, although most would argue that the historical trend is generally positive over very long periods of time. To address this concern some insurance companies offer EIA contracts that credit interest where the ending value is an average of the closing index values over some specified period of time. This is generally referred to as an *Asian-End* (PTP-AE). For the five-year contract discussed above, the contract might have a 6-month, 12-month or possibly a 365-day Asian-end. If this contract uses the 12-month Asian-end, then the ending index value is calculated as the average of the final closing value and the 11 preceding monthly closing values for the index. The 365-day method would average the closing index value on every day during the preceding year. This technique helps mitigate the risk concern some consumers have regarding the final index value, but it will provide a lower expected return calculation. As one would likely conclude, these contracts can generally offer a slightly higher participation rate or floor guarantee than the simple PTP contract. In this example, if the last 12 monthly index values average 2,100 and the participation rate is 80%, then the total contract return would be 25% [(2,100/1,600−1)*0.8].

The fourth product category of EIAs is a *Point-to-Point Look Back* (PTP-LB) contract. This type of contract fits the market niche when a consumer asks, "*Why won't you use the highest value of the index during the contract? It is not my fault the market went back down.*" A common contract in this category is the "high water anniversary look back." With this type of contract the issuer looks back over the index values on each anniversary date of the contract and uses the highest index value as the ending value in the PTP calculation. Alternative variations include the high water *day* look back and the high water *month* look back to find either the highest single closing day or month during the contract period to determine the amount of interest credited to the account. The consumer should generally expect to see higher returns and a shifting of contract risk to the insurance company with look back contracts. The insurer will offset their higher risk with lower participation rates and floor guarantees to compensate the insurer for the additional risk-taking.

For the PTP-LB technique, assume that the annuitant purchases a five-year contract using the high water month look back method and the original example data. Let us also assume that the highest closing month for the S&P 500 index during the contract period is 2380. The PTP-LB contract will have a lower participation rate of 60% and earn the annuitant 29.25% [(2380/1600−1)*0.6] over the five-year period.

Each of these four primary interest crediting technique have numerous permutations. Differences are usually based on the specific index used or on how the initial index value, terminal index value, minimum guarantee, and maximum credited return (cap) are determined. The complicated nature of EIAs places a premium on financial education and understanding for both planners and consumers.

4. Evaluation methodology

The four basic techniques of crediting interest (PTP, PTP-AE, PTP-R, PTP-LB) were chosen through an examination of over 60 individual EIA contracts that were found from

information provided primarily through a report by Milliman & Robertson, Inc (1997). The basic assumptions for the four interest crediting techniques are generic composites of specific information provided in the Milliman & Robertson report and supported by Puertz (1997), Gregory (1997), and Horowitz (1998). This composite method is used for the purpose of analyzing basic interest crediting techniques rather than testing specific products. As discussed earlier, each EIA contract is like a snowflake–similar but never identical. Over 80% of the EIA contracts identified use the S&P 500 as the index of choice in determining the amount of interest to credit to a contract. Alternative indexes represent the NASDAQ and various international equity indexes. Although this method can be easily extended to other equity indices, this paper utilizes only the S&P 500 due to the ease of data availability via the Ibbotson SBBI database (Ibbotson, 1999).

Monthly total return and capital appreciation data for the S&P 500 were collected from the Ibbotson SBBI database (Ibbotson, 1999). These monthly values were collected for the period of December 1925 through June 1998 resulting in 870 monthly returns. This analysis is conducted assuming that the historical monthly return distribution for the S&P 500 is representative of the future monthly return distribution. Each monthly value is then given a unique indicator code ranging from 1 to 870.

The next step involves generating 100,000 random numbers. Each random variable is then uniformly designed to correspond to any one of the 870 monthly S&P 500 return observations. The purpose of this bootstrapping (resampling) technique is to create a larger sample of potential outcomes for each of the contract periods under study and does not force us to consider only the exact set and sequence of economic situations that have historically occurred. Instead, it allows us to consider future unknown situations using the historical distribution of monthly returns. For example, a single simulated year could potentially include the twelve best performing months in history. This scenario is unlikely, but this methodology provides for this extreme possibility in the analysis.

