



Universität St.Gallen



Medical Underwriting and Valuation in the Life Settlements Market

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Munich, Germany

Introduction

Background

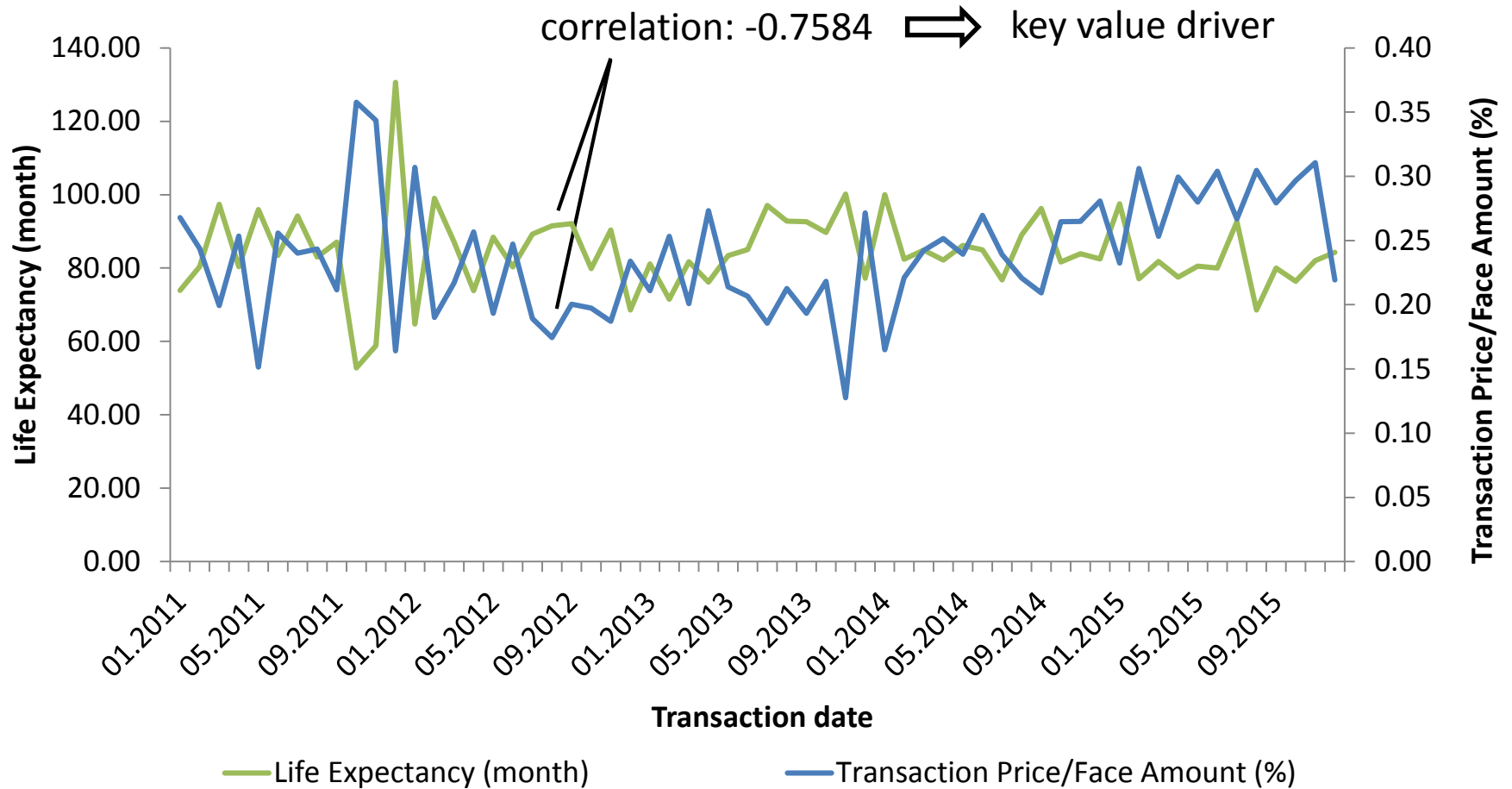
- IRFS 13 and AIFMD are in force and demand that assets are held at fair value
- This can be achieved with econometric models or actuarial models
- In any case, the life expectancy (LE) of the insured is the key value driver
- Investors have to rely on LE estimates, since the “true LE” is unobservable

