



In the Secondary Market, We're First®

Investor Series: Part 3


Longevity Risk & Life Expectancies

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LSAM Events & Resources

- June 1 – Life Settlements Fundamentals
 - June 4 – Life Settlements Advanced Strategies & Case Studies
 - June 7-10 – LSS at the MDRT Convention
 - June 11 – Investors in Life Settlements –Part I*
 - June 16 - Investors in Life Settlements –Part II*
 - June 18 – How changes in past year will impact market going forward
 - June 23 - Investors in Life Settlements –Part III*
 - June 25 – Advanced Strategies: Market and Regulatory Trends
 - June 30 – Life Settlements Fundamentals (repeat)
-
- Continuing Education course on life settlements (www.lss.webce.com) available in all 50 states (2-8 CE Credits)
 - Downloadable resources and event signup at: www.lifesettlementawarenessmonth.com

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Life

Panelists

- Vince Granieri, 21st Services
- Jan Buckler, DBRS
- Jay Vadiveloo, Watson Wyatt Worldwide

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Vince Granieri

21st Services



Agenda

What is a life expectancy and how are LEs used?

- 2008 VBT
 - What it is and what it isn't
- Actuarial aspects of longevity
 - Life settlements vs. life insurance
- Demographic aspects of longevity
 - Seeking additional data
- Clinical aspects of longevity
 - The Docs or the data?

What is a Life Expectancy?

- Actuarial formula for the mean expectation of life:

$$\sum_{t=0}^{\infty} t p_x$$

- In layman's terms, the time until death
- Practically speaking
 - A doctor's subjective judgment (1995-1997)
 - Now commonly understood to be the product of a mortality table and an underwriting process
 - Less commonly known - it is shorthand for a mortality curve**
- Underwriting process generates a mortality multiplier
 - Multiplier of 1.00 = > standard risk for a given age**
 - Multiplier > 1.00 => impaired risk**
 - Multiplier < 1.00 => preferred risk**

Using Life Expectancies

- LEs form the basis for pricing life insurance policies in the secondary market
- There are many pricing methods
 - Most are discounted cash flow models
 - Some derive mortality curves by matching LEs
- Matching LEs
 - Solve for the mortality multiplier of a known table (the 2008 VBT, for example) such that the LE derived using that table is the same as the independent LE provider's LE
- **This practice can result in incorrect prices if the underlying mortality tables are not similar**

Changes in Mortality Tables

- 2008 VBT released by the US Society of Actuaries in April, 2008
 - Mortality improvement varied by age, gender, smoker status vis-à-vis the precursor 2001 VBT
- Early duration mortality in life settlements varies greatly from 2008 VBT and for that matter, the 2001 VBT
- 21st Services (and at least two independent actuarial consulting firms) concluded that the unadjusted VBT are inappropriate as a basis for life settlement pricing
 - 21st Services' new mortality table released in September, 2008

2008 VBT – What it is...

- A **life insurance industry** individual mortality table
 - Defines expected mortality for individual life insurance policies in the year 2008
 - Serves as the basis for life insurance reserves
- A conservative rendering of life insurance mortality
 - Although margins are added before calculating reserves
 - Actuaries must certify that the resulting reserves are adequate
 - Actuaries are conservative because the consequences of inadequate reserves are daunting
 - *Reference the current mortgage situation*

2008 VBT – What it isn't...

- The 2008 VBT is not a life settlements mortality table
 - Grades to population mortality at upper ages
 - Includes simplified/paramedically underwritten experience
 - Excludes experience at face amounts above \$2.5mm
 - Does not reproduce life settlement experience at early durations
 - Too many deaths means overstated cash flows and bids
 - Utilizes a 25 year select period, which is too long for life settlements
- Conclusion: Conservative for the life insurance industry is *not* conservative for the life settlements industry

Actuarial Aspects of Longevity

- Early duration life settlement mortality is low
 - Antiselection occurs because insured who are close to death will avoid selling their policies
- Later duration life settlement mortality experience is nonexistent
- Older age insured data is not voluminous
 - **2008 VBT study has 1,274 deaths at or above age 80**
 - **21st Services has 1,830 deaths at 80 and above**
- 21st Services' conclusions
 - Study our emerging experience at least twice annually
 - Seek alternative sources of data like the CDRG Study
 - Medicare sample of over 1 million lives annually