An alternative methodology is to use only the actual historical holding periods within the Ibbotson SBBI database. Two problems occur with this method. First, it will be a smaller database if only nonoverlapping periods are used and other possible combinations of returns are not considered. This problem is mitigated by using overlapping periods and creates 763 observations for a nine-year contract. This solution creates a second problem of placing a lower relative weight on the earliest and latest monthly return observations. For example, both the first and last monthly observations will each be included only in one nine-year data point while intermediate monthly observations are included in 108 nine-year data points. This method can bias longer-termed EIA simulations. The data set begins with the “roaring 20’s” and ends with one of the greatest bull markets. This methodology will bias downward longer-term expected EIA performance and not be representative of what investors might expect.

Next, the 100,000 observations are broken into nonoverlapping 12-month, 60-month, and 108-month periods. This results in 8,333 1-year periods, 1,666 5-year periods, and 925 9-year periods for analysis. Each of the full data sets allows examination of the expected performance for each of the four previously discussed index crediting techniques. Each full data set is also segmented into quintiles based on EIA return to examine the expected return and risk of the bottom, middle, and top quintiles.

Table 1
Equity index annuity risk-return results for one-year product

Product type	Principal guarantee (guarantee rate)	Participation rate	Ceiling on credited return	Mean return (min, max)	Standard deviation (% at min, % at max)	S&P 500 total return (min, max)
Simple point-to-point (Base case)	100% (3%)	15%	n/a	3.63% (3.0%, 21.2%)	1.61% (73.6%, n/a)	13.7% (−56.9%, 152.2%)
Point-to-point (Simple)	100% (3%)	25%	n/a	4.70% (3.0%, 35.4%)	3.28% (60.1%, n/a)	13.7% (−56.9%, 152.2%)
Point-to-point (Simple)	90% (3%)	40%	n/a	3.79% (−7.3%, 56.6%)	8.11% (8.0%, n/a)	13.7% (−56.9%, 152.2%)
Point-to-point (Simple)	100% (3%)	20%	12%	4.07% (3.0%, 15.0%)	2.10% (65.4%, 2.1%)	13.7% (−56.9%, 152.2%)
Point-to-point 12-month Asian-end	100% (3%)	25%	n/a	3.55% (3.0%, 23.4%)	1.49% (75.3%, n/a)	13.7% (−56.9%, 152.2%)
Point-to-point look back (Highest month in last year)	100% (3%)	15%	n/a	3.80% (3.0%, 23.1%)	1.75% (65.2%, n/a)	13.7% (−56.9%, 152.2%)

Quintile results are available upon request.

A final comparison is made of the implied historical EIA returns to similar products such as an S&P 500 total index returns, historical fixed annuity returns, and Treasury bill returns. This analysis allows only a weak comparison as EIA returns must be simulated using assumed participation, floor, and cap rates when relatively "factual returns" can be generated and applied in an equity index or traditional fixed annuity setting.

5. EIA performance outcomes

5.1 One-year EIA outcomes

The mean return of the one-year PTP is in the neighborhood of 3.6% to 4.0%. Results are provided in Table 1. The one-year product in its simplest terms is simply a bet by the purchaser who believes the market will move significantly upward in the next year, but with a guaranteed minimum. Although there are slight variations between products and firms, the basic one-year PTP has low participation rates between 15% and 40% and principal guarantees between 90% and 100%. If an alternative traditional fixed annuity is currently offering 4% over the next year, then the purchaser must believe that the market index is going to move upward by at least 16% given a 25% participation rate (4%/0.25). If an investor truly expects the market index to climb more than 16%, why is she/he investing in this particular product? A high tax bracket individual with a short-term holding horizon will need to earn an even greater rate with a taxable index mutual fund account.

