Centurion

September 2009

Valuation of micro longevity products

The history of investing in life settlements

In their previous incarnation, life settlements were more often no more than viaticals, which are defined as life insurance policies where the insured is terminally ill and has a typical life expectancy of between 24 and 48 months. As the industry evolved, the definition of life settlements slowly changed to its current form where the insurance policy is on a senior aged 70 or older who may or may not have any health impediments. In the early days when transactions in the industry dealt mostly with viaticals, valuations were done principally on a "straight line" discounted cash flow basis, very similar to how a zero coupon bond is valued. This practice stemmed from the fact that since many of the insured were terminally ill, their policies very often had premium waiver clauses, which justified to some degree the use of this valuation practice which today is commonly known in the industry as the "deterministic" valuation methodology. With the advent of older insured and longer dated policies coming into the market, the focus changed to the accuracy of the medical underwriting and the modifications to the actuarial mortality table.

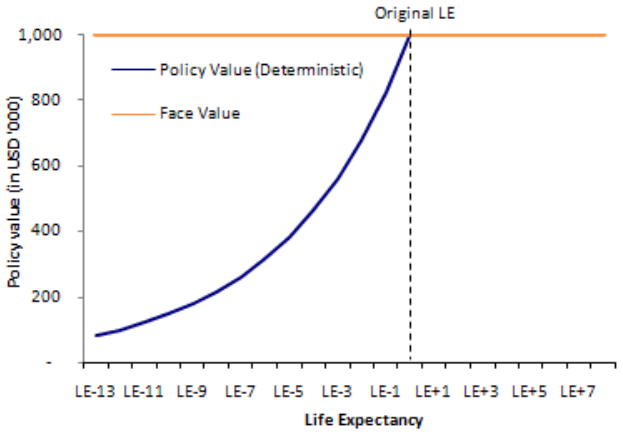
As an increasing amount of institutional capital enters this asset class, more rigour and thought are being put into how life settlements should be valued, be it on a mark-to-model or a mark-to-market basis. As the life settlement market can at best be categorised as thinly traded and that it is impractical, if not impossible, to obtain a mark-to-market value on a large portfolio of policies on a regular basis, the majority of participants in this market value their assets on a mark-to-model basis. The model used will depend on a few important factors such as the type of investment fund e.g. an open-ended or close-ended fund, and on the accounting and tax implications based on the jurisdiction of the investors and/or the fund which will govern the treatment of gains as income or capital gains. The two approaches that are commonly used today are deterministic and probabilistic, both of which are model-based valuation methodologies. The robustness of the model will very much depend on the assumptions and the parameters built into it.

The deterministic valuation methodology

The fundamental premise of the deterministic valuation methodology is that it assumes that the life expectancy ("LE") estimate provided is a certainty, that at that precise point in time, the policy will mature and that the face value will be paid out provided that premium obligations have been met up to this point.

However, if the insured remains alive at LE, the value of this policy using this method would have reached its full face value and yet the investor has a continual obligation to pay the premiums until the actual maturity of the insured, which remains an unknown. This continued unexpected demand on cash flow creates a drop in the value of the policy and hence a decrease in the return of the asset.

Single policy value using a deterministic valuation technique



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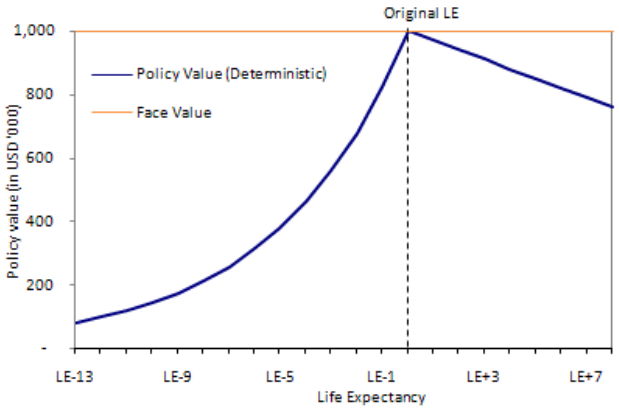
Single policy IRR using a deterministic valuation technique



The deterministic method does not take into account that an LE estimate is as the name suggested, an estimate. The LE estimate used by most investors is the median LE which means that on a portfolio basis, some insured will live shorter than expected and others will live longer than expected.

