Medical Underwriters in the Life Settlements Market

An Empirical Comparison

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Agenda

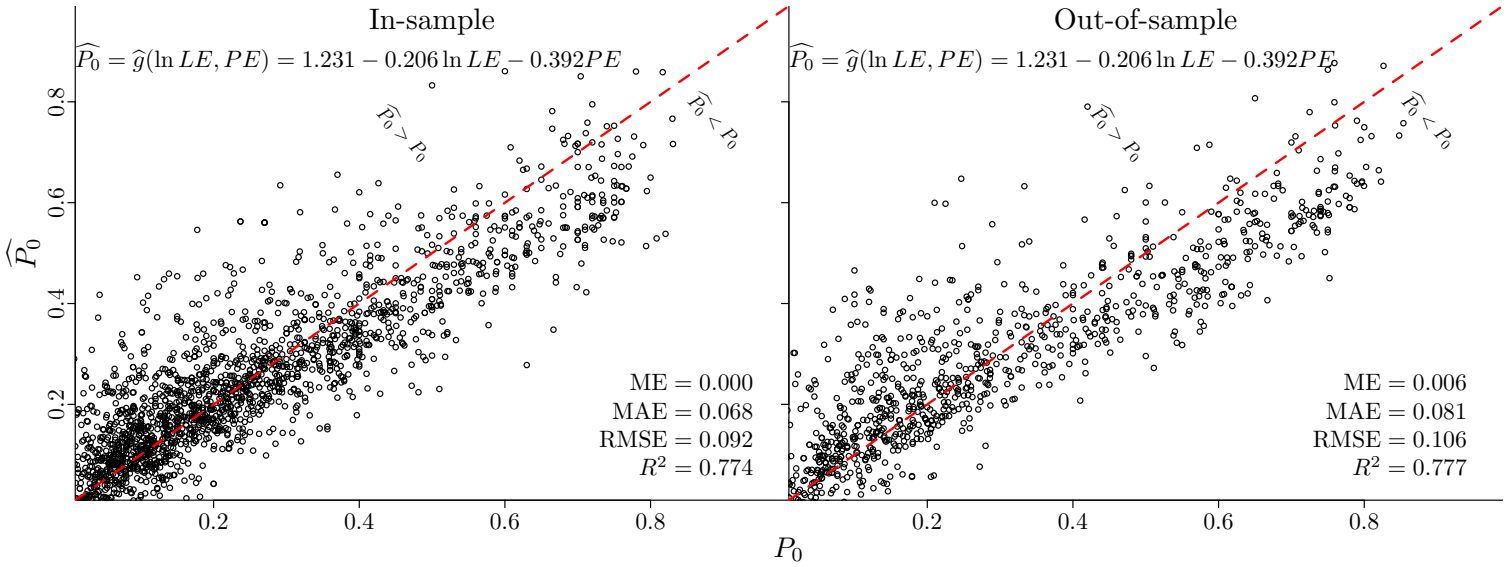
1. Motivation of the study
2. Findings of the study
3. Empirical analysis
4. Interpretations of the findings

Agenda

Motivation of the study

Life expectancy is the key driver of price — empirical evidence

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



$\widehat{P_0} = \widehat{g}(\ln LE, PE) = 1.231 - 0.206 \ln LE - 0.392 PE$, where

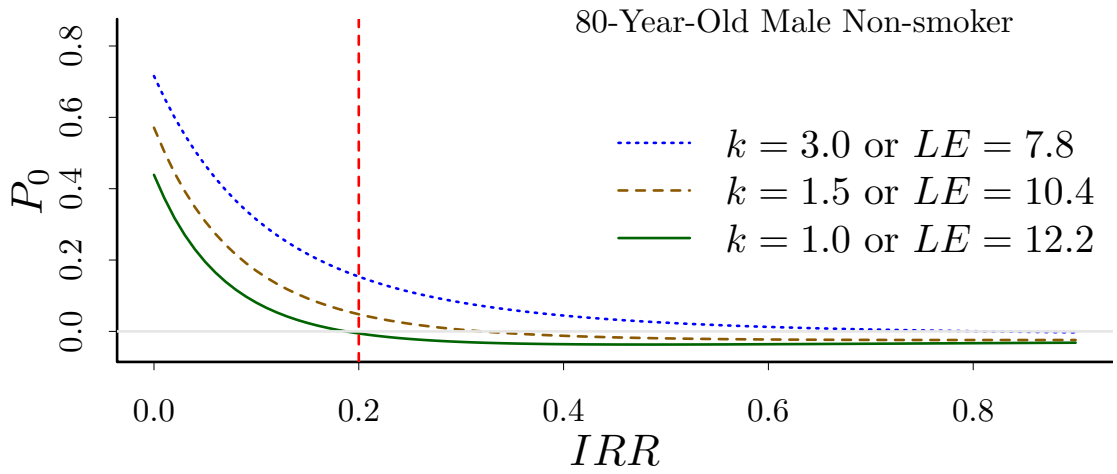
$P_0 = \frac{TP}{DB}$: transaction price (TP) as a fraction of death benefit (DB)
LE: life expectancy (in years) used for pricing
PE: sum of premiums to LE (deterministic)