Motivation for this analysis

- Anecdotal evidence of systematic differences between medical underwriters
- Proper model calibration requires a better understanding of the prevailing LE landscape

Why develop a better understanding of the LE landscape?

Time series of monthly averages



AA-Partners transaction data

Multi-provider dataset

- The transaction data was collected by AA-Partners Ltd. from multiple providers
- Secondary and tertiary market transactions on a monthly basis
- Prices and important deal characteristics (e.g., life expectancy, face amount, etc.)
- The following life settlement providers were transparent at the end of December 2015:

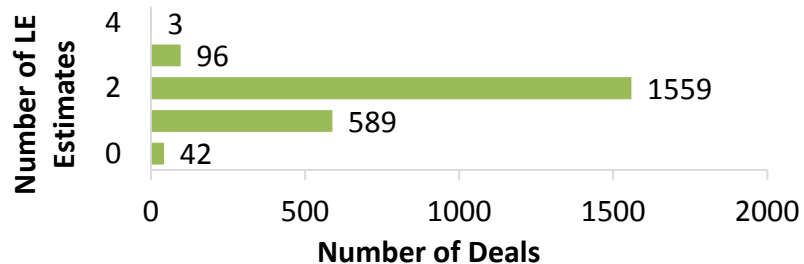
Abacus Settlements, Berkshire Settlements, Habersham Funding, Institutional Life Services, Legacy Benefits, Life Equity, The Lifeline Program, Life Settlement Solutions, LifeTrust LLC, Q Capital Strategies, RiverRock Partners and Settlement Group (GWG Life left the database in August 2011, Magna Life Settlements/Vida Capital left in 2015)

- In addition, Carlisle and SL Investment Management Ltd. provide transaction data

Dataset: 2289 transactions between 01/2011 and 12/2015

Number of deals, LE correlations, and LE pairs

# Deals	All	21st	AVS	Fasano	EMSI
Secondary	1884	1002	1421	278	79
Tertiary	405	531	600	66	30
Total	2289	1533	2021	344	109



Correlations	21st	AVS	Fasano	EMSI
Blended	0.9312	0.9604	0.9654	0.9230
21st		0.8414	0.8516	0.8347
AVS			0.9073	0.7862
Fasano				0.8835

(Pairwise exclusion of missing data)

