



An Overview of Equity-Indexed Annuities

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Equity-indexed annuities are complex investments sold by insurance companies that pay investors part of the capital appreciation in a stock index and guarantee a minimum return if the contract is held to maturity. Sales of equity-indexed annuities have soared in recent years despite the impenetrable formulas used to calculate their likely returns. Equity-indexed annuities to date have been regulated by state insurance commissions, rather than by the Securities and Exchange Commission and the NASD. In this note, we provide an overview of equity-indexed annuities. We also sketch how they can be valued. We estimate that between 15% and 20% of the premium paid by investors in equity-indexed annuities is a transfer of wealth from unsophisticated investors to insurance companies and their sales forces.

I. Introduction

Since their introduction in the U.S. in 1995, sales of equity-indexed annuities have grown dramatically. Approximately \$25 billion in equity-indexed annuities were sold last year. Equity-indexed annuities are quite similar to equity-participation securities, which are traded on the American Stock Exchange under various brand names. Equity-participation securities guarantee that investors will receive the initial face value of the security plus the increase in the value of a stock or stock index reduced by an annual spread. The correspondence between equity-indexed annuities and equity-participation securities is closely analogous to the correspondence between variable annuities and mutual funds.

Insurance companies add trivial insurance benefits, disadvantageous tax treatment and exorbitant costs to mutual funds and sell them as variable annuities. Insurance companies have added similarly trivial insurance benefits, disadvantageous tax treatment and exorbitant costs to equity-participation securities and sell them as equity-indexed annuities. The primary difference in the correspondence is that repackaging mutual funds as variable annuities doesn't remove

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investor safeguards whereas repackaging equity-participation securities as equity-indexed annuities has heretofore exempted them from effective securities regulation.

A direct consequence of the difference in regulatory treatment is that investors in unregistered equity-indexed annuities cannot trace back through returns in the markets to the returns their investments will earn. Also, as a result of the lack of SEC and NASD oversight, investors in equity-indexed annuities cannot determine the costs they are incurring. Moreover, equity-indexed annuities' complexity makes it virtually impossible even for brokers and agents to properly evaluate the annuities. Salesmen can readily determine though that commissions paid for selling equity-indexed annuities – as high as 10% or 12% – are much larger than commissions paid on mutual funds and variable annuities.

A balanced portrayal of the costs and benefits of any equity-indexed annuity requires a comparison of its likely returns to the likely returns on alternative investments – including the investments the customer currently holds – under reasonable assumptions. Such a comparison need not be overly complicated to be informative as we will show below.

II. Regulation

In 1997, the Securities and Exchange Commission issued a Concept Release requesting comment on the (then) recent advent of equity-indexed annuities. More recently, the Commission warned investors considering buying equity-indexed annuities that “You should fully understand how an equity-indexed annuity computes its index-linked interest rate before you buy.”²

In August 2005, the NASD issued a Notice to Members on the supervision of the sale of unregistered equity-indexed annuities by registered representatives.³ The Notice describes some of the potentially misleading marketing claims used to sell equity-indexed annuities and encourages broker-dealers to adopt enhanced supervisory procedures for the sale of equity-indexed annuities by their registered representatives. The Notice tells broker-dealers that

² See www.sec.gov/rules/concept/337438.txt and www.sec.gov/investor/pubs/equityidxannuity.htm.

³ See *Equity-Indexed Annuities* NASD Notice to Members 05-50, August 2005.



any recommendation to liquidate securities to purchase an equity-indexed annuity requires a determination that the equity-indexed annuity was suitable for the investor, even if the annuity is not a registered security. For a broker to determine that an equity-indexed annuity is suitable, he or she must understand the hidden costs generated within equity-indexed annuities' complex structures.