Demographic Aspects of Longevity

- 21st Services utilizes a rules-based approach which dovetails with CDRG methodology
- Both organizations also utilize ICD-9 codes which provides further reinforcement
- We will evaluate all lives in the CDRG study using our underwriting system
 - This will provide statistically credible feedback on our debits/credits
 - We can fine-tune our underwriting based on millions of senior lives

Demographic Aspects of Longevity

- Medicare data is available by zip code (residence)
- US Census Bureau links zip codes and income levels
- We will evaluate all lives in the CDRG study using our underwriting system
 - This will provide statistically credible feedback on our debits/credits
 - We can fine-tune our underwriting based on millions of senior lives
- This enables us to incorporate demographic influences into our methodology
 - Life Settlements homogeneity on the rise

Clinical Aspects of Longevity

- There are issues as mortality rates increase towards 1 later in life
 - Counter this by adjusting debits and/or table
- However there are also issues in using educated estimates/clinical judgment
 - Too many permutations of different conditions
 - Subjectivity
- 21st Services' conclusions
 - Study the data
 - Listen to the Docs as they interpret data
 - **More data means more credibility**



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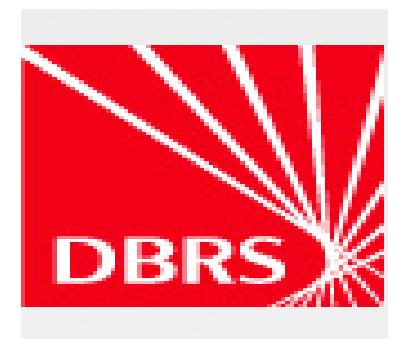
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DBRS





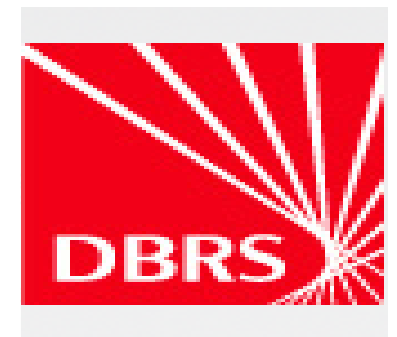
Forward Pricing an Insurance Policy within a Simulation Environment

One possible approach

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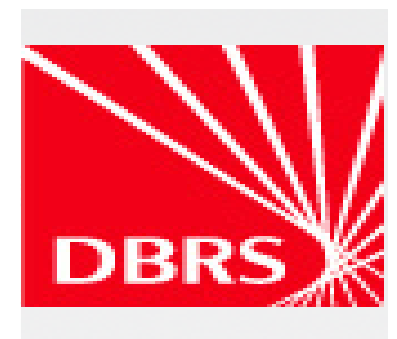


- At this time, the DBRS criteria for Life Settlement Securitization does not allow the proceeds from sales of insurance policies to be utilized for payment of premiums or bond principal.
- This presentation is merely a representation of one of the steps we would consider in assessing a market value securitization.



Relevant Components of an Insurance Policy

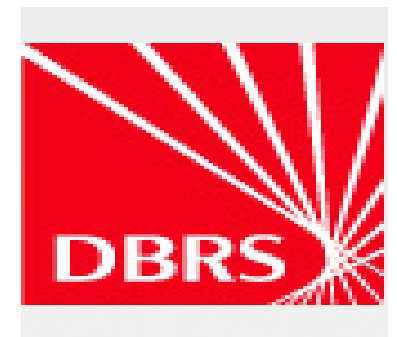
- Death Benefit or Face Amount
- Premiums
- Discount Rate
- Cost of Insurance (COI)
- Mortality Assessment