Even within this category, the various company specific products may not be close to each

other on the efficient frontier with regards to the risk-return trade-off. A similar return is found between the base case and the 90% principal-guarantee contract, but the range of possible EIA returns increase to 63.9% from 18.2% for the base case. A second risk measure, standard deviation, is provided for both (1.61% and 8.11%) but has limited value due to the elimination of one or both tails of the return distribution. This result indicates that different products are designed with different consumer preferences in mind. It is also *not* possible to definitively state that one annuity provider generates a larger profit margin than another, as the underlying portfolio will be different for each product.

The simple PTP examples show that the participation rate can be increased if firms place a cap on the maximum rate of return that can be earned during the contract period. In this particular case, a 5% increase in the participation rate associated with a cap of 12% on the one-year EIA will cause a slight 44 basis point increase in the expected return. An examination of the quintile subgroups show that the bottom and middle quintiles *always* receive the minimum guarantee return of the one-year simple PTP contract. The top quintile group provides a solid mean return of 10.04%. Throughout the paper quintile results may be discussed but are not presented due to space limitations. Results are available upon request.

Participation rates with the PTP-AE case can increase substantially (by 10%) to generate an expected return that is near that of the base case PTP because the S&P 500 index has historically moved in a positive direction. The mean return at 3.55% is only 8 basis points lower and the standard deviation 0.12% less than the base case one-year product. Overall, the risk and return figures are very similar to the base case with the exception of a much higher participation rate that can be quoted to potential customers. An analysis of index return quintiles yields no additional insight. Not surprising, the PTP-LB mean return and standard deviation are 17 and 14 basis points greater respectively for an EIA with a monthly look back and identical participation rate. An analysis of index return quintiles also yields no additional insight.

The issue at hand is determining if a short-term EIA contract is appropriate for a client to "gamble" that the index is going to rise in an efficient market by purchasing a one-year EIA. In most scenarios it is unlikely unless the client is exchanging one form of annuity contract for another (to postpone taxes) *and* prefers to be in the equities market for the near term.

5.2 Five-year EIA outcomes

The longer-term data provide a much more fertile analysis beyond the one-year PTP. Five-year results are provided in Table 2. The mean total return for the S&P 500 index over the set of five-year periods is 91.1% [range from –59% to 784%]. In comparison, the mean EIA return is 34.7% [range from 15.9% to 311.5%] or slightly more than one-third that of a direct investment. The owner of the base case five-year EIA should expect that nearly 45% of the time the client will earn only the minimum return guarantee of 15.9%.

The full data set is again segregated into quintiles to examine return and risk more carefully. The results are as expected with the bottom quintile receiving the total guarantee floor return of 15.9%. The middle quintile performs below the mean response for the full data set since the return distribution is not truncated to the right. The mean rates for the median

Table 2
Equity index annuity risk-return results for five-year product

Product type	Principal guarantee (guarantee rate)	Participation rate	Cap on credited return	Mean return (min, max)	Standard deviation (% at min, % at max)	S&P 500 total return (min, max)
Simple point-to-point (Base case)	100% (3%)	50%	n/a	34.7% (15.9%, 311.5%)	30.0% (44.7%, n/a)	91.1% (−59.0%, 784.2%)
Point-to-point (Simple)	100% (3%)	60%	n/a	40.3% (15.9%, 373.8%)	36.9% (41.5%, n/a)	91.1% (−59.0%, 784.2%)
Point-to-point (Simple)	90% (3%	65%	n/a	39.2% (4.3%, 405%)	43.2% (26.8%, n/a)	91.1% (−59.0%, 784.2%)
Point-to-point (12-month Asian-end)	100%	55%	n/a	34.6% (15.9%, 349.7%)	29.4% (43.7%, n/a)	91.1% (−59.0%, 784.2%)
Point-to-point (Annual ratchet)	100% (3% per year)	50%	12% annual (per year)	34.9% (15.9%, 76.1%)	11.0% (96.3%, 69.0%)*	91.1% (−59.0%, 784.2%)
Point-to-point (Look back)	100% (3%)	45%	n/a	35.5% (15.9%, 315.6%)	28.7% (38.11%, n/a)	91.1% (–59.0%, 784.2%)

* The annual ratchet technique allows each year out of the contract period to receive either the guarantee rate, the cap, or the actual return based on the participation rate. Out of the five years, this refers to the percent of observations that have at least one period that the minimum or maximum levels impact the overall return of the product.