If the NASD applies the principles in Notice 05-50, broker-dealers will no longer be allowed to sell current equity-index annuities. As we explain below, existing equity-index annuities are too complicated for the majority of brokers and retail investors to understand. The complicated structures allow insurance companies to sell investments which are much more costly and much less liquid than available alternative investments. If brokers are required to understand equity-indexed annuities in the same way brokers must understand stocks, bonds or options, equity-indexed annuities must become simpler and more transparent.

The NASD updated a previous Investor Alert last summer warning potential investors that equity-indexed annuities are complex.⁴ Combined with the Notice to Members 05-50, the Investor Alert makes clear that the NASD has determined that registered representatives who recommend that retail investors sell securities including variable annuities in order to buy equity-indexed annuities must do a thorough job explaining the features of the equity-linked annuity. It is also apparent that the NASD believes that broker dealers must supervise registered representatives, who send out sales material on equity-indexed annuities to ensure that the materials are not misleading and that any subsequent sale of an equity-indexed annuity is suitable.

The industry's trade groups are fighting back. In an effort to head off regulation of equity-indexed annuities, the National Association of Insurance and Financial Advisors sent out an Action Alert on November 29, 2005 urging its members to write the NASD and the Securities and Exchange Commission demanding the withdrawal of Notice to Members 05-50. The National Association for Fixed Annuities' December 5, 2005 *The Cry Over Indexed Annuities*:

⁴ See *Equity-Indexed Annuities – A Complex Choice*, NASD Investor Alert, June 30, 2005.



Fact or Fiction, NAFA Sets the Record Straight claims that equity-indexed annuities are not securities, that some equity-indexed annuities are suitable for seniors and that not all equity-indexed annuities have high surrender charges and pay exorbitant commissions.

III. Contract Features

A. Maturity

Equity-indexed annuity contracts pay out at maturity just like zero-coupon bonds but unlike bonds the amount to be received is unknown until maturity. The payout is a function of the general level of price appreciation in the stock market at or shortly before maturity. Other things equal, equity-indexed annuities with longer maturities provide less value to investors than annuities with shorter maturities.

B. Surrender Charge Schedules

Equity-indexed annuities have surrender charges frequently of 10% or 12% and as high as 25% if premium credits are included.⁵ The surrender charges usually decline over a period of years. On some contracts, surrender charges last throughout the contract's life, making the contract's cash surrender value less than the premiums paid for many years.

C. Guaranteed Minimum Rates of Return

Equity-indexed annuities do not guarantee that investors won't lose money. They do guarantee a minimum rate of return – typically 3% – but the guaranteed rate is typically much less than the risk free rate of return offered on US Treasury securities with the same maturity as the annuity. Also, the guaranteed rate of return is usually only applied to a fraction of the amount invested and sometimes without compounding. On some contracts, no interest is credited unless the annuity is held to maturity. Holding constant the guaranteed rate of return, the higher the risk-free interest rate, the less valuable equity-indexed annuities are to investors.

⁵ Premium or bonus credits are a gimmick used to sell both variable annuities and equity-indexed annuities. These credits increase the face value of the policy but are completely offset by higher surrender charges and longer surrender periods. These credits fool investors into believing they are getting something for nothing.

D. The Stock Index

Equity-indexed annuities credit the investor a return under certain circumstances based on the change in the level of a stock price index. Most equity-indexed annuities are linked to the level of the S&P 500 Index. A few equity-indexed annuities are linked to other indices.

The indexes used are price appreciation indexes and so changes in the level of the indexes do not include the dividends investors would receive if they owned the underlying stocks or stock mutual funds. Exclusion of dividends causes the changes in the S&P 500 Index level used in equity-linked annuities to significantly understate the returns earned by investors in the S&P 500, as dividends have historically accounted for 20% of the returns investors in the S&P 500 stocks have earned.

The higher the dividend yield on the index stocks, the less valuable equity-indexed annuities are to investors. The more volatile the stock index, the more valuable equity-indexed annuities are to investors.