Simplistic Approach



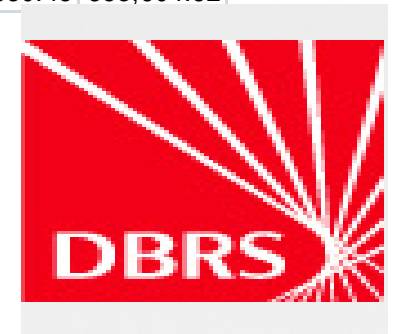
Attained Age	Date	Premium	Death Benefit
87	1/1/2019	165,823	
88	1/1/2020	165,823	
89	1/1/2021	165,823	
90	1/1/2022	165,823	
91	1/1/2023	165,823	10,000,000



A Little Mortality Goes a Long Way

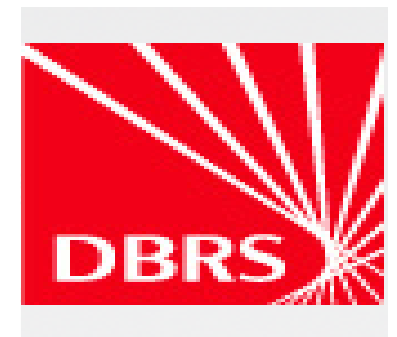


	Monthly Mortality	Monthly Min Prem	PV of Premium		Tpx	Units 2,500,000.00	Monthly DB	agg PV of Monthly DB
12	6.09	15,493.78	1,345,800.64		0.98850	2,471,239.43	2,384.02	27,213.79
24	10.17	17,693.88	1,322,633.20		0.96951	2,423,763.23	3,921.27	66,971.70
36	14.62	20,189.16	1,275,783.52		0.94273	2,356,824.45	5,506.91	116,583.46
48	19.48	22,987.56	1,197,736.39		0.90804	2,270,097.04	7,103.74	173,472.21
60	24.81	26,144.38	1,078,069.15		0.86548	2,163,704.45	8,672.30	235,238.16
72	33.25	29,734.61	906,967.90		0.81112	2,027,801.21	10,991.59	305,071.55
84	44.58	33,817.68	666,495.07		0.74281	1,857,033.55	13,663.89	382,743.09
96	56.51	38,461.15	321,942.70		0.66352	1,658,796.30	15,678.50	462,555.86
108	69.18	18,336.04	137,148.99		0.57681	1,442,018.99	16,927.91	539,813.53
120	82.70	2,871.59	122,058.58		0.48670	1,216,742.07	17,346.21	610,885.22
132	96.84	2,957.95	125,989.86		0.39766	994,158.30	16,879.65	673,048.78
144	108.81	3,052.13	134,373.59		0.31593	789,813.04	15,290.81	723,567.38
156	118.78	3,485.00	144,440.98		0.24504	612,595.05	13,109.60	762,348.56
168	129.41	4,148.50	154,233.97		0.18514	462,839.98	10,939.32	791,357.43
180	140.73	4,821.15	164,236.94		0.13592	339,796.74	8,864.37	812,456.05
192	152.76	5,734.10	172,459.56		0.09670	241,741.90	6,957.19	827,340.19
204	165.52	6,793.01	176,684.16		0.06646	166,155.68	5,273.57	837,497.28
216	179.03	8,029.35	172,605.96		0.04399	109,962.81	3,848.37	844,182.16
228	198.55	9,401.28	155,408.29		0.02749	68,719.27	2,745.58	848,526.65
240	225.03	10,911.08	114,044.20		0.01580	39,507.41	1,865.10	851,252.01
252	251.94	12,619.89	12,619.89		0.00828	20,704.90	1,145.38	852,805.82
264	278.95	0.00	0.00		0.00392	9,794.52	630.43	853,604.52



How to...

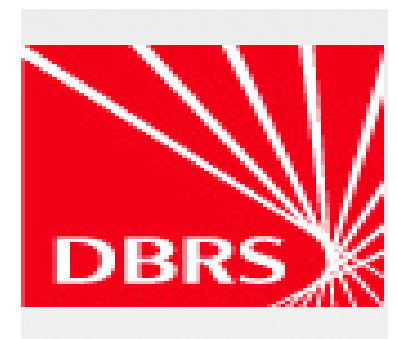
- Arrive at the proper premiums
- Determine the timing of the death benefit
- Select the proper mortality table
- Determine the 'q' values
- Determine the interest rate