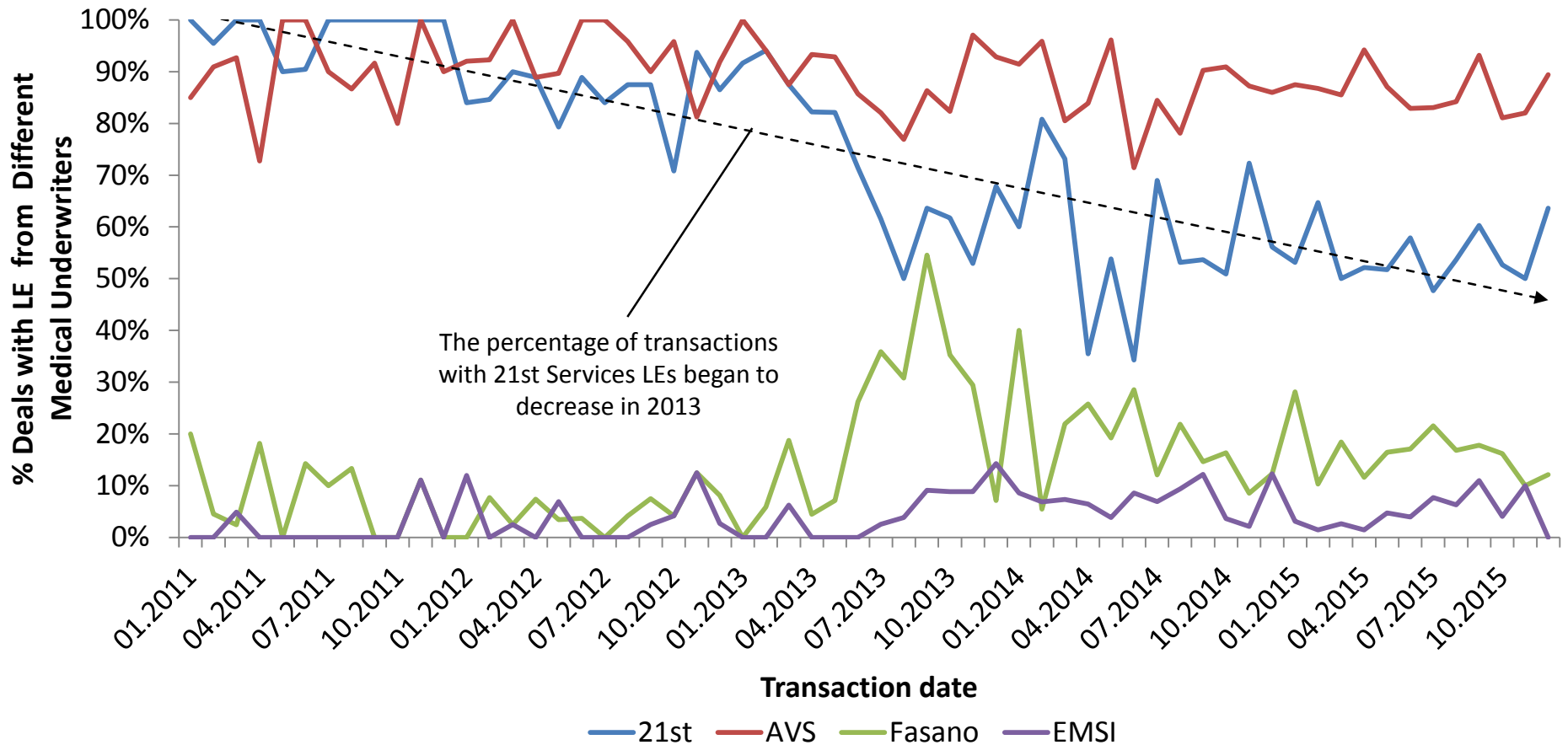
Secondary Market			
# Pairs	AVS	Fasano	EMSI
21st	853	94	43
AVS		195	57
Fasano			8