The probabilistic valuation methodology

Probabilistic valuations are inherently actuarially based. Mortality is established based on the probability that someone may die at any one point in time (i.e. the probability of someone having achieved 70 years old surviving until the age of 100) by referencing it to the population typically based on a size of 1,000. For example, a group of 85 year old

females with similar health conditions and lifestyle would have a 0.70% probability of reaching age 100, or put another way, 7 out of 1,000 in the group would be expected to reach age 100. The mortality experience for the population that survives another year is not linear, so an 85 year old female with an LE of 10 years will not have an LE of 9 years when she turns 86 but rather an LE of 9.25 years assuming her health conditions and lifestyle remain the same.

If the insured's health is not considered "standard" for his sex and age, then a mortality factor (or mortality multiplier) is applied by the medical underwriters to account for the deviation from the norm. The poorer the health when compared to the normal population (standard), the greater the mortality factor or multiplier, where standard is typically defined as 1.0 or 100%. The LE estimate is derived by applying the mortality factor to the standard mortality table.

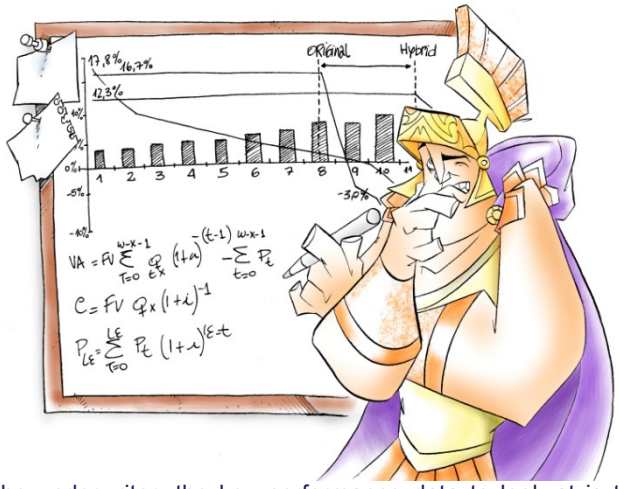
Factors affecting the accuracy of the LE estimate

In each country, mortality tables (or life tables or actuarial tables) are produced by the government statistics office based upon information gathered from the entire population. Actuaries in insurance companies and pension funds use these tables as a basis to develop their mathematical models in order to predict future insurable events such as death, sickness and disability for a specific population or sub-set of a population.

Life settlements have specific requirements which make deriving an accurate life table difficult. Mortality tables are lagging indicators which means they are produced based on experiences and events that have already happened. As the life settlement industry is still fairly young and concerns a very specific subset of the population - typically affluent seniors with access to the best medical care - insufficient time has passed to have significant data on hand in order to generate an accurate set of mortality tables which pertains specifically to this population subset. Furthermore, medical underwriters typically will base their adjustments on the standard mortality tables which are usually very accurate up to age 65 but thereafter can deviate substantially from the actual mortality experiences.

Another factor that needs consideration when using actuarial tables for the procurement of life settlements is negative selection, defined as the unlikelihood that the insured would sell a policy if his health is suspect. Mortality curves are derived assuming some form of probability distribution without taking into account negative selection, which is to say that the probability of death in the earlier years would be lower than expected. However, as this parameter is qualitative rather than quantitative, it is difficult to conclusively calculate the shift in the distribution curve due to negative selectivity.

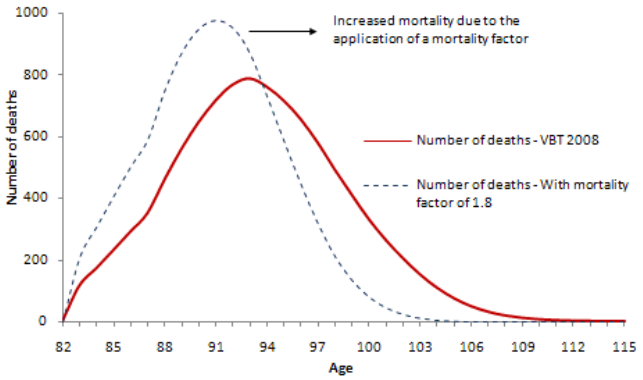
In the micro longevity industry, LE estimates are typically provided by a handful of underwriters so the accuracy of their estimates is of vital importance and dictates to a large degree the expected return on investment. So how does one go about separating the good from bad? To decipher the skill of