E. The Fraction of the Index Change Credited

The participation rate is the fraction of the change in a stock index credited to the investor. Participation rates vary significantly and can be applied to different measures of index level changes. Participation rates are easy to compare but are misleading; a higher participation rate may not mean higher payouts to investors since with equity-indexed annuities all else is seldom held constant. However other things being equal, the higher the participation rate an equity-indexed annuity pays, the more valuable it is.

F. The Method for Measuring Changes in the Stock Index

There are three common formulas, called indexing methods, used to translate changes in the index level into gross returns on the contract.

The point-to-point method measures the increase in the index level from the beginning to the end of the contract's term. If the index level was 1,000 when the contract was purchased and was 1,500 when the contract matured, the point-to-point method records a 50% increase. The



point-to-point method is the traditional way to measure, quote and interpret the change in the level of an index.

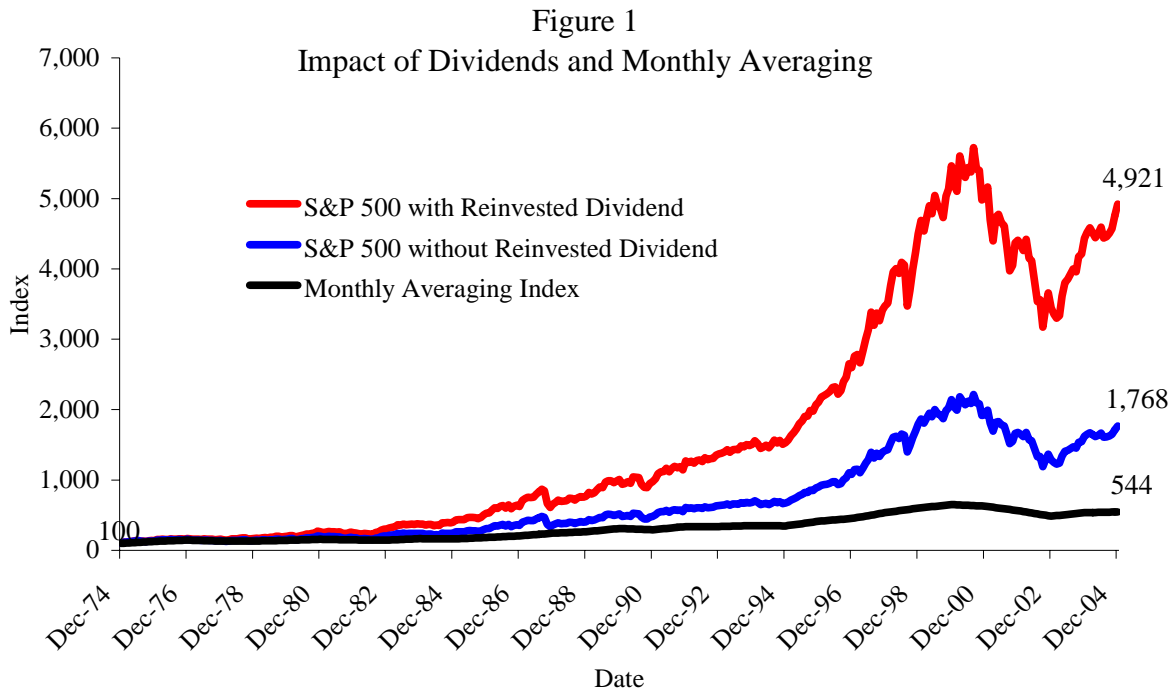
In some contracts, a point-to-point return is calculated at regular intervals, usually the contract's anniversary date, and the index value is reset or ratcheted up to reflect the credited return. If the index level is lower at the end of the contract than it was on some earlier reset date, the reset feature will record an increase that is greater than the simple point-to-point method. For instance, if in our previous example the index had been as high as 1,700 on a reset date the point-to-point with reset method will record a 70%, rather than a 50%, increase.