Tertiary Market			
# Pairs	AVS	Fasano	EMSI
21st	501	34	12
AVS		48	18
Fasano			2

thin data

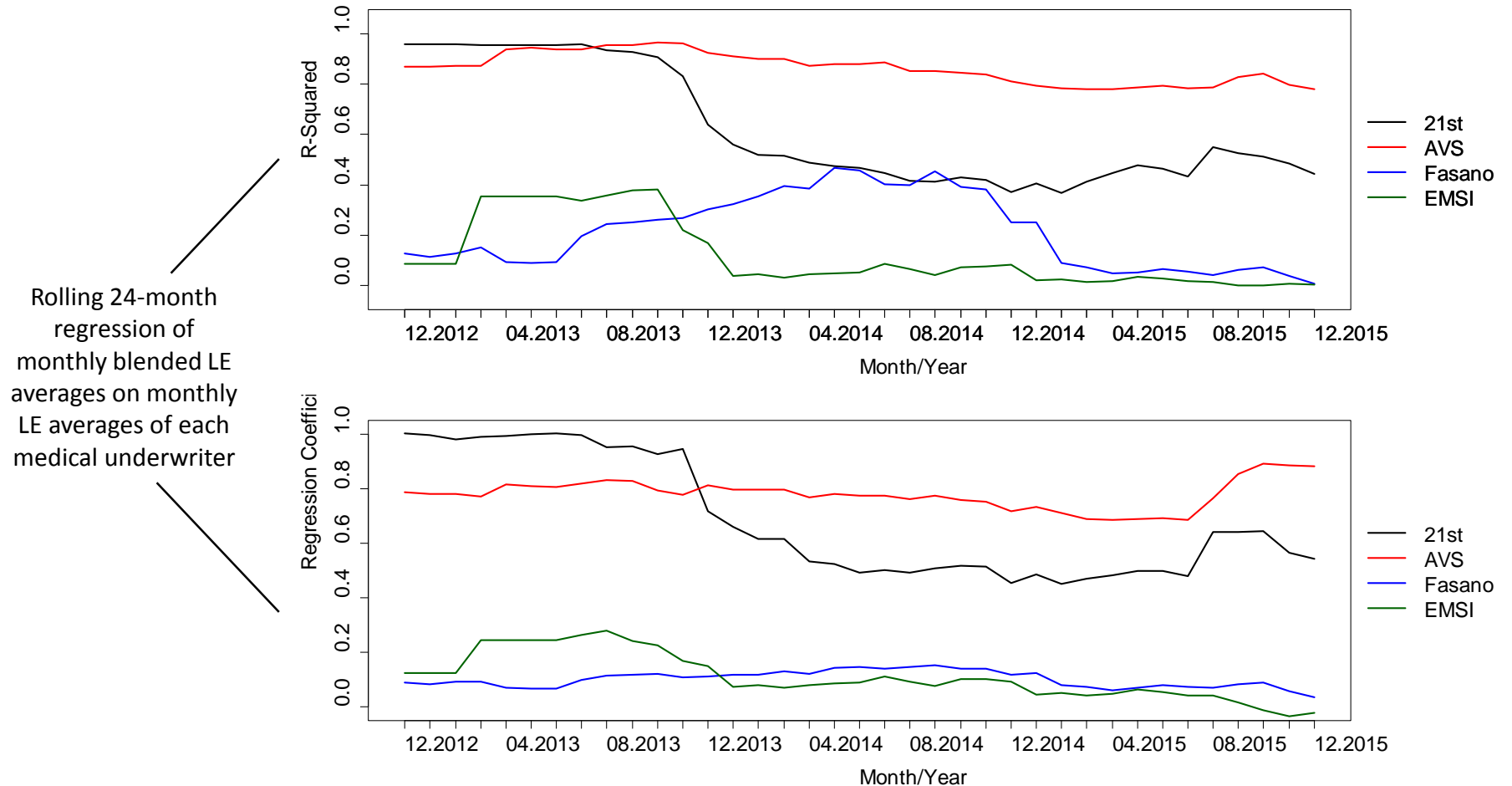
Influence of the individual medical underwriters (I)

Relative market shares have changed over time



Influence of the individual medical underwriters (II)