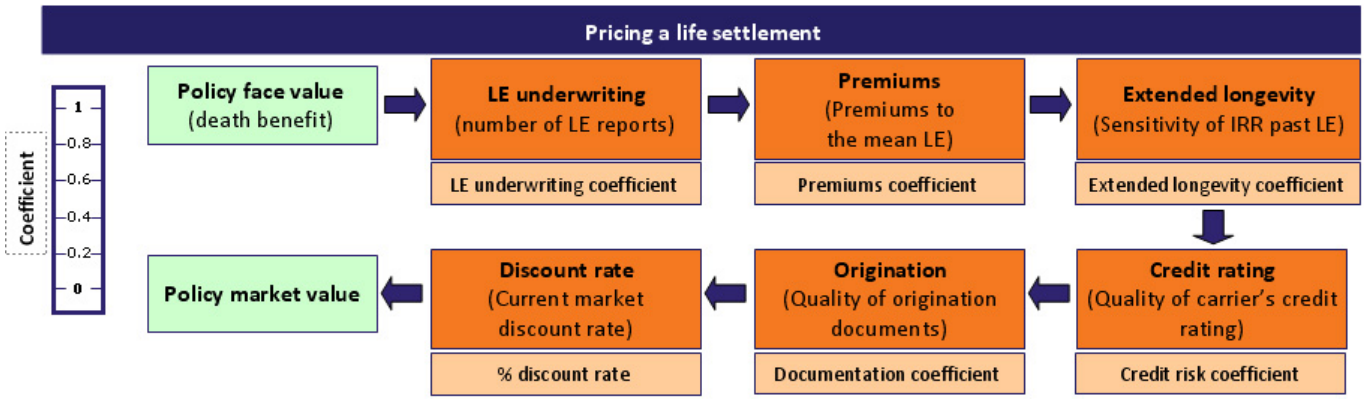
the underwriter, the key performance data to look at is the actual-to-expected mortality experience which shows the number of actual deaths versus predicted deaths for given impairments, though there needs to be sufficient data in the sample to form a proper opinion.

Each underwriter uses its own methodology in determining the LE estimate but by and large will use the same generally accepted principles. They will look to the insured's medical and family history and, based on their assessment of the health of the insured, establish a mortality factor which is defined as deviation from the standard risk for a person of the same age and gender.

Mortality experience — Standard VBT 2008 versus impaired life



Standard actuarial tables represent a proxy of the life expectancy of the general population with standard health at a given age. However, if there is a divergence from "standard" (defined as 1.0 or 100%), then actuaries adjust the mortality curve based on the actual health of the insured in mortality tables produced by the American Society of Actuaries for the US general population. The actuaries then apply their own mortality factor which takes into account not



order to determine their own mortality factor or multiplier. Over the years, underwriting firms have built up sufficient data to derive their own mortality curves which generally are a variation on the 2008 Valuation Basic Table (VBT2008), only the health of the insured but also hereditary longevity and longevity improvements.

Bid process in life settlements

Factors that need to be considered when pricing a life settlement include the LE estimates provided by one or more underwriters, the credit risk of the carrier going into default, the type of policy, the size of the premiums due to LE and their sensitivity to extended longevity and the quality of the documentation. The illustration above shows how coefficients can be used for each of these factors in the bidding process to determine the value.

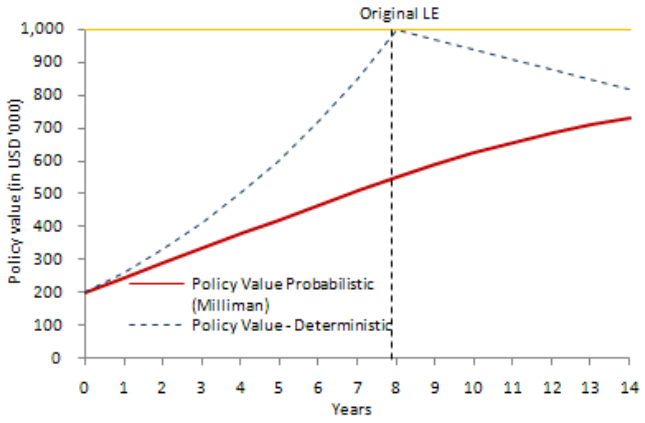
The market will often price policies differently dependent on their characteristics. For example, in the market today, a jumbo policy, defined as a policy with face value of $10m or greater, will price at a substantially higher IRR than a policy with a face value of $1m. The reason for this is because a jumbo policy is deemed to be less liquid than a small face value policy. So when pricing a policy during the bid process, many of these elements needs to be taken into account. Without the application of some coefficients or discount factors, policies with different characteristics and liquidity constraints using the standard valuation method would result in overpaying on some policies and not being competitive enough in others.