Quintile results are available upon request.

and top quintiles imply annualized returns of 5.08% and 12.8% respectively over the five-year period.

These results are again somewhat troubling as consumers truly benefit only when they can correctly anticipate those economic periods in which the index returns are above the norm. Again, efficient markets preclude this from occurring. A consumer that has the ability to properly "time the market" would be better served to make a direct investment since it is more profitable. Thus, 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 rate of 3.8% and a comparable S&P 500 investment expects to earn an annualized total return of 13.8%.

An identical PTP contract with a participation rate that is 10% higher generates an expected mean return of 40.3% (annualized rate of 7.01%). For the 90% principal guarantee alternative the participation rate can be increased to 65% (15% greater than the base case) to provide a similar mean return when compared to the base case. This alternative is also associated with an increase in risk as measured by standard deviation, return range, and proportion of the time receiving the minimum return.

As one might expect, the participation rate must increase with the PTP-AE interest crediting technique to compensate for an average closing value that, more often than not, is lower than the actual closing index value. An increase from a 50% to a 55% participation rate

Table 3
Equity index annuity risk-return results for nine-year product

Product type	Principal guarantee (guarantee rate)	Participation rate	Cap on credited return	Mean return (min, max)	Standard deviation (% at min, % at max)	S&P 500 total return (min, max)
Simple point-to-point (Base Case)	100% (3%)	70%	n/a	93.2% (30.5%, 789.0%)	94.0% (34.7%, n/a)	222.3% (−56.5%, 1717.6%)
Point-to-point (Simple)	100% (3%)	80%	n/a	105.1% (30.5%, 901.7%)	108.4% (31.8%, n/a)	222.3% (−56.5%, 1717.6%)
Point-to-point (Simple)	90% (3%)	75%	n/a	95.2% (17.4%, 845.4%)	103.9% (26.6%, n/a)	222.3% (−56.5%, 1717.6%)
Point-to-point (12-month Asian-end)	100% (3%)	75%	n/a	92.7% (30.5%, 745.9%)	92.4% (35.1%, n/a)	222.3% (−56.5%, 1717.6%)
Point-to-point (Annual ratchet)	100% (3% per year)	100%	12% annual (per year)	90.4% (30.5%, 177.2%)	23.0% (99.5%, 98.7%)*	222.3% (−56.5%, 1717.6%)
Point-to-point (Look back)	100% (3%)	65%	n/a	95.3% (30.5%, 732.7%)	92.2% (30.7%, n/a)	222.3% (−56.5%, 1717.6%)

* The annual ratchet technique allows each year out of the contract period to receive either the guarantee rate, the cap, or the actual return based on the participation rate. Out of the nine years, this refers to the percent of observations that have at least one period that the minimum or maximum levels impact the overall return of the product.

Quintile results are available upon request.

combined with the Asian-end method of interest crediting will provide nearly identical performance results. The PTP-R product return is also nearly identical to the base case but investor risk is significantly smaller. The PTP-R method provides a preferred alternative to the base case for most risk averse clients although they give up the possibility of the "homerun" as the maximum expected return falls from 311.5% to 76.1%. Over the five-year period, 96.3% of observations have at least a single one-year period that earn the minimum return and 69% of observations have at least a single year that is restricted by the contract cap. The results of the PTP-LB show that using a lower participation rate of 45% will provide a slightly higher mean return, slightly less risk as measured by standard deviation, no increase in the downside risk, and earning the guaranteed return on a lower proportion of the observations.