LE down $\rightarrow$ P_0 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

$P_0 = -\sum_{i=0}^{\infty} \frac{\pi_i Prob_i}{(1+IRR)^i} + \sum_{i=1}^{\infty} \frac{1-Prob_i}{(1+IRR)^i}$, where

$P_0 = \frac{TP}{DB}$: transaction price (TP) as a fraction of death benefit (DB)
k: implied mortality multiplier (VBT 2015) LE: life expectancy (in years)
$Prob_i$: Survival probability at time i π_i: premium rate (to DB) at time i

k up $\rightarrow$ $Prob_i$ down & LE down & P_0 up

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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

	ITM	AVS
Conservative (low k / long LE)	male; healthy	female; unhealthy
Aggressive (high k / short LE)	female; unhealthy	male; healthy

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. $k_{\text{ITM}} > k_{\text{AVS}}, k_{\text{Fasano}}, k_{\text{LSI}}$ or $LE_{\text{ITM}} < LE_{\text{AVS}}, LE_{\text{Fasano}}, LE_{\text{LSI}}$)

Sample data from two investors ("side samples")

- On average, ITM's underwriting is more conservative than AVS's (i.e. $k_{\text{ITM}} < k_{\text{AVS}}$ or $LE_{\text{ITM}} > LE_{\text{AVS}}$)

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.

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Data sources

We thank all the data providers for supporting our research!

Source for **main sample**	2011	2012	2013	2014	2015	2016
GWG Life	(✓)					
Legacy Benefits	✓	(✓)	(✓)	✓	✓	(✓)
Q Capital Strategies	✓	✓	✓	✓	✓	✓
Magna Life Settlements	✓	✓	✓	✓	(✓)	
Life Equity	✓	✓	✓	✓	✓	✓
The Lifeline Program	✓	✓	✓	✓	✓	✓
SLG	✓	(✓)				
Settlement Group	(✓)	✓	✓	✓	✓	✓
LifeTrust		✓	✓	✓	✓	✓
Berkshire Settlements		(✓)	(✓)	✓	(✓)	(✓)
Abacus Settlements		(✓)	✓	✓	✓	✓
Institutional Life Settlements		(✓)	✓	✓	✓	✓
Asset manager 1			✓	✓	✓	✓
Asset manager 2			(✓)	✓	✓	✓
Habersham Funding			(✓)	✓	✓	✓
Life Settlement Solutions			(✓)	✓	✓	✓
RiverRock Partners				(✓)	✓	✓
FairMarket Life Settlements					✓	✓
Emergent Capital						(✓)

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

		n	Min	Median	Max	Mean
Main Sample	Transaction date	3,236	07/01/2011	24/03/2015	31/12/2016	03/11/2014
	Age (year)	3,234	20.2	80.7	101.0	78.3
	ITM LE (month)	2,026	5.2	63.8	342.0	70.0
	AVS LE (month)	2,794	5.1	81.0	266.1	85.9
	Fasano LE (month)	445	6.0	111.0	280.1	104.2
	LSI LE (month)	185	17.5	97.4	253.1	95.4

