

## Will Your SWiP Beat Your ILY?

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Most practitioners understand the importance and benefits of including income annuities within an optimally constructed retirement income portfolio. Longevity insurance – whether in the form of a Single Premium Immediate Annuity (SPIA) or a Defined Benefit pension, or even the guaranteed withdrawal benefit within a Variable Annuity (VA) – provides income that can not be outlived.

All of these SPIA-type products result in the pooling and sharing of longevity risk -- the risk that an individual will live longer than their assets last -- which allows clients to transfer longevity risk from their personal balance sheet to the insurance company's corporate balance sheet. In this article we intend to show that by annuitizing some fraction of assets, individuals also receive better investment returns. The only remaining question is the extent to which income annuities should be mixed and matched with other asset classes in the optimal portfolio.

Despite the apparent benefits of SPIAs, there is a large community of financial advisors who remain unconvinced and consequently many consumers are receiving suboptimal advice because income annuities are not being considered. Perhaps this is due to the lack of knowledge regarding how an annuity functions, confusion as to where an annuity fits within a retirement portfolio, or the desire for higher commissions. This group of financial advisors is more comfortable with the language of capital markets, alphas and betas and view the ideal retirement income portfolio as one that is diversified between

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equities and fixed income. Both of these asset classes provide simple, commonly accepted methods of calculating alpha. Conversely, annuities lack a widely accepted methodology of calculating this metric because payments are made for the life of the annuitant, which is not known in advance. An Internal Rate of Return (IRR) is equally hard to compute give the inherent uncertainty.

So, in an effort to dispel some of the confusion surrounding the SPIA, in this brief article we review something called the implied longevity yield (ILY<sup>3</sup>), the only currently known measure for the embedded annuity's alpha; and ask: Can a systematic withdrawal plan (SWiP) that is composed of equities and fixed income beat an alternate plan where some of the fixed assets are used to buy a SPIA? We illustrate these odds at various ages and with a number of examples.

### **A Case Study: Understanding the ILY**

Let's start our analysis with Mr. Client, a 67 year-old male in average health who is about to retire. Let's assume that after a thorough and detailed *retirement needs* analysis, he learns that he requires an additional \$4,000 per month – above and beyond his Social Security benefits in order to maintain his desired standard of living. We abstract from a number of distracting details here by ignoring the impact of income taxes, inflation and a possible spouse (although all are important and will be revisited in the conclusion).

According to data provided by CANNEX Financial Exchanges in November 2008, Mr. Client would be able to purchase a SPIA that pays \$4,000 per month for the remainder of his life for an upfront cost of approximately \$498,471. The SPIA would contain a guarantee that if Mr. Client dies within the next five years, his beneficiary would continue receiving the fixed monthly payments for the remainder of the five year period.

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<sup>3</sup> Note that ILY is a registered trademark of CANNEX Financial Exchanges. The actuarial mathematics behind the ILY are described in the published technical article "Implied Longevity Yield: A Note on Developing an Index for Payout Annuities", *Journal of Risk and Insurance*, 2005, Vol. 72(2), pg. 301-320

Should Mr. Client die after this period, no payment would be made to the beneficiary. In the language of insurance this is a 5 year payment certain.

Now, an axiomatic feature of SPIA pricing is that the cost of this \$4,000 per month for life declines as a function of age. The older you are and the lower your remaining life expectancy, the cheaper the cost of the same income stream, all else being equal. In other words, if current payout rates remain at their current level, the cost of the same \$4,000 in three years from now, at the age of 70, would be \$464,865.85 and at the age of 75 it would be an even lower \$408,825.64 upfront. So, at first glance one might be tempted to delay this particular decision until the cost is lower. But of course, Mr. Client would have to generate an annual income of \$4,000 from total portfolio returns.

*What is the return that Mr. Client must earn – during the waiting period – in order to generate the same \$4,000 in monthly income and still have enough in the portfolio to purchase the same income stream at the end of the waiting period?* This is the implied longevity yield (ILY). In the above case the answer is that Mr. Client would have to earn 7.33% over a 5 year waiting period and 7.25% over a 10 year waiting period. How do we know this? Well, to a first order of approximation one can compute the internal rate of return of a series of cash-flows. A more answer precise answer requires some advanced calculus, which might not be suitable for this particular venue.

Either way, table #1 displays these ILY values for a variety of ages and waiting periods. Note that a SPIA can be divided into two portions: 1) a guaranteed portion analogous to a number of zero coupon bonds and 2) a life contingent portion that begins once the guaranteed portion ends and pays a regular income while the annuitant is alive then terminates when the annuitant dies. Essentially, the ILY measures a type of investment alpha during the guaranteed portion.

The reader will notice that the interest rate that must be earned in order to beat the annuity (the ILY) is higher for males than females. Intuitively, this is observed because males do not live as long and are therefore more likely to die during the waiting period.

SPIAs are pooled. This means its principle and interest is shared among a smaller expected number of survivors, resulting in a higher guaranteed lifetime payout to males. Consequently, the ILY is higher since the male must earn a greater return to meet his withdrawal requirements and afford the SPIA at the end of the waiting period. The same effect results in a higher ILY for older ages since an older person is more likely to die during the waiting period. On the other hand, the ILY declines as the waiting / guarantee period increases – intuitively because the income generated by an annuity with a longer guarantee period is lower so the interest rate required to beat this annuity is lower.

