Explaining the Rate Spreads of Life Settlements

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Introduction

- Life settlements are becoming an increasingly popular asset class, offering good returns that are largely unaffected by financial crises and market downturns like those of 2000 and 2008.
- With the structure similar to hedge funds, the open-end life settlement funds usually targeted absolute returns of between 8 and 15 percent per annum.

Life Settlements Market

The Growth of the Life Settlement Market

YEAR	TOTAL FACE AMOUNT SOLD
1998	$200 million
2006	$5.5 billion
2008	$12.95 billion
2009	$7.01 billion

Important Characteristics :

- Largely uncorrelated performance, Potentially attractive risk/return profile, Relatively low volatility, Superior credit quality.

US Life Insurance Markets

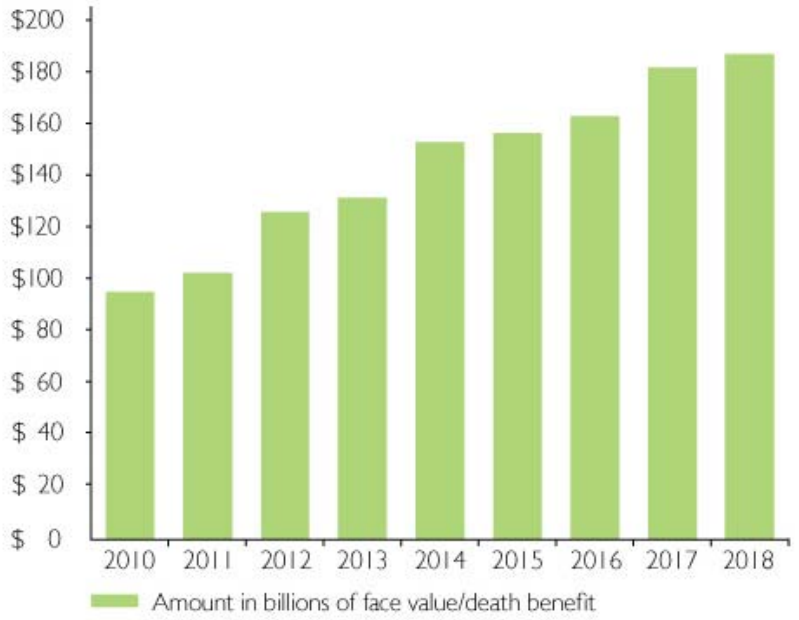
Primary Market

- **88% of universal life insurance policies** do not pay out in a claim.
- **85% of term life insurance policies** do not pay out in a claim.

Secondary Market

- **$180 billion** by 2017[1].

Forecast of US Life Settlement Market Potential[1]



1 Conning 2009

Previous Research

- Gatzert (2010) gives an excellent review of various settlement products and recent life settlement markets.
- Braun, Gatzert, and Schmeiser (2011) provide a comprehensive analysis of the risk and return performance of life settlements and show that life settlements offer attractive returns with low volatility and uncorrelated with other asset classes.
- Braun, Gatzert, and Schmeiser (2011) suggest that Life settlements can be good investments to life insurance companies since they offer good yields with near-zero betas.
- Wang, Hsieh and Tsai (2011) show that life settlements can be an effective hedging tool to significantly reduce the insurer's mortality risk.

What determines risk premiums?

- Stock returns
  - CAPM: β
  - APT: the β's associated with some macroeconomic / systematic risk factors
  - Fama and French's factor models: size, book-to-market ratio, momentum, etc.

Determinants of Corporate Yield Spreads

- Default risk
- Tax premium
- Liquidity
- Other components seemingly relating to the determinants of stock risk premiums

Other Fixed-Income Securities

- Corporate Loans
  - credit quality of borrowers, loan maturity, banks' previous losses
- Emerging Market Bonds
  - macroeconomic fundamentals of individual countries
- Catastrophe Bonds
  - Behavior factors (e.g., reluctance of investment managers to invest in cat bonds), the threats of catastrophes on risk bearers

A hole in the current literature

- The determinants of the risk premiums implied by life settlements have not yet been examined, albeit the increasing importance of such products.
- Identifying the determinants and understanding their relative significance will help current and potential stakeholders assess the value and risk of the life settlements.