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

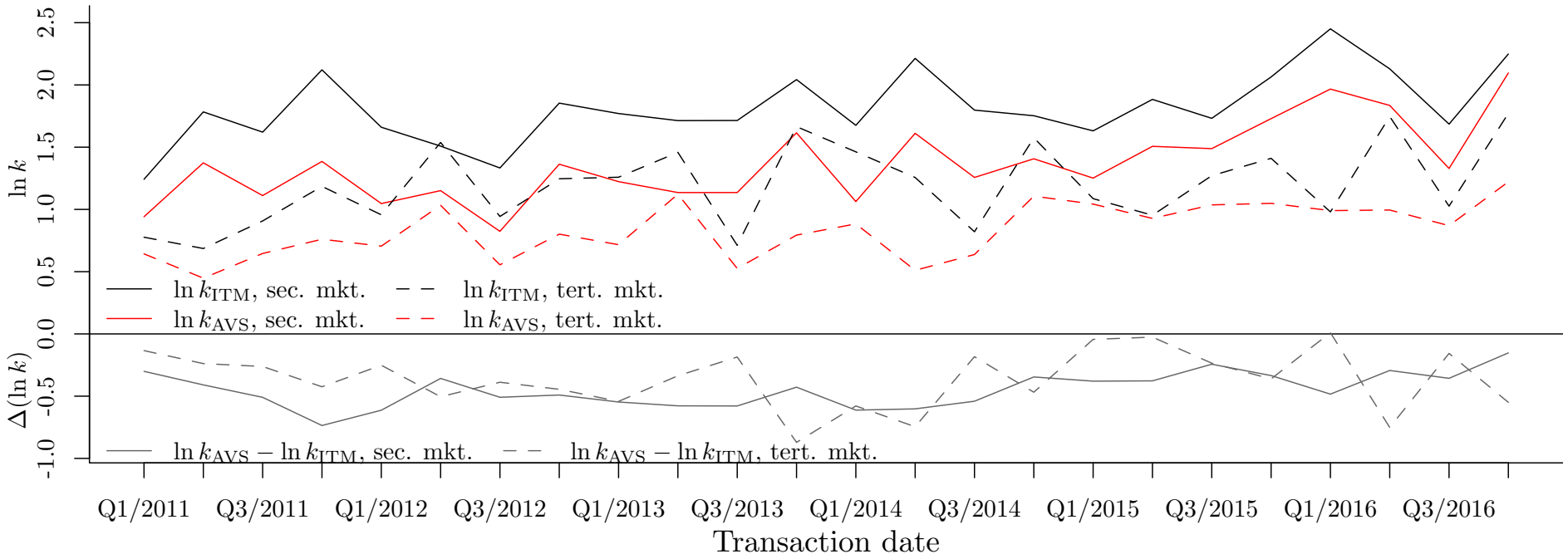
		n	Min	Median	Max	Mean
Side Sample 1	ITM undewriting date	584	02/11/2015	14/03/2016	07/10/2016	07/03/2016
	ITM Age (year)	584	64.0	84.7	98.3	84.3
	ITM LE (month)	584	11.0	76.5	283.0	85.1
	AVS undewriting date	584	02/11/2015	28/03/2016	01/11/2016	16/03/2016
	AVS Age (year)	584	64.0	84.7	98.2	84.4
	AVS LE (month)	584	12.0	74.0	180.0	79.3
Side Sample 2	ITM undewriting date	552	26/06/2009	26/05/2015	24/10/2016	18/02/2015
	ITM Age (year)	552	54.8	80.2	98.1	80.8
	ITM LE (month)	552	6.0	132.0	291.0	129.6
	AVS undewriting date	552	25/06/2009	14/05/2015	25/10/2016	15/02/2015
	AVS Age (year)	552	54.9	80.2	98.2	80.8
	AVS LE (month)	552	12.0	125.5	222.0	125.0