A more complicated indexing method - the monthly average return method - calculates the increase in the index level from the start of each year to the average month-end level during the year. The base is then reset at the beginning of the next year and the process is repeated until the contract matures. Other things equal, equity-indexed annuities with resets are more valuable than annuities without resets and point-to-point annuities are more valuable than monthly-averaging annuities.

Advocates for equity-indexed annuities claim that the monthly average return method makes the resulting calculated index level changes less volatile and that this reduced volatility makes the return guarantee less costly so the industry can offer investors a higher participation rate on annuities which use monthly averaging. Such statements are misleading since the volatility primarily relevant to the cost of the guaranteed minimum return is the volatility of the underlying stock index.

Insurance companies can offer higher participation rates on annuities with monthly averaging rather than point-to-point indexing because monthly averaging systematically understates the increase in the level of the index. The expected index change with monthly averaging will be roughly half the expected change calculated by the traditional point-to-point method. Thus, under the monthly averaging method insurance companies can claim to pay 100% participation of the calculated index level change while only paying 50% of the actual change in the index level.

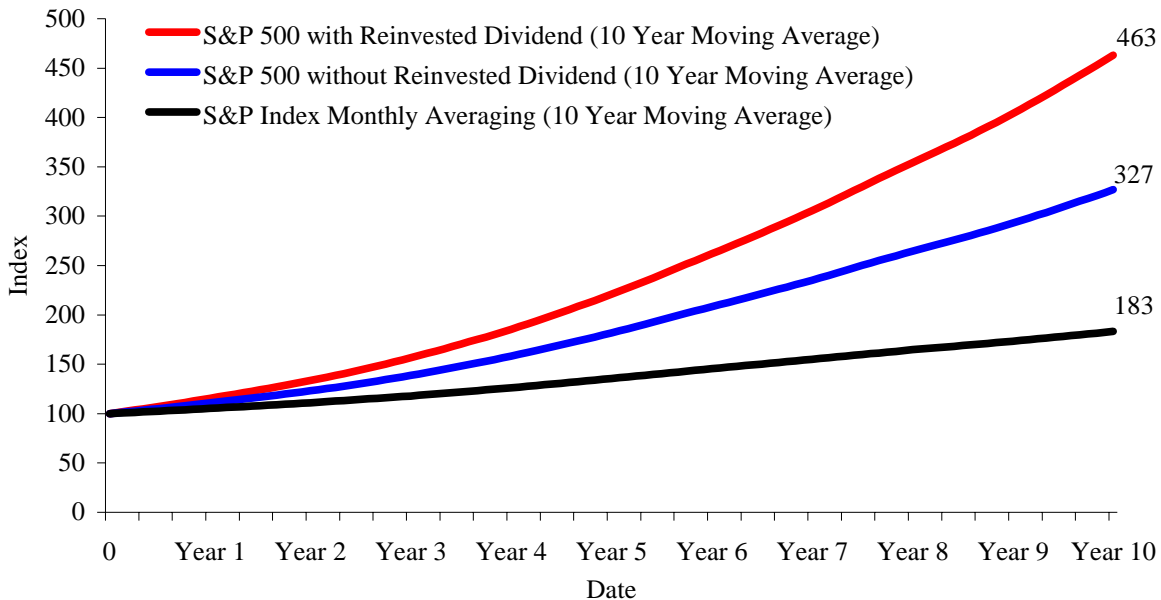
Figure 1 illustrates the impact of monthly averaging on the calculation of index changes from 1975 to 2004. On December 31, 1974 the S&P 500 closed at 68.56. The top line shows the value of the S&P 500 over time with reinvested dividends. The second line from the top shows the level of the S&P 500 index excluding dividends. As you can see, excluding dividends reduces the return over the 30 year period by 64%. The lowest line shows the value of the index calculated by applying the monthly averaging with annual reset method. Monthly averaging further reduced the change in the price level of the index by 70% over 30 years.