### **Portfolio: What Are The Odds?**

Can Mr. Client expect to earn these rates? First, let's consider the payout rate from alternative fixed income instruments that do not offer longevity protection. For example, Table #2a lists the current annual yields from Government Treasury bonds which also offer a fixed and predictable payout rate. In addition, Table #2a displays the yield from corporate fixed-income securities, as represented by the Lehman Brothers Corporate (*or use Aggregate*) Index. Given these current rates, it is clear that it would be difficult for the age and gender groups summarized in Table #1 to achieve the required annual investment return rate equal to their respective ILY values. Would incorporating alternate asset classes with higher growth potential allow the client to achieve an investment rate above the ILY? In Table #2b we provide a probabilistic analysis which gauges the chances that a portfolio of stocks and bonds can exceed a given annualized rate over a period ranging from 5 to 15 years. For example, we see that the chances a portfolio – with a 70% equity and 30% bond mix – has only a 55% chance of earning an annualized rate greater than 6.5% over the next 10 years. The portfolio only has a 42.7% chance of achieving an 8.0% annualized rate. While the portfolio may have the growth potential to exceed the ILY, the Table illustrates that there is a substantial risk of shortfall. In short, it is difficult to find an alternative investment vehicle that offers such high yields, especially at advanced ages.

## Putting it All Together

So, once again, while a SPIA is typically the least liquid among possible investment products, we find that the annuity provides a higher alpha compared to a similar investment that does not have longevity protection – a bond issued by the government or a highly rated company. Similarly, a portfolio allocated to a mix of equity and bonds has a low probability of exceeding the ILY on an annualized basis.

There are a number of other considerations to be made when assessing an income annuity's role in a retirement portfolio. For example, the income annuity is taxed more favorably because when the SPIA is purchased with non-qualified funds, the IRS allows a portion of each payment to be considered repayment of principal and this portion is not subject to tax.

SPIAs can also be purchased with a degree of inflation protection. This version of the SPIA guarantees that payments are indexed to the CPI or are increased by a fixed compounded rate annually. Typically, however, this inflation protection is not elected because it is provided at the cost of a lower initial monthly income. Alternatively, a client can rely on the equity portion of the overall portfolio which would likely keep up with inflation over a long period of time.

Annuities are also available with a variety of optional guarantees. Generally, the greater the value of the guarantee, the more similar the annuity payout is to that of a bond and the lower the ILY. This is true whether the guarantee is in the form of a longer guarantee period; a joint and last survivor SPIA, which terminates on the last death of the annuitant and the annuitant's spouse; or an annuity that pays a percentage of the initial premium on termination.

We have reviewed the basic SPIA functions and features and have examined the Implied Longevity Yield (ILY) – an analogue for the SPIA's alpha. Equipped with this

metric, we are better able to quantify the cost of delaying annuitization and determine whether the SPIA belongs in the client's retirement portfolio and in what proportion. We conclude by asking once again; *are you sure your client's SWiP will beat his or her ILY?* If you are not 100% confident – and we certainly are not, given what happened to markets in late 2008 – then perhaps it's worth hedging some client longevity risk and allocating a portion of their portfolio to some form of guaranteed lifetime income.

**Table #1**

**Title: What Must Your Portfolio Earn  
to Beat the “Implied” Return from the Income Annuity?  
Quotes from CANNEX, November 2008**

<b>Age / Gender</b>	<b>5 Years Wait</b>	<b>10 Years Wait</b>	<b>15 Years Wait</b>
<b>62M</b>	6.8%	6.8%	6.8%
<b>67M</b>	7.3%	7.2%	7.0%
<b>75M</b>	8.5%	8.0%	7.4%
<b>62F</b>	6.5%	6.5%	6.5%
<b>67F</b>	6.8%	6.8%	6.8%
<b>75F</b>	7.7%	7.5%	7.2%

Note: At advanced ages it become increasingly

**Table #2a****Title: Comparing SPIA vs. Other Fixed Income Products**

1) List of current Treasury bond rates from US gov't November 6, 2008

(<http://www.federalreserve.gov/releases/h15/update/>)

5 Year	7 Year	10 Year	20 Year
2.5	3.0	3.8	4.5

2) List of current fixed income index values (Source: e.g. Lehman Corporate Index or Lehman Brothers Aggregate index

(<http://www.lehman.com/fi/indices/factsheets.htm#>)

**Table #2b****Title: What is the Probability Portfolio Earns More?**

	Over 5 Years from...		Over 10 Years from...		Over 15 Years from...	
	100% Equity Portfolio	70% Equity & 30% Bonds	100% Equity Portfolio	70% Equity & 30% Bonds	100% Equity Portfolio	70% Equity & 30% Bonds
<b>Probability of Earning An Annualized Return Greater Than:</b>						
<b>6.5%</b>	56.7%	53.7%	59.4%	55.2%	61.4%	56.4%
<b>8.0%</b>	50.0%	44.8%	50.0%	42.7%	50.0%	41.1%
<b>9.5%</b>	43.3%	36.2%	40.6%	30.8%	38.6%	27.0%
<b>11.0%</b>	36.9%	28.2%	31.8%	20.7%	28.1%	15.9%
<b>12.5%</b>	30.7%	21.1%	23.8%	12.9%	19.2%	8.3%

Assumptions: *The numbers are all in nominal terms, and assume an expected growth rate (a.k.a. geometric mean) of 8% (which reflects the historical performance of the S&P 500 equity index over the long term) from all equity portfolio (after all fees) and 7.1% from the 70/30 portfolio. These are rather optimistic estimates given the current economic environment. The true odds are likely lower.*