Variation in market shares impacts the (blended) LE used for closing



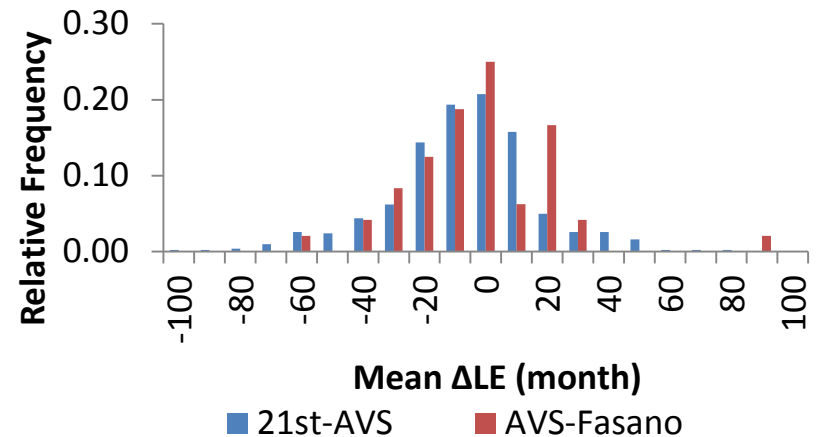
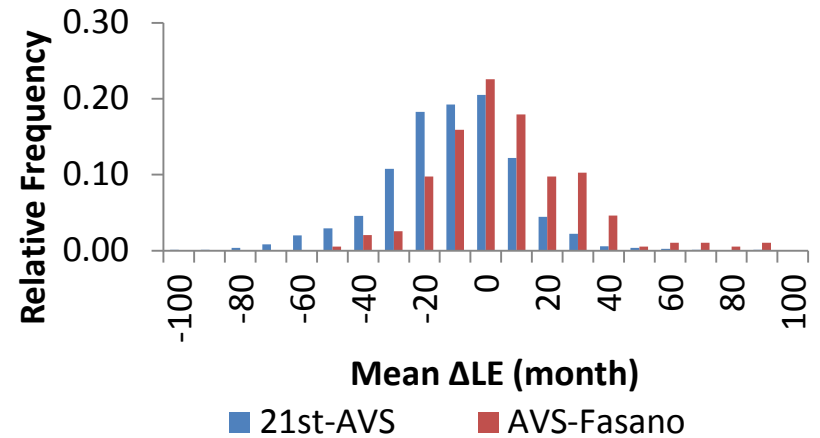
Differences in the LE estimates of the medical underwriters (I)

21st Services LEs are, on average, shorter than those of other underwriters

Secondary Market	Mean Δ LE (Months)	AVS	Fasano	EMSI
	21st	-15.56***	-12.39***	-14.31***
	AVS		1.32	5.75*
	Fasano	statistically significant with $p \leq 0.001$ (Wilcoxon Test)		-3.08