Premiums

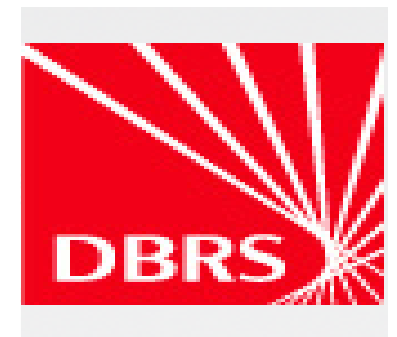


- Optimized using COI with tools such as:
Milliman
Datalife
- Rating agency seat... so client provides
optimized premiums that are then vetted.



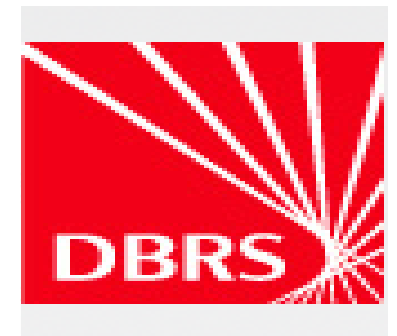
Timing of Death Benefit

- Consequences of mortality tables and 'q' values
- Consider an 88 year old individual ... is he 79 stripe with a 9 duration = 92.22 q of is he 88 stripe with a 1 duration = 27.37 q



Mortality Table

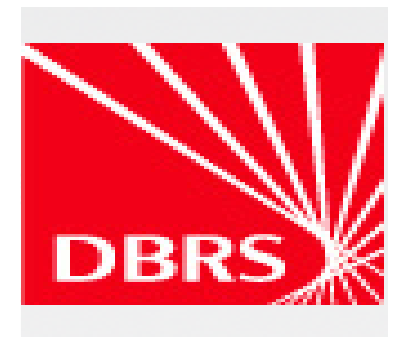
age	1	2	3	4	5	6	7	8	9	10
70	3.90	6.10	8.40	10.87	13.53	16.44	19.63	23.13	26.98	31.22
71	4.39	6.84	9.42	12.19	15.18	18.44	22.01	25.92	30.21	35.01
72	4.95	7.67	10.56	13.66	17.00	20.65	24.63	28.99	33.85	39.27
73	5.57	8.60	11.82	15.28	19.02	23.10	27.53	32.45	37.94	43.95
74	6.28	9.63	13.22	17.07	21.24	25.78	30.78	36.33	42.43	49.09
75	7.06	10.78	14.76	19.05	23.69	28.78	34.42	40.59	47.35	56.58
76	7.92	12.05	16.46	21.21	26.42	32.15	38.41	45.26	54.76	67.04
77	8.87	13.43	18.32	23.64	29.47	35.83	42.78	52.61	65.36	79.20
78	9.92	14.95	20.39	26.34	32.81	39.85	50.05	63.37	77.73	93.42
79	11.06	16.64	22.71	29.29	36.45	47.05	61.02	75.97	92.22	110.07
80	12.33	18.53	25.23	32.51	43.56	58.26	73.91	90.80	109.23	128.84
81	13.74	20.57	27.97	39.53	55.05	71.49	89.12	108.23	128.50	147.20
82	15.27	22.80	34.91	51.35	68.68	87.16	107.06	128.11	147.20	164.55
83	16.94	27.12	47.12	65.45	84.89	105.70	127.65	147.20	164.55	182.79
84	18.73	34.08	61.76	82.29	104.14	127.13	147.20	164.55	182.79	201.30
85	20.67	42.33	79.32	102.37	126.53	147.20	164.55	182.79	201.30	218.61
86	22.75	52.13	100.35	125.85	147.20	164.55	182.79	201.30	218.61	235.43
87	24.98	63.74	125.09	147.20	164.55	182.79	201.30	218.61	235.43	252.99
88	27.37	71.77	147.20	164.55	182.79	201.30	218.61	235.43	252.99	271.73
89	29.96	80.67	164.55	182.79	201.30	218.61	235.43	252.99	271.73	293.39
90	32.82	111.62	182.79	201.30	218.61	235.43	252.99	271.73	293.39	316.47