The impact of monthly averaging is not a phenomenon of the time period covered. We constructed 241 10-year periods by rolling 10 years of data forward one month at a time from 1975 to 2004. The first months' returns, second months' returns and so on were then averaged across the 241 periods. The impact of dividends and monthly averaging on these average returns is illustrated in Figure 2. Excluding dividends reduces the average return over 10-year periods by 29%. Monthly averaging reduces the change in the level of the index by a further 44%.

Unsophisticated investors might believe that they will get 100% of the increase from 100 to 463 when in fact they receive only 23% of this increase.

Figure 2
Impact of Dividends and Monthly Averaging (10 Year Moving Average)



G. Additional Deductions: Spreads, Caps and Fees

The gross credit calculated by multiplying the index change by the participation rate is then sometimes further reduced by an amount called a spread that can be as great as 3%. Thus, two contracts linked to the same index, with the same indexing method and the same participation rate can have significantly different net returns.

Caps are also used to reduce the credited index level changes on some annuities. For example, the increase in a contract's index value under the point-to-point method with annual resets might be capped at 14% meaning that the contract's index value will increase by only 14% in years when the index level increases by more than 14%. The effect of annual caps is dramatic because the average long run return to stocks is heavily influenced by years with unusually high returns. For example, the annualized price appreciation in the S&P 500 from 1975 to 2004 was

10.0%. If we cap the yearly increase at 14%, the resulting series has an annualized appreciation of only 5.5%.

IV. A Simple Comparison

Equity-indexed annuities are touted as excellent investments for investors wanting to participate in market returns without bearing market risk. We can evaluate the industry's claims by directly comparing the value of the point-to-point structure to a simple combination of stocks and Treasury Securities.

Consider a point-to-point annuity purchased on December 31, 2005 which pays out 50% of the change in the S&P 500 Index over a 10-year term. It guarantees a 3% return, compounded annually, on 90% of the premium paid and the return of the principle if the investment is held until maturity. The annuity has a 10% surrender charge which declines 1% per year. The S&P 500 Index closed on December 30, 2005 at 1,248.29. On December 30, 2015 the annuity will return to the investor \$100 plus the greater of \$30.95 (i.e. 3% interest on \$90 for 10 years) or 50% of the difference between the S&P 500 on December 30, 2015 and 1,248.29.

The comparison portfolio consists of \$60,000 invested 10-year Treasury strips maturing on December 30, 2015 and \$40,000 invested in a low cost S&P 500 Index fund.⁶ \$60,000 would have purchased \$92,628 face value on December 31, 2005 and so the \$60,000 Treasuries investment would be worth \$92,628 on December 31, 2015 regardless of the level of the S&P500.⁷ The \$40,000 invested in the S&P 500 Index fund will be worth more or less than \$40,000 depending on the total return on the fund. Consistent with historical dividend yields on the S&P 500 companies, we assume that the stocks in the index have an average dividend yield of 2.5%. The value of the equity-indexed annuity and of the stock/cash portfolio as a function of the level of the S&P 500 on December 31, 2015 is plotted in Figure 3. The probability distribution of the S&P 500 Index level in 2015 is also plotted in Figure 3.⁸ Except in extremely