thin data, untested

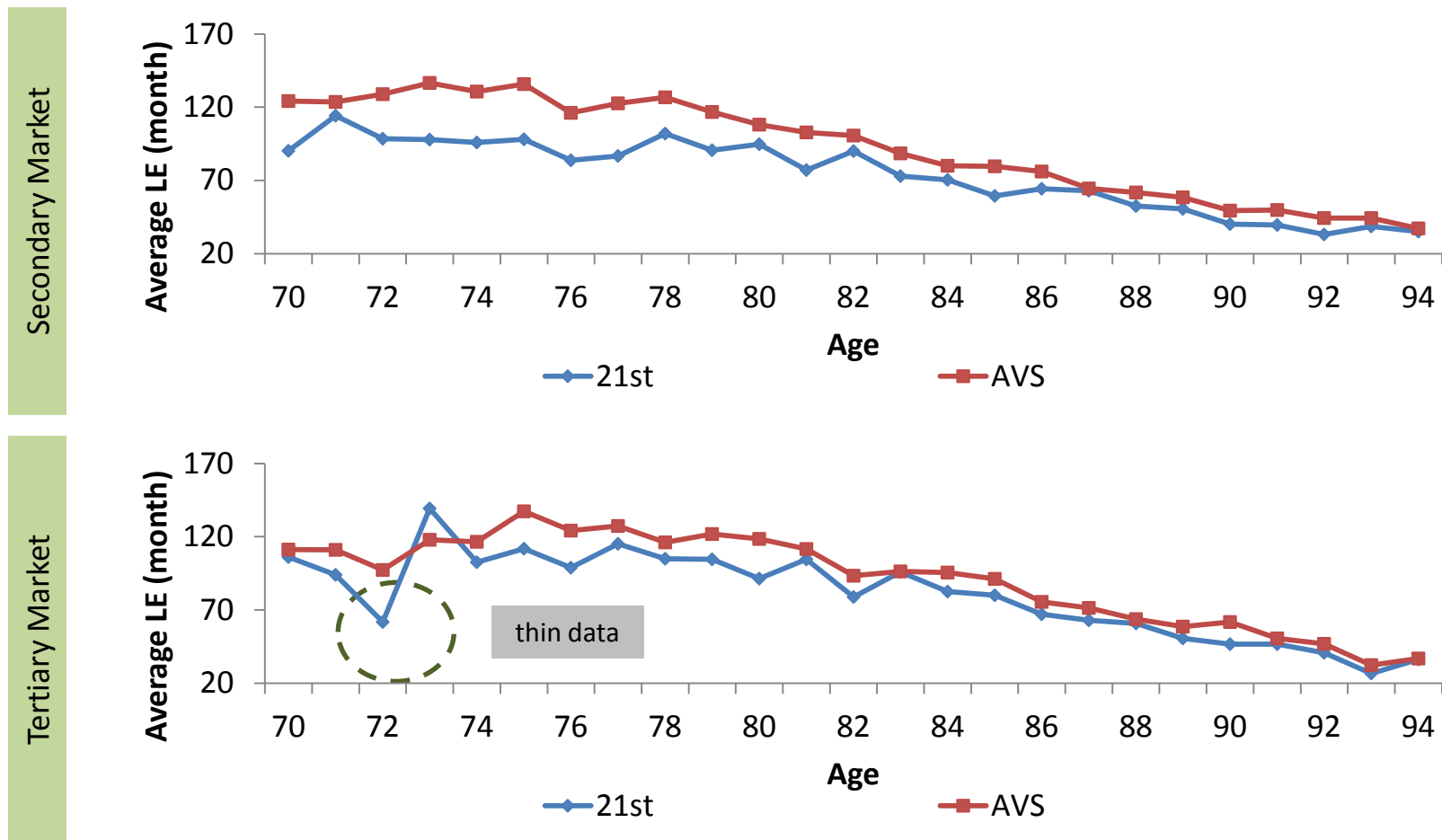
Tertiary Market	Mean Δ LE (Months)	AVS	Fasano	EMSI
	21st	-11.40***	-20.15***	-16.46
	AVS		-7.21*	-1.22
	Fasano			-6.00



Note: analysis based on transactions with LE pairs

Differences in the LE estimates of the medical underwriters (II)

