Medical Underwriters in the Life Settlements Market
An Empirical Comparison

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21st APRIA 2017 Annual Conference, Poznan
Agenda

1. Motivation of the study
2. Findings of the study
3. Empirical analysis
4. Interpretations of the findings
Agenda

1 Motivation of the study

2 Findings of the study

3 Empirical analysis

4 Interpretations of the findings
Motivation of the study
Life expectancy is the key driver of price — empirical evidence

New econometric pricing model [Source: Braun and Xu (2017b)]

\[
\hat{P}_0 = \hat{g}(\ln LE, PE) = 1.231 - 0.206 \ln LE - 0.392 PE
\]

\[
P_0 = \frac{TP}{DB}: \text{transaction price (TP) as a fraction of death benefit (DB)}
\]

\[
LE: \text{life expectancy (in years) used for pricing}
\]

\[
PE: \text{sum of premiums to LE (deterministic)}
\]

\text{LE down } \rightarrow P_0 \text{ up}
Motivation of the study
Life expectancy is the key driver of price — theoretical evidence

Simulated $P_0 - IRR - k$-relationship [Source: Braun and Xu (2017a)]

$k$, or its natural logarithm $\ln k$, is used to indicate underwriting aggressiveness throughout the study.

$k$ up $\rightarrow$ $\text{Prob}_i$ down & $\text{LE}$ down & $P_0$ up
Agenda

1 Motivation of the study

2 Findings of the study

3 Empirical analysis

4 Interpretations of the findings
Findings of the study
The current LE landscape

Consistent findings discovered from different samples:

### Across samples

For different life cohorts, ITM and AVS underwrite differently

<table>
<thead>
<tr>
<th></th>
<th>ITM</th>
<th>AVS</th>
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<tbody>
<tr>
<td>Conservative</td>
<td>male; healthy</td>
<td>female; unhealthy</td>
</tr>
<tr>
<td>(low ( k ) / long ( LE ))</td>
<td></td>
<td></td>
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<tr>
<td>Aggressive</td>
<td>female; unhealthy</td>
<td>male; healthy</td>
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<tr>
<td>(high ( k ) / short ( LE ))</td>
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</tbody>
</table>
Findings of the study
The current LE landscape

Seemingly contradictory findings discovered from different samples:

Sample data mostly from settlements providers ("main sample")
- On average, ITM’s underwriting is more aggressive than AVS’s, Fasano’s and LSI’, in both secondary and tertiary markets
  (i.e. $k_{ITM} > k_{AVS}, k_{Fasano}, k_{LSI}$ or $LE_{ITM} < LE_{AVS}, LE_{Fasano}, LE_{LSI}$)

Sample data from two investors ("side samples")
- On average, ITM’s underwriting is more conservative than AVS’s
  (i.e. $k_{ITM} < k_{AVS}$ or $LE_{ITM} > LE_{AVS}$)
Findings of the study
The current LE landscape

Other findings:

Sample data mostly from settlements providers ("main sample")

- Underwriters are sometimes chosen to evaluate those lives for which they tend to give a more aggressive estimate (higher $k$ / shorter $LE$).
- Lives in the secondary market seem to be more impaired than those in the tertiary market.
Agenda

1. Motivation of the study
2. Findings of the study
3. Empirical analysis
4. Interpretations of the findings
Data sources
We thank all the data providers for supporting our research!

<table>
<thead>
<tr>
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The main sample is collected by AA-Partners mostly from settlements providers.

✓: data provided every month of the year.
✓: data provided in some, but all months of the year.

Side samples are provided by two anonymous investors.
### Descriptive statistics

ITM & AVS LEs in all samples, Fasano & LSI LEs only in side samples

<table>
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<th>$n$</th>
<th>Min</th>
<th>Median</th>
<th>Max</th>
<th>Mean</th>
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<td>ITM LE (month)</td>
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<td>2,794</td>
<td>5.1</td>
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<td>Fasano LE (month)</td>
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<td>185</td>
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<tr>
<td>AVS Age (year)</td>
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<td>54.9</td>
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<td>AVS LE (month)</td>
<td>552</td>
<td>12.0</td>
<td>125.5</td>
<td>222.0</td>
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</table>

The **main sample** is collected mostly from life settlements providers.