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

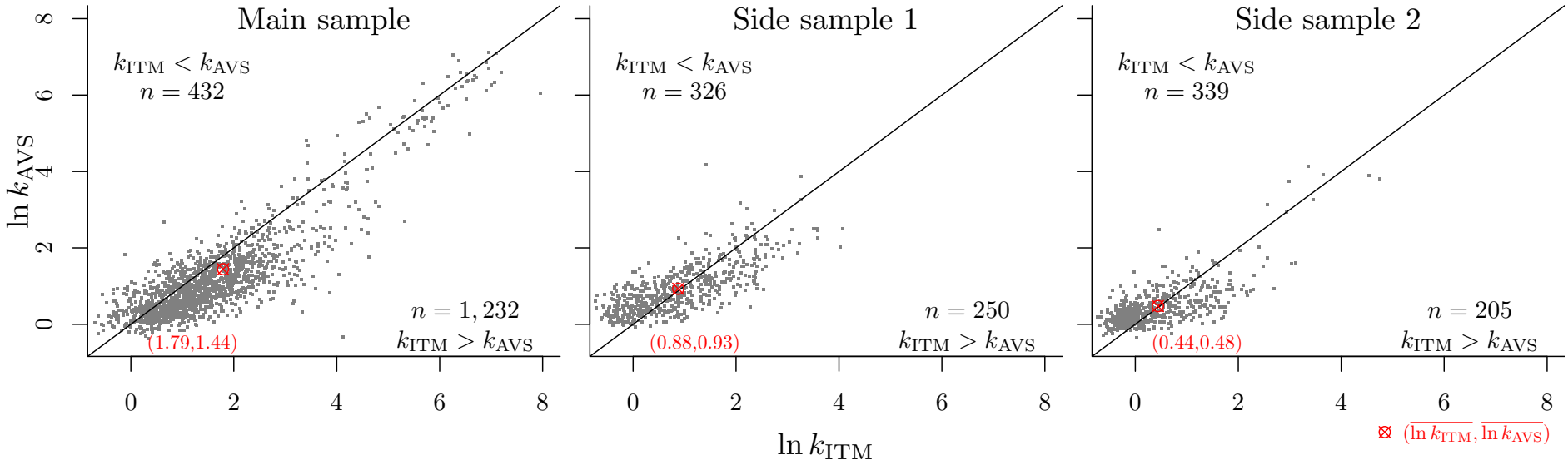


$\Delta(\ln k) = \ln k_{\text{AVS}} - \ln k_{\text{ITM}} < 0$ (i.e. $k_{\text{ITM}} > k_{\text{AVS}}$ or $LE_{\text{ITM}} < LE_{\text{AVS}}$) in both secondary and tertiary markets across the whole sample period

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

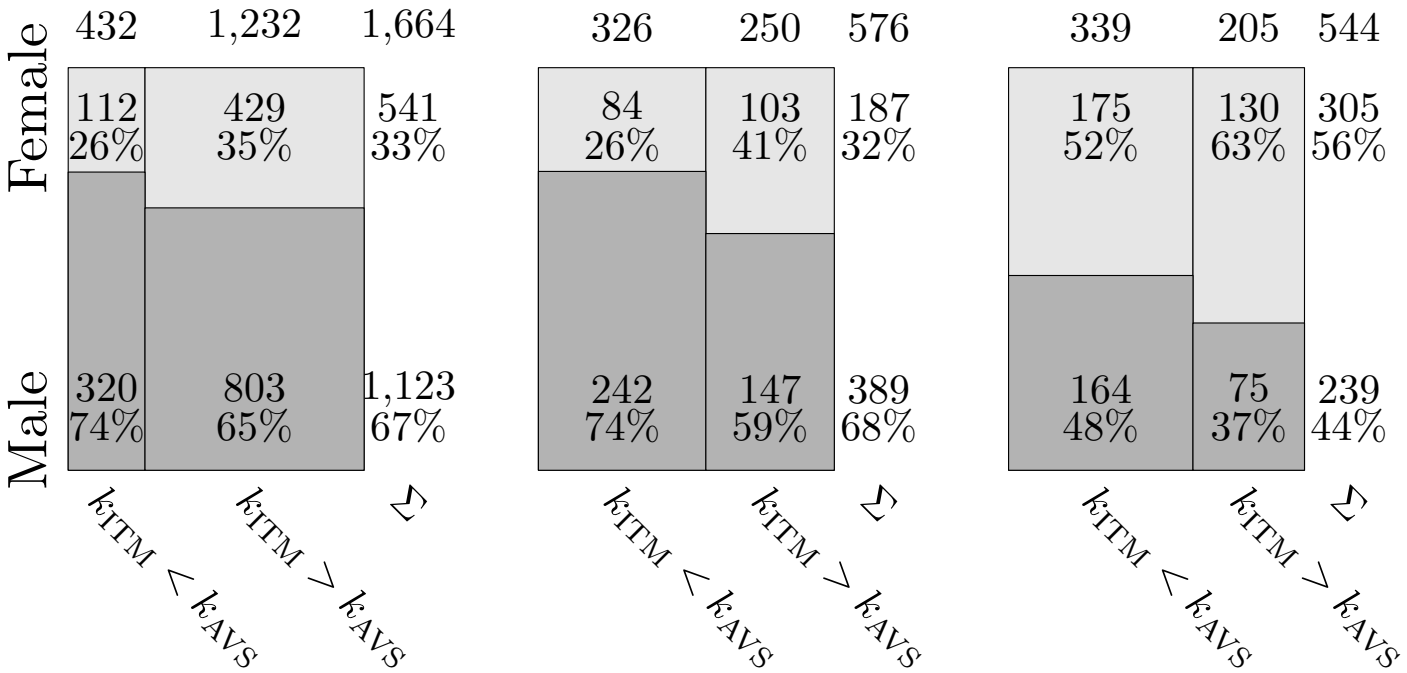


The majority of lives received more aggressive LE estimates from AVS than from ITM ($k_{ITM} < k_{AVS}$) in the side samples, while the main sample shows the opposite.