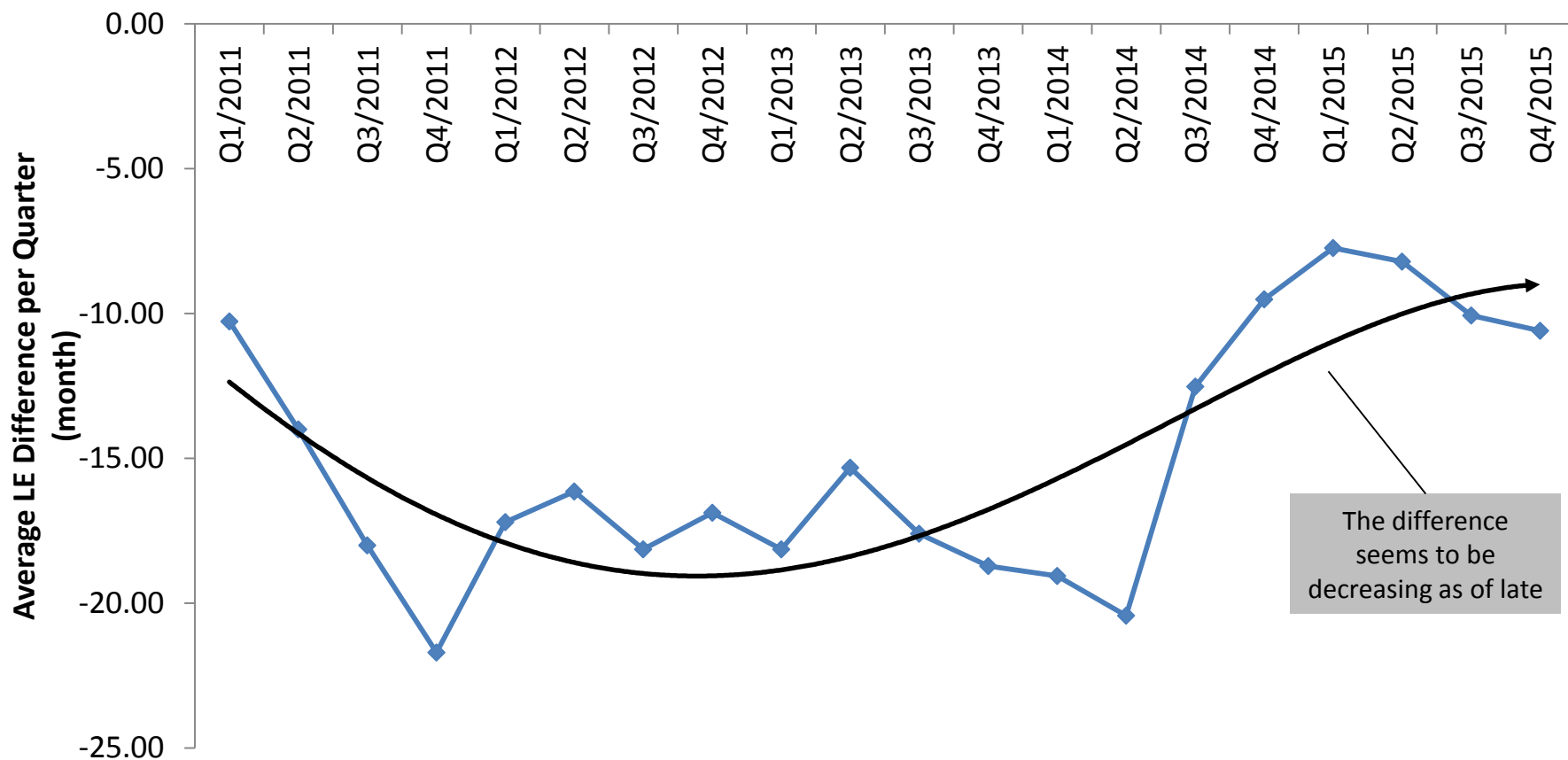
The difference persists across age brackets and markets



Note: analysis based on all transactions for each underwriter

Differences in the LE estimates of the medical underwriters (III)