Modeling

- Expected Returns of Life Settlements
  - life expectancy vs. bond maturity
  - Internal rate of return (IRR) vs. bond yield

$$0 = -\sum_t PV(Premium_t) + PV(NDB_{LE}),$$

  - NDB_{LE} is the nominal death benefit to be paid at the expected death time

Risk Premiums

- the difference between the calculated IRR and the risk-free rate at the inception of the life settlement
  - the spot rates derived from Treasury STRIPS as the risk-free rates with maturities being matched with the expected death time at the funding time

Samples

- Real-case data from Coventry
- Policies purchased from July 2009 to April 2011
- Underlying policies: universal life
- 344 samples

Independent Variables

- Policy: insured age at funding date, policy year (from issued date to funding date), acquisition cost / NDB;
- Insured: gender, smoking status, the insured's age when the policy is funded, life expectancy,
- Carrier: rating

The First Trial

	beta	t	R2
Intercept	0.0530	4.71	21%
Carrier Rating - S&P	0.0007	0.79	AdjR2
Insured Gender	0.0030	1.85	19%
Smoking Status	-0.0013	-15.18	
UW LE	0.0000	326.57	
Acquisition Cost	0.0000	-1.00	
Age at UW	0.0000	2.28	

A Better Model (after some thoughts)

(Intercept)	-3.14510	1.42089	-2.213	0.027537
Policy Year	-0.07890	0.02110	-3.739	0.000218
Rating	1.64575	0.63699	2.584	0.010198
Gender	0.36952	0.16204	2.280	0.023211
Smoking	-0.32977	0.63647	-0.518	0.604711
LE Diff	-0.39325	0.05352	-7.347	1.55e-12
AqCost/NDB	-10.15805	1.62963	-6.233	1.37e-09
Age	0.10660	0.01725	6.180	1.85e-09

R-squared: 0.2239, Adjusted R-squared: 0.2077

F-statistic: 13.85 on 7 and 336 DF, p-value: 9.037e-16

A Two-Stage Estimation

- 1st stage on life expectancy

(Intercept)	87.9908	23.2286	3.788	0.000180 ***
LE.SSA	-0.6208	0.4368	-1.421	0.156153
Age	-0.8699	0.2409	-3.611	0.000352 ***
Smoking	-4.5151	0.7475	-6.040	4.05e-09 ***
Gender	-3.5306	0.8166	-4.324	2.02e-05 ***

R-squared: 0.6935, Adjusted R-squared: 0.6899

F-statistic: 191.8 on 4 and 339 DF, p-value: < 2.2e-16

2nd Stage

(Intercept)	-3.84911	1.42263	-2.706	0.007165 **
Policy Year	-0.08033	0.02107	-3.813	0.000163 ***
Rating	1.65502	0.63512	2.606	0.009573 **
Gender	0.59006	0.16243	3.633	0.000324 ***
Smoking	1.71345	0.63932	2.680	0.007722 **
AqCost/NDB	-9.71303	1.58459	-6.130	2.47e-09 ***
Age	0.09673	0.01689	5.729	2.25e-08 ***
residuals(LE)	-0.39834	0.05315	-7.495	5.92e-13 ***

R-squared: 0.2283, Adjusted R-squared: 0.2122
F-statistic: 14.2 on 7 and 336 DF, p-value: 3.686e-16

Conclusion

The important determinants of the risk premiums for life settlement:

- Insurer's rating, insured's gender, smoking status and age life expectancy are positive related to risk premiums
- policy year and acquisition cost are negative related to risk premiums

Future Work

- Estimating mortality risk premium
  - By risk-neutral valuation
  - Mortality-adjusted IRR

$$\sum_t [E(CF_t) \times \frac{1}{(1+IRR)^t}] = 0$$

    - with or without mortality improvement

- Analyzing the non-mortality components

Non-Mortality Component = $\beta_0 + \sum_i \beta_i \times Variable_i + \varepsilon$

Thank you