The **side samples** are from life settlements investors.
ITM vs. AVS

high $k$ or $\ln k$ (short $LE$): aggressive; low $k$ or $\ln k$ (long $LE$): conservative

ITM’s underwriting is more aggressive than AVS’s in the main sample

$\Delta(\ln k) = \ln k_{AVS} - \ln k_{ITM} < 0$ (i.e. $k_{ITM} > k_{AVS}$ or $LE_{ITM} < LE_{AVS}$) in both secondary and tertiary markets across the whole sample period
ITM vs. AVS

high $k$ or $\ln k$ (short LE): aggressive; low $k$ or $\ln k$ (long LE): conservative

ITM’s underwriting is more conservative than AVS’s in the side samples

The majority of lives received more aggressive LE estimates from AVS than from ITM ($k_{ITM} < k_{AVS}$) in the side samples, while the main sample shows the opposite.
ITM vs. AVS

high \(k\) or \(\ln k\) (short \(LE\)): aggressive; low \(k\) or \(\ln k\) (long \(LE\)): conservative

Consistent findings discovered from different samples:

<table>
<thead>
<tr>
<th></th>
<th>Main sample</th>
<th>Side sample 1</th>
<th>Side sample 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Female</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(k_{ITM} &lt; k_{AVS})</td>
<td>112 (26%)</td>
<td>84 (26%)</td>
<td>175 (52%)</td>
</tr>
<tr>
<td>(k_{ITM} &gt; k_{AVS})</td>
<td>429 (35%)</td>
<td>103 (41%)</td>
<td>130 (63%)</td>
</tr>
<tr>
<td>(\Sigma)</td>
<td>541 (33%)</td>
<td>187 (32%)</td>
<td>305 (56%)</td>
</tr>
</tbody>
</table>

| **Male**   |             |               |               |
| \(k_{ITM} < k_{AVS}\) | 320 (74%)   | 242 (74%)     | 164 (48%)     |
| \(k_{ITM} > k_{AVS}\) | 803 (65%)   | 147 (59%)     | 75 (37%)      |
| \(\Sigma\)     | 1,123 (67%) | 389 (68%)     | 239 (44%)     |

Compared to a female life, it is more likely for a male life to have \(k_{ITM} < k_{AVS}\).
ITM vs. AVS

high $k$ or $\ln k$ (short $LE$): aggressive; low $k$ or $\ln k$ (long $LE$): conservative

Consistent findings discovered from different samples:

Healthiness is proxied by the average of $k_{\text{ITM}}$ and $k_{\text{AVS}}$:
higher $\frac{\ln k_{\text{ITM}} + \ln k_{\text{AVS}}}{2}$ → more impaired life;
lower $\frac{\ln k_{\text{ITM}} + \ln k_{\text{AVS}}}{2}$ → less impaired life.

Compared to an unhealthy life, it is more likely for a healthy life to have $k_{\text{ITM}} < k_{\text{AVS}}$. 
ITM vs. AVS

high $k$ or $\ln k$ (short $LE$): aggressive; low $k$ or $\ln k$ (long $LE$): conservative

ITM’s underwriting is more aggressive than AVS’s, but more conservative in the side samples

Possibly due to the combination of:
A. Lives in side samples are healthier; plus
B. ITM more conservative in healthy lives and more aggressive in unhealthy lives than AVS
Secondary vs. tertiary market

High $k$ or $\ln k$ (short $LE$): aggressive; low $k$ or $\ln k$ (long $LE$): conservative

Lives in the secondary market seem to be more impaired than those in the tertiary market.
Secondary vs. tertiary market

high $k$ or $\ln k$ (short LE): aggressive; low $k$ or $\ln k$ (long LE): conservative

Lives in the secondary market seem to be more impaired than those in the tertiary market throughout the whole sample period.
Secondary vs. tertiary market

high $k$ or $\ln k$ (short $LE$): aggressive; low $k$ or $\ln k$ (long $LE$): conservative

Compared to a life in the tertiary market, it is more likely for a life in the secondary market to have $k_{ITM} < k_{AVS}$.

Possibly due to the combination of:
A. Tertiary lives are healthier; plus
B. ITM more conservative in healthy lives and more aggressive in unhealthy lives than AVS
Explain the discrepancy – adverse selection?!

high $k$ or $\ln k$ (short $LE$): aggressive; low $k$ or $\ln k$ (long $LE$): conservative

Underwriters are sometimes “chosen” to evaluate those lives for which they tend to give a more aggressive estimate.

Lives valued ONLY by ITM (red curve —) tend to have a higher $\ln k_{\text{ITM}}$ than those by both ITM AND at least one other underwriter (black curve —).

The same goes for AVS, Fasano and LSI.
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Interpretations of the findings
Potential factors causing the current LE situation

Difference in LE estimates between underwriters:

- Underwriters:
  - Underwriting methods
  - Tables
  - Incentives (historical)

Difference in impairment between secondary and tertiary markets:
Interpretations of the findings
Potential factors causing the current LE situation

Difference in LE estimates between underwriters:

- Underwriters:
  - Underwriting methods
  - Tables
  - Incentives (historical)

- Life settlements sell-side:
  - LE cherry-picking

Difference in impairment between secondary and tertiary markets:
Interpretations of the findings
Potential factors causing the current LE situation

Difference in LE estimates between underwriters:

- Underwriters:
  - Underwriting methods
  - Tables
  - Incentives (historical)

- Life settlements sell-side:
  - LE cherry-picking

Difference in impairment between secondary and tertiary markets:

- Legacy issue:
  - STOLI
References

The presentation is based on the following two working papers


Thank you!

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