Valuation process in life settlements

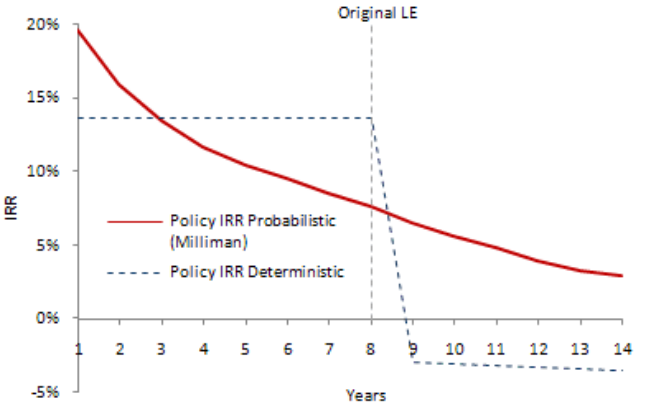
When a life settlement is purchased, a market price is effectively established upon the close of that transaction. Given an LE estimate and the maturity value of the policy, how should value be attributed to the policy for valuation purposes given that the duration before the maturity of the policy is not fixed in stone? The first question that needs answering is whether the policy needs to be priced to market thereby dictating the use of the probabilistic, instead of the deterministic approach.

As time extends, the deterministic approach overvalues a single policy compared to the probabilistic approach, a proxy for market value. However, if deaths occur in a portfolio over time in exactly the manner as predicted by the actuarial model, the prices determined by the probabilistic method would equate to those using deterministic. However, this would not happen on a policy by policy basis. The graph below shows how the price and IRR would evolve for a single policy using the two different approaches.

Single policy value — deterministic versus probabilistic

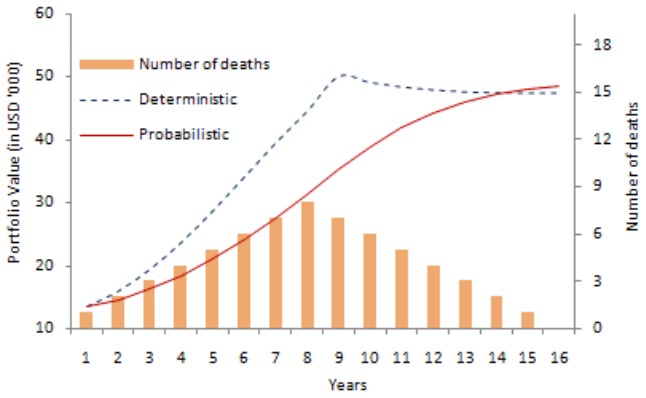


Single policy IRR — deterministic versus probabilistic

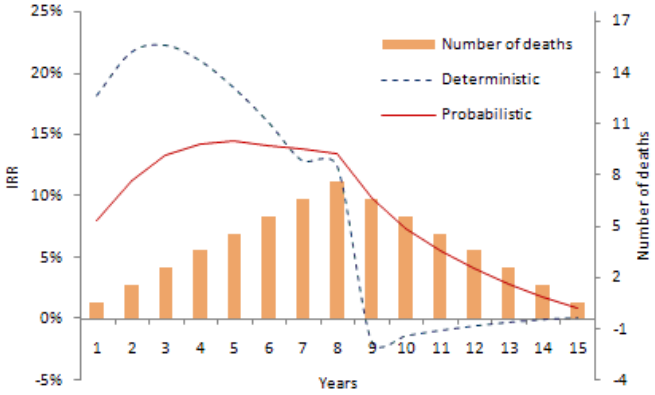


The valuation process becomes more complex when working with a portfolio of policies. The graphs below show the portfolio value and the IRR for a group of 64 policies using the deterministic and the probabilistic approach.

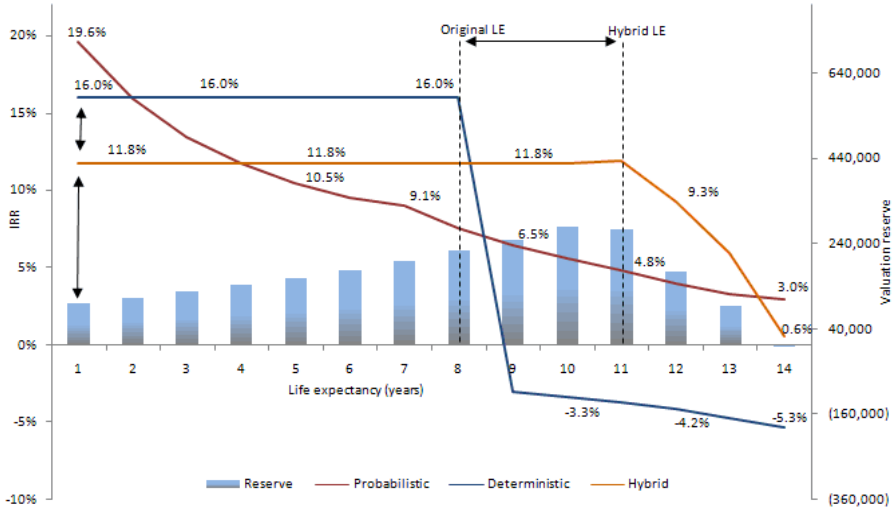
Portfolio value — deterministic versus probabilistic