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:

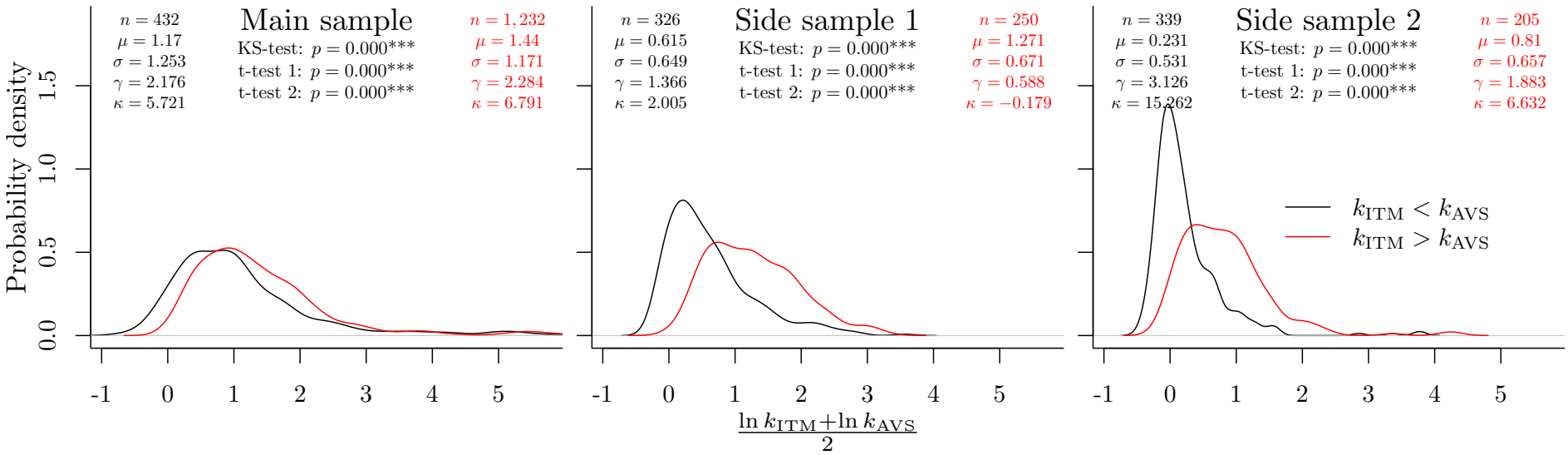


Compared to a female life, it is more likely for a male life to have $k_{\text{ITM}} < k_{\text{AVS}}$.

ITM vs. AVS

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

Consistent findings discovered from different samples:



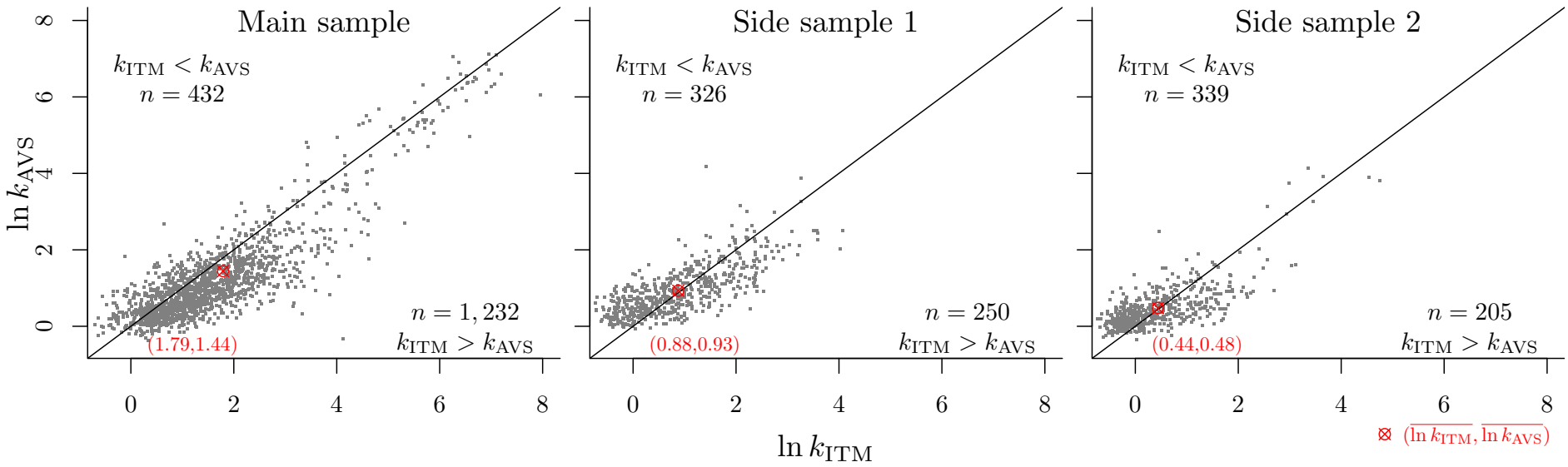
Healthiness is proxied by the average of k_{ITM} and k_{AVS}:
higher $\frac{\ln k_{\text{ITM}} + \ln k_{\text{AVS}}}{2}$ $\rightarrow$ more impaired life;
lower $\frac{\ln k_{\text{ITM}} + \ln k_{\text{AVS}}}{2}$ $\rightarrow$ less impaired life.