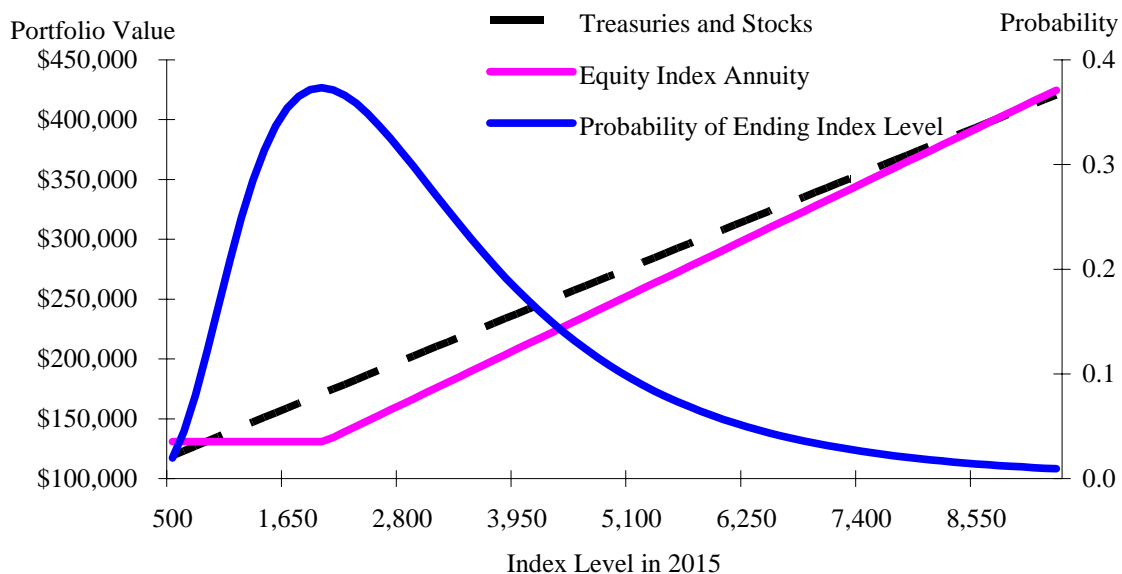
⁶ We assume the fund has an expense ratio of 0.25%.

⁷ The yield to maturity on 10-year strips on December 31, 2005 was 4.39%.

⁸ The annual changes in the S&P 500 Index level are assumed to be log-normally distributed with a mean of 10% and a standard deviation of 20%.

rare cases, the equity-indexed annuity returns much less to investors than a portfolio of risk-free Treasury securities and large-cap stocks.

Figure 3
Equity Index Annuity and 60% Treasuries / 40% Stock Portfolio
After 10 Years



We performed a Monte Carlo simulation on the two investments pictured in Figure 3 based on realistic assumptions and determined that 96.9% of the time the investor is better off with the Treasury securities and stocks than with the equity-indexed annuity. That is, investors sold this example annuity would be worse off 96.9% of the time, even if they held the annuity to maturity and it performed exactly as designed.

After 10 years, the expected value of the Treasuries and stocks is \$219,696 and the expected value of the equity-indexed annuity is \$186,265. The \$33,431 equity-index annuity shortfall can be broken down into a \$219 expected benefit for when the annuity is better and a \$33,650 expected cost for when the Treasuries and stock would have been better. The expected



cost/benefit ratio is thus a staggering 153 to 1. That is, investors pay \$153 in costs for every \$1 in benefits relative to the Treasuries and stock portfolio.

Even this comparison is overly generous to the annuity because we have assumed that the contracts were held to maturity and so no surrender charge was applied. In addition, equity-indexed annuities are worse than our illustrations imply because of their disadvantageous tax treatment. The returns earned on equity-indexed annuities are taxed at the investor's marginal income tax rates when the returns are withdrawn. Currently this rate could be as high as 35%. Long term capital gains and dividends for most investors are currently taxed at 15%. Thus investors keep 80 or 85% of the returns earned in the stock index fund but only 65% of the returns paid out of the annuities. If, as seems likely, the before-tax return on the equity-indexed annuity equals about 40% of the before-tax return on index fund, the after-tax return on the equity-indexed annuity will equal only about 30% of the after-tax return on index fund.⁹

V. Equity-Indexed Annuity Valuations

In the previous section, we illustrated the payoffs to a typical equity-indexed annuity and an ultra low-risk portfolio of Treasury securities and stocks. These illustrations suggest that typical equity-indexed annuities are a poor investments but don't tell us just how bad they are. We have extended models found in the actuarial science literature using complex mathematical formulas, numerical approximations and Monte Carlo simulations to value real world equity-indexed annuities.¹⁰ Our software allows us to evaluate various equity-indexed annuities and to calculate the likelihood different investors would benefit from an equity-indexed annuity. This ongoing research is the subject of a related technical working paper.

