# POPULAR IBC TOPICS

## Notes on Lecture 3:

## Policy Illustrations and "Internal Rate of Return"

Robert P. Murphy

July, 2015

**REVIEW FROM MANUAL:**

(Taken from SOL-I in the Course Manual.)

The discussion in SOL-I of the Manual shows you how to build your own Excel file, relying on publicly available data on mortality, in order to compute the "actuarially fair" premium on various types of life insurance policies, making assumptions about portfolio rates of return etc. However, in order to keep the analysis simple and to avoid (arbitrary) assumptions about cost structures, these calculations *ignore all overhead, including agent commissions*. The point is to start from the basics, to show the pure theory of life insurance pricing, before adding real-world complications such as commissions, the overhead costs of running a life insurance company (secretaries to answer phones), etc.

One payoff from this simplistic approach is that it allows an IBC Practitioner to easily defuse objections about the "high cost" of a whole life policy. Even setting aside all overhead costs, the actuarially fair premium rises substantially as we increase the term of a policy. This is illustrated in Table SOL-I-3 of the Manual.

**Table SOL-I-3. Actuarially Fair Level Premium for $1m Term Policies of Varying Lengths (using 2001 CSO Mortality)**

| Term Length (Years) | Level Premium (35yr old male) |
|---|---|
| 5 | $954 |
| 10 | $1,378 |
| 20 | $2,184 |
| 30 | $3,403 |
| 40 | $5,140 |
| 50 | $7,024 |
| 60 | $8,049 |
| 65 | $8,142 |
| 86 | $8,225 |

***Internal Rate of Return (IRR)***

The internal rate of return for a life insurance policy is the *single* interest rate that a checking account would have to use, over the history of the policy to that date, to give the same surrender value (as a checking account balance) in light of the net cash flows into the policy/bank. It is a way of evaluating the whole life policy *purely as an investment vehicle*.

This is a *very treacherous* subject to open up, because it is very easy to make erroneous calculations and/or to compare apples to oranges. See the new course addition, located as an appendix in the new (as of April 2015) SOL-IV chapter, on how to appropriately evaluate "buy term and invest the difference" as a strategy against whole life. *[Lecture video is posted to the course syllabus, whereas the written lecture is posted to the PRACTITIONER DASHBOARD under the RESOURCES tab.]* This appendix explains many of the pitfalls with the "internal rate of return" approach which superficially seems to cast whole life in a bad light.

With those caveats in mind, the rest of this lecture will discuss some specifics of IRR in the context of whole life.

If you want to get a sense of how the "pure" factors affect the internal rate of return, check out Table SOL-I-4 (which I am not reproducing here because it will take us too far afield). As the cash value grows over time, the Net Amount at Risk diminishes, which (by itself) would lower the "pure" insurance mortality charge that must somehow be accounted for, when the actuaries originally price out the whole life policy. This is one of the reasons why "front-loading" a policy with large PUA contributions (or doing a 7-pay versus a paid-up at 65, for example) will boost the internal rate of return.

However, there is a countervailing force, which is that as a person gets older, his or her probability of death increases. Thus, even though the Net Amount at Risk shrinks, the actual mortality expense per year generally rises (if we are just looking at the "pure" factors) for most of the policy. You can see this in column (7) of Table SOL-I-4 if you want to look it up.

In the real world, one of the major forces affecting the apparent internal rate of return is the timing of agent commissions. Specifically, in the real world the surrender value of a whole life policy does not grow as much in the early years as it does in an idealized Excel spreadsheet that only accounts for the "pure" factors like mortality and portfolio growth.

In the real world, the only truly safe way to talk about internal rates of return with clients who insist on such a discussion, is to use the home office's software to generate such values as a separate column in the actual illustration. Trying to "wing it" with quick calculations in the margin will give the wrong answer. *You cannot calculate an IRR to date by looking at just two yearly values of the policy*. Let me show the potential problem below.

**Possible Pitfall:** Some fans of IBC might say something like, "As the life insurance policy ages, it becomes more efficient and your premium payments have a greater impact. For example, look at this illustration. In year 6, the cash value grows by more than the premium payment. And if we jump ahead to year 20, we see that the cash value jumps by just about *twice* the amount you put in that year. And yet people will tell you whole life has a terrible internal rate of return!"

**The Problem:** Although the statements in the hypothetical quotation above are correct (for a typical non-guaranteed illustration), they potentially are very misleading. They imply that the way to judge the impact of premium payments in year *X* is to look at the growth in cash value from year *X-1* to year *X*. However, in reality the growth in cash value is driven not just by the influx of new money that year, but also by the earnings from all of the *previous* premium payments in the lifetime of the policy.

The easiest way to illustrate the problem with the above way of thinking is to switch contexts to a conventional commercial savings account, which earns 5% interest. Consider the following history:

**Table: Hypothetical Commercial Account Paying 5% Interest**

| Year | Deposit (start of year) | Balance (end of year) |
|---|---|---|
| 1 | $1000 | $1,050 |
| 2 | $1000 | $2,153 |
| 3 | $1000 | $3,310 |
| 4 | $1 | $3,477 |

The hypothetical client of the commercial bank put in $1,000 in each of the first three years. During the first year, the cash value grew by $1,050. In Year 2, it grew by ($2,153-$1,050) = $1,103, and during Year 3 it grew by ($3,310-$2,153) = $1,157.

So does that mean the saving account grew more efficient over time? Perhaps it overcame the drag caused by the overhead costs of opening the account?

No, of course not. By construction in this simplistic example, any funds deposited in this savings account roll over at 5% annually, regardless of when they were deposited. The reason the later deposits of $1,000 *seem* to make the balance jump more and more, is that later deposits are placed into a bigger starting balance, which generates more interest (in absolute dollars).

To make the point crystal clear, in the table above I had the hypothetical person deposit only $1 in Year 4. Yet that measly $1 deposit went hand in hand with a jump of $167 in the bank balance. Does that mean by Year 4, this bank account has become so efficient that deposits now yield a return of 16,600% (which is $1 turning into $167)? Of course not; the deposits always earn a return of 5% annually. The increment of $167 in the balance in Year 4 is almost entirely due to the interest on the balance in Year 3, *not* to the measly $1 deposit in Year 4. That particular $1 deposit made at the beginning of Year 4 only contributed a nickel in interest (on top of the $1 itself) to the ending balance in Year 4.

**Conclusion:** Nelson frequently warns that IBC is not about rates of return. Today's discussion showed some pitfalls in trying to shore up whole life from the common objections.

It *is* true that the IRR on a whole life policy, especially when we take into account tax considerations, improves over the life of the policy. Many clients probably do not realize how decent such rates can be, and in some cases it might be worthwhile to show them this information.

However, keep in mind that we are dealing with *life insurance*. It is *more* than a simple vehicle for accumulating cash. See the appendix in SOL-IV to see all of the reasons that these quick comparisons—which evaluate solely on the basis of "rate of return"—are inappropriate.

However, the only way to accurately generate these IRR is to ask the software to do it; trying to do it manually is very likely to introduce a mistake. (You have to keep track of the net cashflows over the life of the policy to that point, and find the single annualized rate of return that yields the same ending balance with that history of cashflows.)

In any event, it is simply wrong to look at the change in cash value from one year to the next, and try to relate that to the rate of return accruing to a particular cash inflow that year.