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:

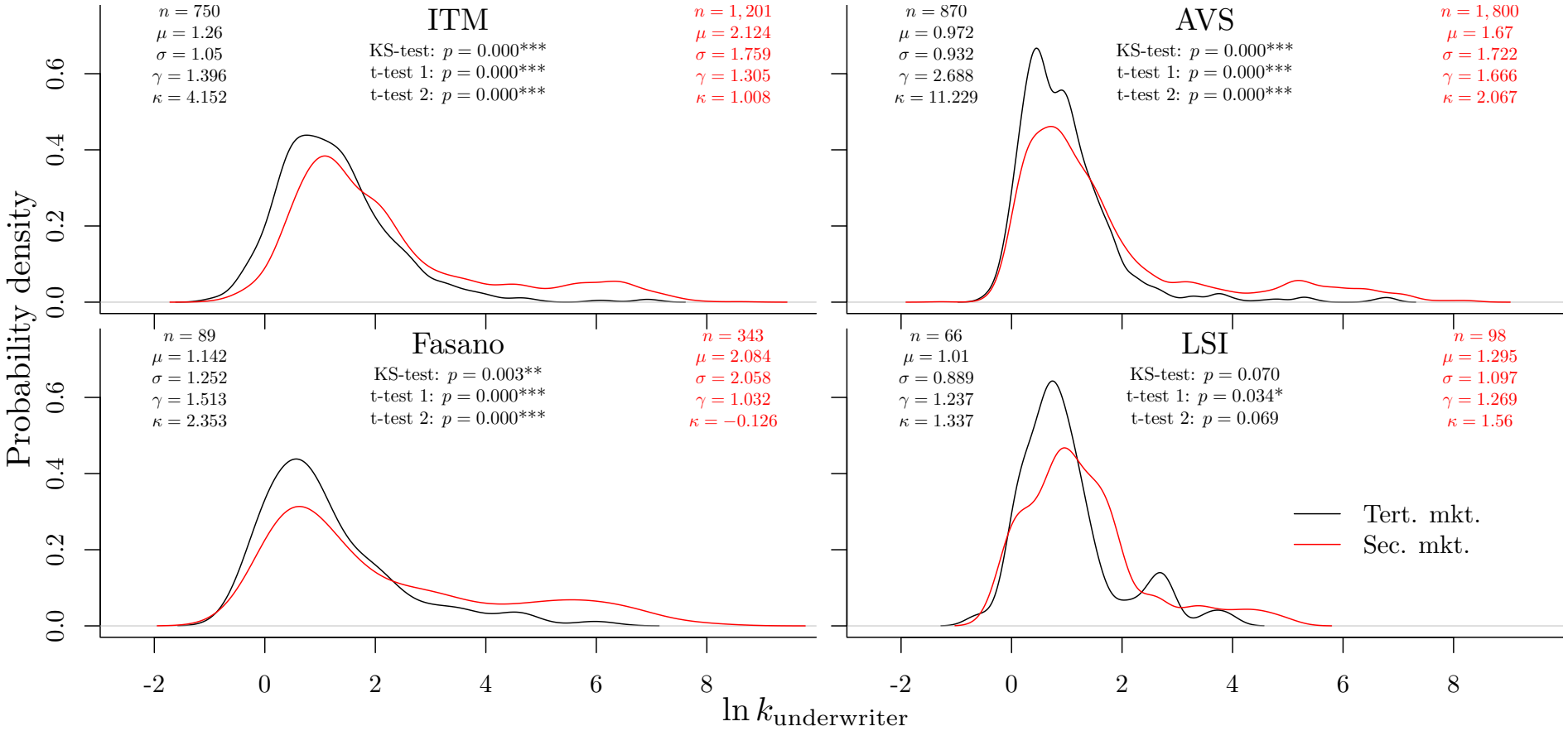
A. Lives in side samples are healthier; *plus*