Portfolio IRR — deterministic versus probabilistic



Being equitable to investors in an open-ended fund



Unlike buying a single policy or a portfolio of policies held on one's account or in a closed-ended fund, in an open-ended fund, there are continuous inflows and outflows. Inflows come from investors and policy maturities while outflows are for policy premiums, servicing costs and redemptions from investors. Hypothetically speaking, optimum performance of the portfolio can be achieved if premiums and servicing costs are met by subscriptions and surplus cash from death benefits are used to meet redemptions. However, this is unlikely to happen in reality. The issue is then how to ensure new investors coming into the fund are not buying at an inflated price which in effect subsidises those leaving as the assets are not priced mark to market.

A hybrid valuation technique

The hybrid valuation technique recognises that LE estimates are probabilistic and that the market prices a policy based on the underwriters used, the deviation in the LE estimate, the type of policy as well as the origination documents. In short, any value attributed to a policy is at best a best estimate. Given these variables, is it possible to design a valuation method that is probabilistic in its approach yet aims to achieve a deterministic IRR? In short, the answer is yes. The hybrid method in its simplest form puts gains from early maturities into reserve in order to fund late maturities, a concept that regulated insurance companies have been mandated to use for years in all parts of the world. These reserves are published in the audited accounts of the entity or the fund.

Fund managers have developed their own in-house models in an attempt to resolve these issues and to be equitable to investors wanting to buy into the longevity risk without buying into a "pyramid scheme". In this asset class, it is very easy for the uninitiated to be blind sighted by valuation methods which purport to have "solved" this problem by simply having exponential net inflows thereby masking the real actual-to-

expected mortality experience, avoiding the need to sell assets (at market price) and thereby exposing the weakness in the model used to price the value of the assets accrued in the fund.

As with all esoteric assets, establishing a market price is not as simple as looking up the price on Bloomberg or Reuters. Imagine the complexity and the enormity of building a pricing system that would take into account the permutation of the number of carriers, the number of LE estimates per policy, the underwriters used, the mortality factors used by each underwriter, all for a population aged between 70 and 90 years old.

The hybrid model can run the gamut from the simplistic to the more complex. In its simplest form, the model adjusts LEs probabilistically putting gains from early deaths into reserve which is then used to support the fund value for late maturities. A more sophisticated and complex solution involves setting a target rate of return. A debit-and-credit system is applied to the reserve whereby early deaths are credited to the reserve while late deaths are debited from the reserve. Equally the reserve can be used to buffer any movements in the market rate of return, thus truly creating a fund that is not exposed to the volatility of the market.

Experience in this asset class is everything. At Centurion, we have been involved in this asset class since 2002. Like most in this market, we have learnt as the market matured and have used this knowledge to improve our systems and methodology. When our first share class was launched, we used the deterministic method in valuing our policies. Over time, we have worked with a team of in-house actuaries to develop our own proprietary hybrid valuation methodology. This method has not only proven to be accurate, as attested by our actual-to-expected results, but also allows us to be equitable to our shareholders and to maintain a reasonable level of liquidity.

** David Rawson-Mackenzie is founder and managing director at Centurion Fund Managers and has over 15 years experience providing cross-border tax and investment advice to private and institutional clients.*

About Centurion

Centurion's current fund range includes one of the first micro-longevity funds in the market, established in 2002, which consists of physical (or cash) policies, a micro-longevity fund established in 2006 which combines both physical and synthetic policies, a micro-longevity fund of funds launched in 2003 and a macro/micro longevity fund of funds launched in 2009.

Fund name	Type of fund	Domicile	Quoted
Defined Return Fund PLC	Micro longevity with physical policies only	Cayman Islands	
Life Settlement Strategy Fund SPC	Micro longevity with physical and synthetic policies	Cayman Islands	Channel Islands Stock Exchange
Argent Fund SPC	Micro longevity fund of funds	Cayman Islands	Luxembourg Euro MTF
Centurion SICAV SIF SCA – Longevity Fund	Macro/micro longevity fund of funds	Luxembourg	

Website	Telephone	Email
www.centurionfundmanagers.com	+44 (0) 207 079 5850	info@centurionfundmanagers.com