5.3 Nine-year EIA outcomes

The time period over which an EIA contract is written does not generally exceed nine years, although a few 10-year products exist. The nine-year product appears to be a much better purchase for the consumer than its shorter-term counterparts. The results, provided in Table 3, show that the simple PTP product has a mean annualized EIA return of approximately 7.6%. Contrasting the 93.2% mean EIA holding period return with a mean holding

period return on the S&P 500 data of 222.3% illustrates that the consumer is receiving about 42% of the total possible return. An examination of the quintile performance provides a nearly identical explanation as the five-year product and adds no additional insight.

Increasing the participation rate by 10%, ceteris paribus, results in an expected mean holding period return of 105.1% (annualized rate of 8.31%). The second alternative guarantees 90% of the principal allowing the insurer to increase the participation rate to 75% to maintain a similar mean interest credit over the nine-year contract. Unlike the previous case, the risk factors do increase with this technique. The standard deviation increases along with the range of possible returns (17.4% guarantee rather than 30.5%) and fully one-fourth of the holding periods will result in the deferred annuity owner receiving only the 17.4% floor guarantee.

The three remaining techniques, PTP-AE, PTP-R, and PTP-LB each act similarly to the five-year product. The biggest surprise is with the PTP-R technique. The annual cap combined with a guarantee rate on the entire principal allows the firm to raise its participation rate dramatically to 100%. This results in a similar mean return with approximately one-fourth the standard deviation and a tighter range of possible returns of the base case. The PTP-R interest crediting technique on a longer-term EIA will fit well with most risk averse investors as the annuity owner is guaranteed a rate of return and receives all of the appreciation in the index up to the maximum cap set by the insurer. In addition, the return is "locked" each year and cannot be reduced or eliminated because of adverse market conditions in later years.

5.4 Fixed annuity comparison

In total, the expected performance of the five-year EIA will be similar to that of a regular fixed annuity. There are a few data sources that provide historical deferred fixed annuity rates, although they are not precisely what is needed for comparison in this analysis. The first data source (JNL, 1999) is a single annuity issuer. The insurer provides information regarding the current contract value and annualized return of annuities purchased from 1975 through 1998. These annuities have holding periods from 1 to 24 years and annualized returns that range from 5.71% to 8.40% with a mean annualized rate of 7.15%. The most recent 10-year and 11-year annualized yields generate rates of 6.68% and 6.84% respectively. The web site for the Thrift Savings Plan for Federal employees (1999) provides an annuity history going back to 1989. The average monthly annuity rates range from 5.56% to 8.76% with a 7.06% mean for the years 1989 through 1998. The Annuity Shopper (1999) also supplied single premium deferred annuity rates going back to 1980. A simple average of the rate set yields a 7.03% average and a 6.73% monthly weighted average rate. Although it is important not to generalize recent history as being historically representative, the long-term fixed annuity yields have been in the 6.6% to 7.1% range.

As an additional comparison, the performance of intermediate and long-term government bonds is examined using the Ibbotson SBBI database. The results are comparable to the previous annuity data sources as the ten-year period from 1988 through 1997 has geometric mean returns of 7.36% and 6.71% respectively for long-term and intermediate-term government bonds. For a broader comparison, the geometric mean over the entire 1926 to 1998

period for the long-term and intermediate government yields 5.24% and 4.75% respectively. If one assumes that the recent relationship between deferred annuity rates and the yield range of intermediate and long-term bonds continues into the future, then it is reasonable to expect that returns on deferred annuities might yield approximately 5% annually.

The results seem to indicate the five-year EIA product is comparable in expected returns to traditional fixed annuities ignoring all issuance costs. Overall, it appears that the best choice for typical investors who are considering EIAs is to invest for longer-term periods. Highly risk-averse investors who have a sufficient investment horizon should consider *multiple* long-term contracts (assuming EIAs continue to exist) to reduce the risks inherent in a single long-term (say nine years) period. An annualized return of 7.6% to 8.3% on a tax-deferred basis for two or three decades will provide a solid investment alternative for the risk involved. On the other hand, it is difficult to justify very short-term EIAs in any portfolio.