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

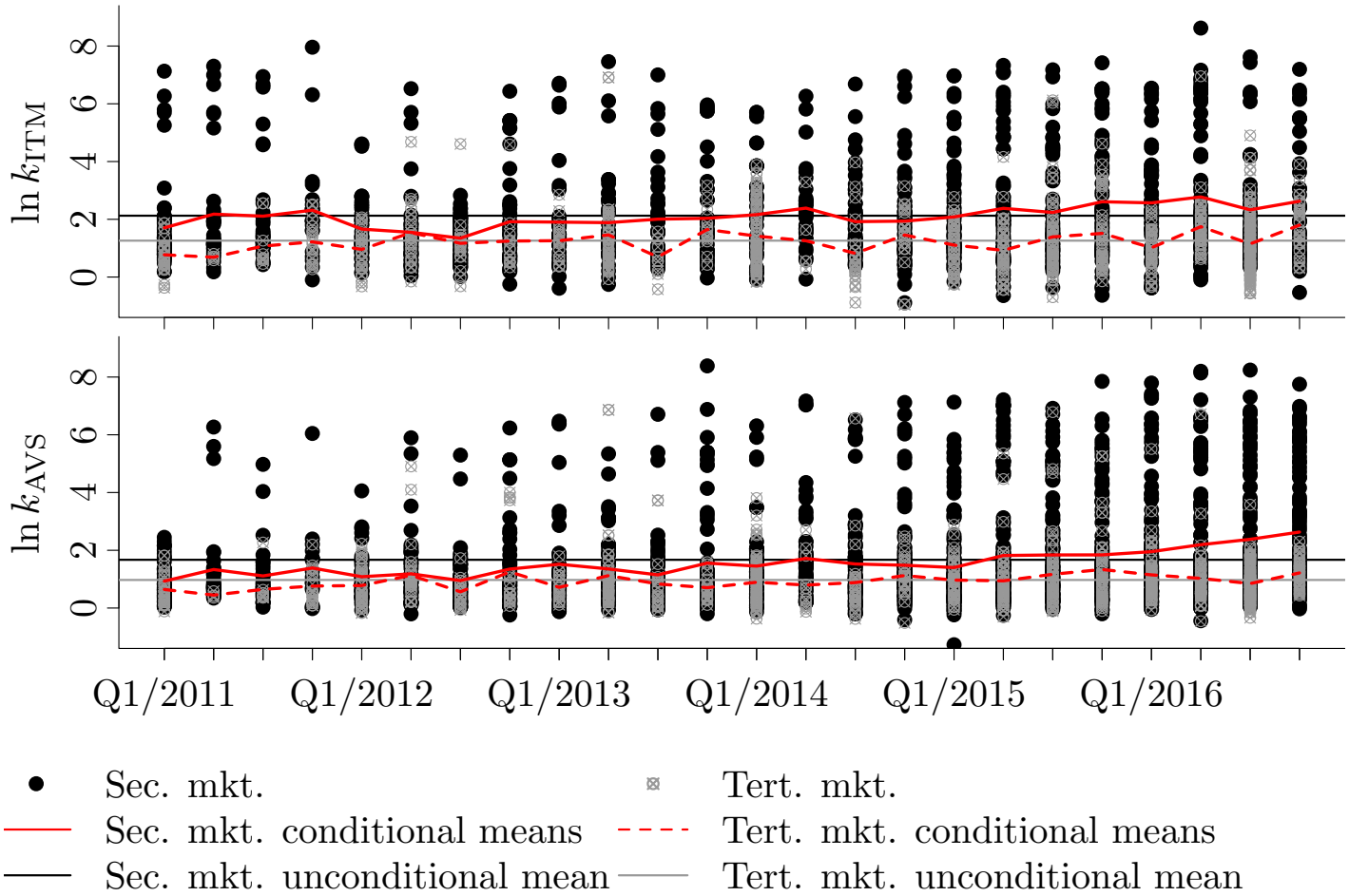
Lives in the secondary market seem to be more impaired than those in the tertiary market.



Secondary vs. tertiary market

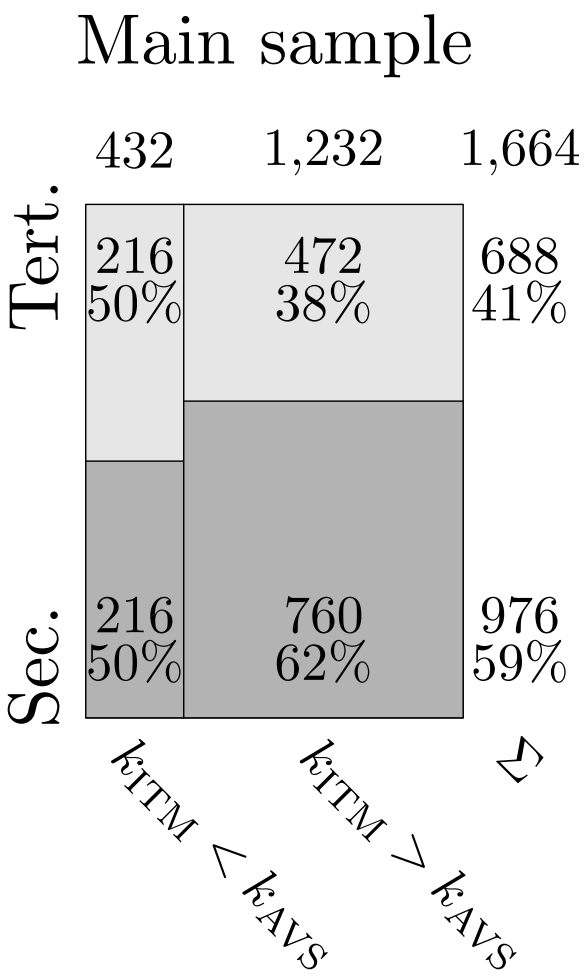
high k or $\ln k$ (short LE): aggressive; low k or $\ln k$ (long LE): conservative