Table 1 presents an example valuation of a 10-year point-to-point equity-indexed annuity guaranteeing a 3 percent return compounded annually on 90% of the initial premium. We

⁹ Withdrawals from equity-indexed annuities' made before the investor is 59 ½ may be subject to early withdrawal penalties further exacerbating the annuities' underperformance relative to Treasury securities and stock mutual funds.

¹⁰ See Serena Tiong, "Valuing equity-indexed annuities," *North American Actuarial Journal*, 4, pp. 49–170, 2000 and Sebastian Jaimungal, *Pricing and Hedging Equity-indexed Annuities with Variance Gamma Deviates*, working paper, November 2004.



assume the risk-free interest rate is 4.5%, the dividend yield on the S&P 500 is 2% and the volatility is 25%. We solve for the “breakeven” participation rate, α , which makes the annuity worth \$1 for each \$1 the investor pays and find it to be 92% in this example. The forgone dividends plus 8% of the total price appreciation foregone is the “fair” price for the downside protection provided by the equity-indexed annuity’s return guarantee.

Table 1
Typical Point-to-Point EIAs Have Large Hidden Costs

Base Assumptions:	
Guaranteed Return Base (Percentage of Initial Premium)	90%
Minimum Guaranteed Return	3%
Years to Maturity	10
Risk-Free Interest Rate	4.5%
Dividend Yield	2%
Standard Deviation	25%
Fair Participation Rate	92%
Typical Participation Rate	50%
Investment Value Per Dollar Invested	\$1.00 \$0.84

The last column of Table 1 re-calculates the value of the annuity under the same set of assumptions except we assume a 50% participation rate.¹¹ A 50% participation rate reduces the value of the annuity by 16%. This 16% is a good estimate of how much wealth is transferred from the investor to the insurance company and broker when the equity-indexed annuity is sold.¹²

There is an interesting fee and expense twist in equity-indexed annuities. Equity-indexed annuities do not have explicit annual fees or expense ratios. Instead, the insurance company makes money by giving investors less than a fair share of the increase in the value of the S&P 500 index. In the example above, fair compensation for the downside guarantee is the dividends

¹¹ 10-year point-to-point annuities typically have participation rates of around 50%.

¹² This example does not include many features – most of which further reduce the value of the annuity.

paid on the underlying stocks plus 8% of the capital appreciation in the S&P 500 index. The insurance company in our example takes the dividends plus 50% of the capital appreciation.

This 42% spread is more valuable to the insurer – and more costly to the investor – the longer the maturity of the equity-indexed annuity. If we change the maturity in our example to 5 years, a contractual 50% participation rate in the capital appreciation compared to the “fair” participation rate of 81% implies a cost to the investor of 8% of their investment. With a maturity of 15 years, a contractual 50% participation rate compared to the “fair” participation rate of 100% implies a cost to the investor of 23%. *See* Table 2.

Table 2
Equity-Indexed Annuities With Longer Maturity
Have Higher Imbedded Costs

Years to Maturity	5	10	15
Fair Participation in Capital Appreciation	81%	92%	100%
Investment Costs at 50% Participation	\$0.08	\$0.16	\$0.23

VI. Conclusion

Equity-indexed annuities are complicated investments sold to unsophisticated investors without the regulatory safeguards afforded to purchasers of similar investments. If brokers and agents told investors of the effect equity-indexed annuities’ shaving of index returns and extraordinary costs the market for these products would dry up.

Ironically, both the SEC and the NASD caution investors to review and understand the impact on likely returns of the myriad equity-indexed annuity features. No registered rep, insurance broker, or retail investor, and precious few finance PhDs, could understand these products. 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.