6. Product regulation

Equity index annuities are commonly referred to as having 1) the ability to participate in the market with equity appreciation and 2) a limited downside risk because of contract guarantees. This opens up problems on how the EIA will be marketed by the insurance company's agents without crossing into the securities environment that is regulated by the SEC. EIAs are a lot like the creature that looks like a duck, quacks like a duck, and flies like a duck. Is it duck? EIAs have returns dependent on equity securities and risk that is greater than a fixed income security. Is it a security?

A basic return-risk analysis of EIA product has yet to be published. It appears that insurance companies have intentionally steered away from providing this type of information due to the possibility of future SEC regulation and a potential threat of other legal actions. The improperly trained or naïve agent selling EIAs may not properly inform or understand the consequences of the EIA product on the future value of a customer account. In fact, there appears to be a potential quandary for agents as a thorough explanation of this issue to a client could raise two difficult questions. The prospective client might ask: *1) Should I just purchase a portfolio of index securities directly?* or *2) Why should I purchase a product where I do not receive all of the return (dividends)?* The first question implies that the purchase would have to be facilitated by a securities licensed representative (or directly by the customer) and the traditional, nonsecurities-licensed insurance agent loses the sale. The second question is more easily handled as the EIA contract guarantees a minimum percentage return. The overall problem is that a thorough explanation of the EIA product crosses the line into selling a securities product and is dangerously forcing many insurance agents into areas that they are not legally equipped to handle.

A subtle, but important point should be made regarding the difference between traditional fixed annuity contracts and the EIA. The traditional fixed contract has an initial known rate that the purchaser accepts on the date that the contract is purchased, while the EIA purchaser only accepts a minimum guarantee that may not even guarantee a complete return of

principal. It is the opinion of the author that the above arguments should generate SEC regulation of EIA contract sales in this country similar to other variable securities.

EIA contracts also raise an insurance regulatory issue as these products have the potential of increasing the business risk of those insurance companies underwriting EIA contracts based on their decision on how to properly fund and manage their underlying portfolio. A.M. Best has previously made public announcements that downgrades could occur if EIAs were to become a significant part of the product portfolio. SafeCo and Keyport Life have left the index product business in recent years because of what the popular press (Greene, 2000) has reported as poor investment decisions with EIA premiums. This seems to provide supporting evidence of the potential risk that exists to insurers in this market that must ultimately be borne by the customers of the insurer.

7. Conclusion

The equity index annuity is a recent development that allows traditional insurers to provide an equity-like product to their product line. The results of this analysis indicate that the product, on its performance basis only, does not match up well with traditional equity-based investments and, in many instances, traditional annuity performance. The biggest advantage that a single premium deferred annuity has is tax deferral. The EIA tax advantage disappears as the direct investment has the benefits of sale timing, a lower U.S. capital gains rate, and the inclusion of dividends. The results presented here are highly dependent on the participation rate assumption. Market variations in participation rates may cause varying buying opportunities for investors in EIA contracts.

Regardless of the type of financial professional, professional and ethical responsibilities to the client should generally result in the same use of these instruments. Thus, a nonsecurities licensed insurance agent should be working with a securities-licensed representative to help clients achieve their goals *if* the agent does not have the appropriate tools or training available. In fact, a planner may be able to replicate a similar tax-advantaged portfolio through the use of a combination of traditional fixed annuities that provide a guarantee-like floor return and options on spiders (SPDRs). Yet, there is substantial risk to the financial professional as the ability to manage a portfolio of derivative securities is essential to the success of this technique and may place additional liability risks on the planner.

It is important to keep in mind that the future regulation of these instruments is still in question. The EIA product is an exceptional addition to the product list of the insurance representative if the client and the nonsecurities licensed insurance agent both self select each other because of risk-aversion, tax-aversion, or both. In this case, the product allows the agent to better fill the needs of those clients who are less risk-averse and desire the tax deferability of this product. As the market size of this product line continues to grow, it will become more difficult to regulate this burgeoning industry. Firms should take a proactive approach at properly educating representatives how to merchandise these instruments without concern for the regulatory environment. Additionally, insurers should be careful in setting participation rates to minimize future solvency difficulties.

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