Interest Rate for Discounting

Combination of:

- Libor
- Credit Spread
- Liquidation Premium



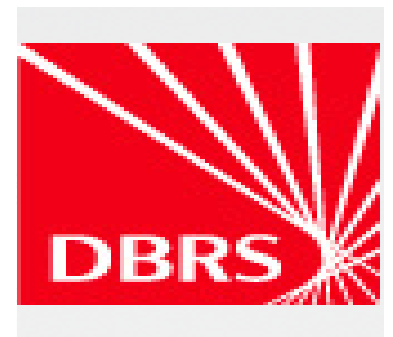
Simulation Premise



Each mortality and cash flow simulation encompasses 1000 policy pricing simulations

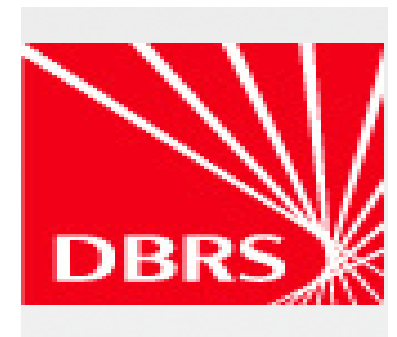
1 simulation pass through deal

Month 1	
Month 2	Simulation of policy value
-	
-	
-	
-	
-	
-	
-	
Month N	1000 simulations for each live insured



Summary

- Less moving pieces than RMBS or ABS
No prepay model per se
- Contractual flows... paying premiums entitles holder to receive death benefit in time
- Type of policy
Age 100 and over... no further premiums
Age 100 no more policy?
- Market value deal may be possible
(For now, not approved in DBRS criteria)





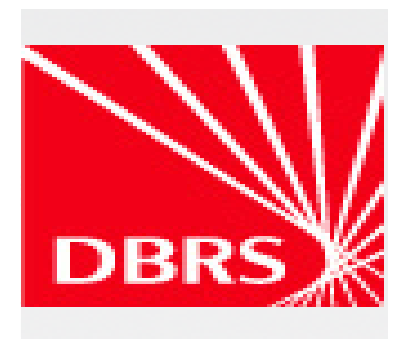
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Definition of Longevity Risk

- Usual definition is the risk of a settled policy maturing after the priced for LE
- Risk increases the later the maturity date from the pricing LE

Pricing Life Expectancy (LE)

- Typically an average of the underwriting LE from 2 to 3 external underwriters
- Could be provided as a mortality multiple to a base table or the actual estimated LE

Factors Contributing to Longevity Risk

- LE is correct and the mortality slope is correct, but the policy matures after the LE – statistical fluctuation risk
- LE is correctly estimated but the mortality slope is wrong

Factors Contributing to Longevity Risk

- Mortality multiple is correctly estimated, but it is applied to the wrong base
- LE is underestimated

Examples



- For a \$1M policy on a 70 year old male with an LE of 10 years, based on the 2008 S/U VBT table, there is a **35%** chance of the policy maturing after 12 years
- Changing the slope to assume no deaths in the first **3** years can reduce the LS value by **\$16K** from \$247K to \$231K



Examples

- Mortality multiple of 4.6 on the 2008 S/U VBT table generates an LE of **10** years and a LS value of **\$247K**. However the same mortality multiple of 4.6 applied to the 2001 S/U VBT table generates an LE of **9.1** years and a LS value of **\$285K**.
- If the true LE is 11 years but estimated as 10 years, then the LS value of \$247K is overstated by **\$41K**

Ways to Mitigate the Longevity Risk

- Due diligence on the external underwriters and getting more than one U/W estimate
- Incorporating a **Provision for Adverse Deviation** (PAD) on the LE estimate to adjust for the underwriter misstatement risk
- Adjusting the mortality slope to reflect specific medical impairments of the policyholder

Ways to Mitigate the Longevity Risk

- Eliminating the statistical fluctuation risk by having a sufficiently large pool of lives, with diversity in impairment type, LE's, minimal face amount variability, etc
- Reinsuring the tail risk
- Continually monitoring the portfolio and re-estimating pricing mortality assumptions based on actual experience

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