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



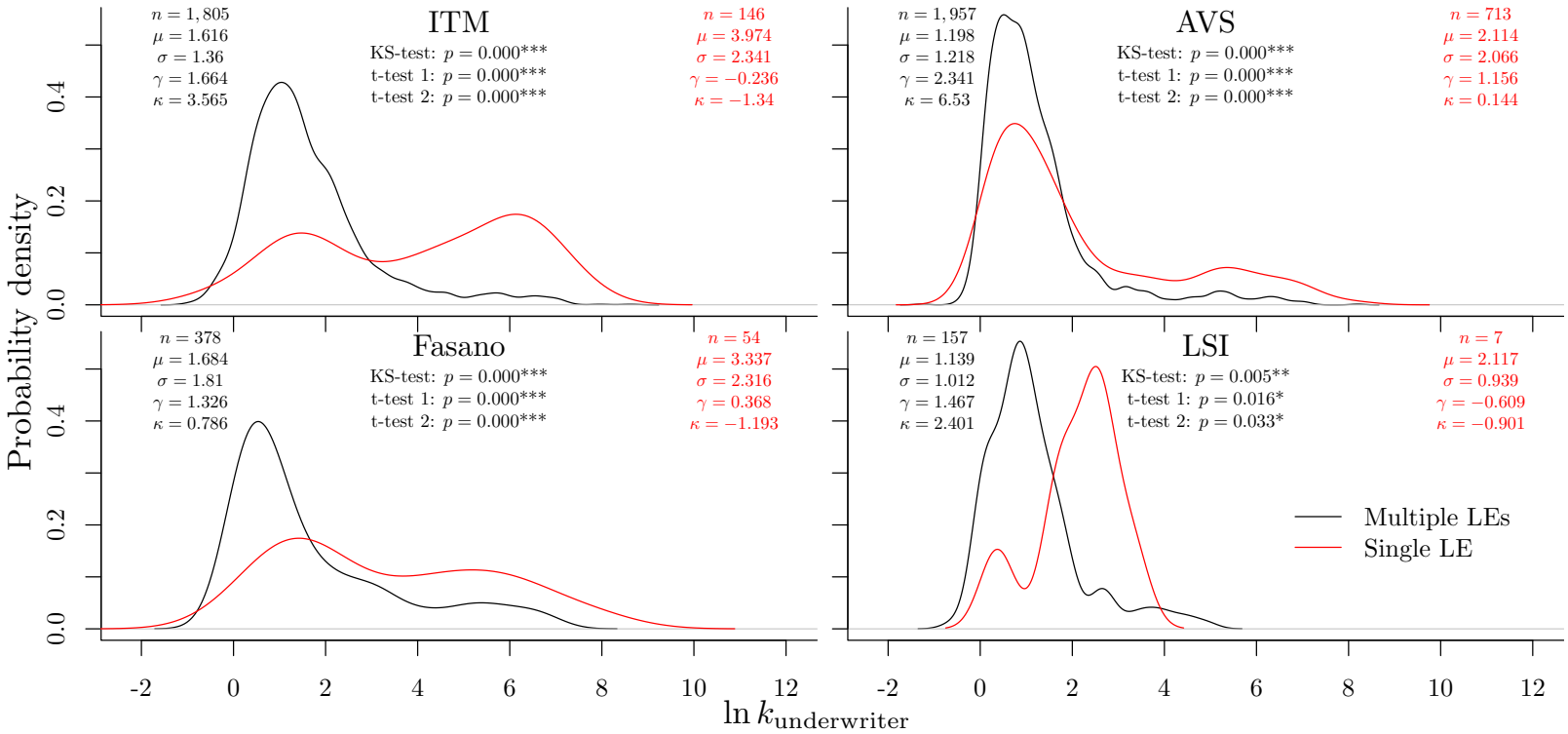
Compared to a life in the tertiary market, it is more likely for a life in the secondary market to have $k_{\text{ITM}} < k_{\text{AVS}}$.

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

Braun, A. and Xu, J. (2017a). Dating Death : An Empirical Comparison of Medical Underwriters in the U . S . Life Settlements Market.

Braun, A. and Xu, J. (2017b). Pricing in the Secondary Market for Life Insurance: New Empirical Evidence.

Thank you!

Contact

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