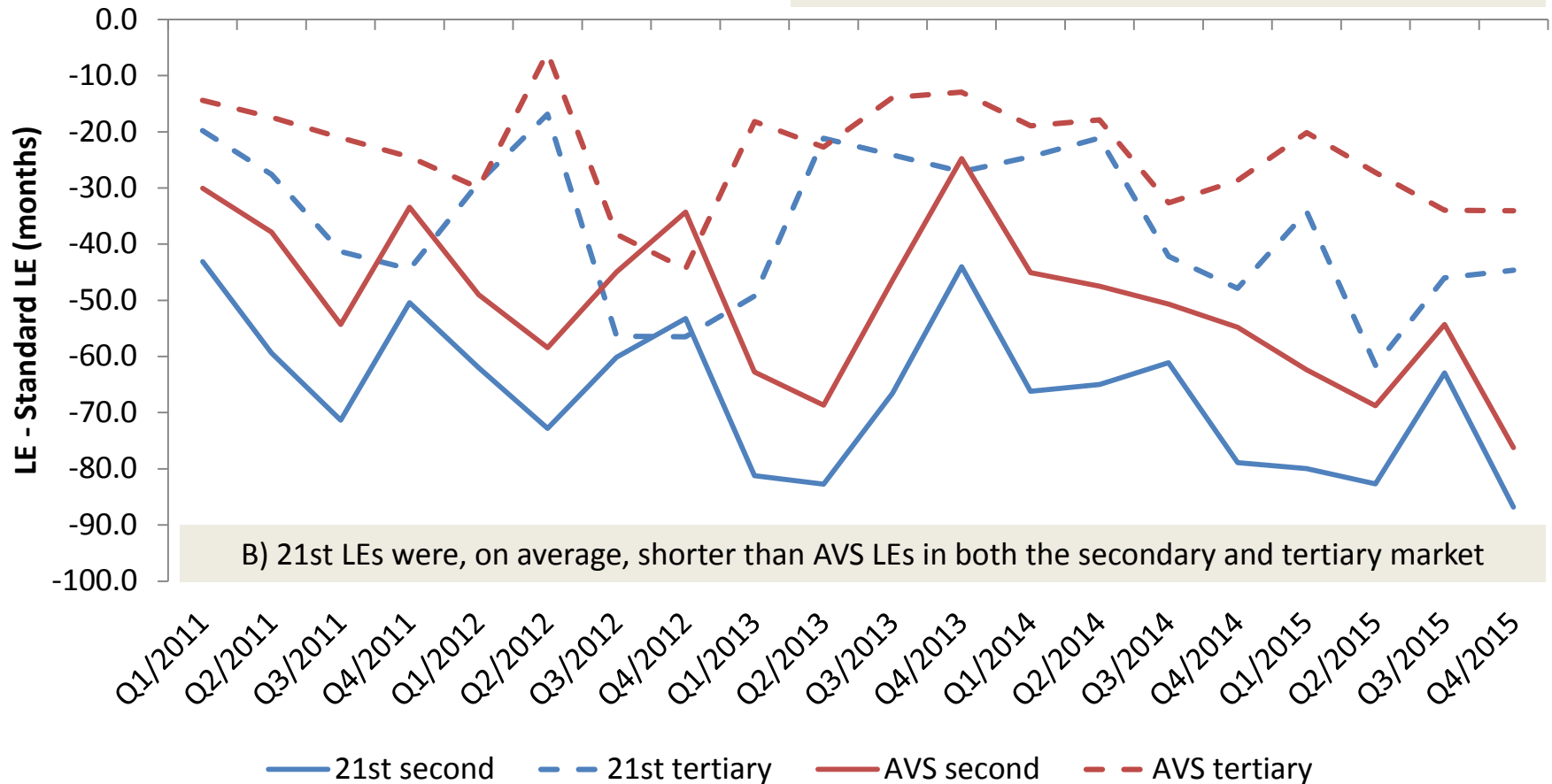
Time variation in the 21st-AVS difference



Differences between the secondary and the tertiary market

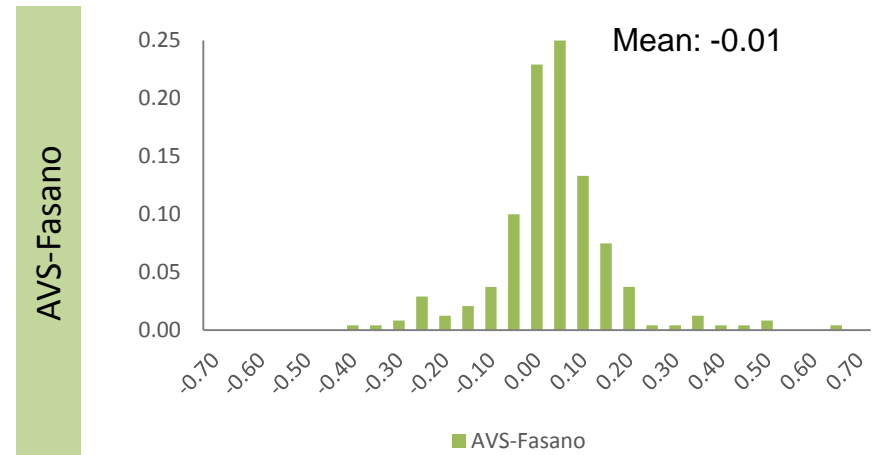
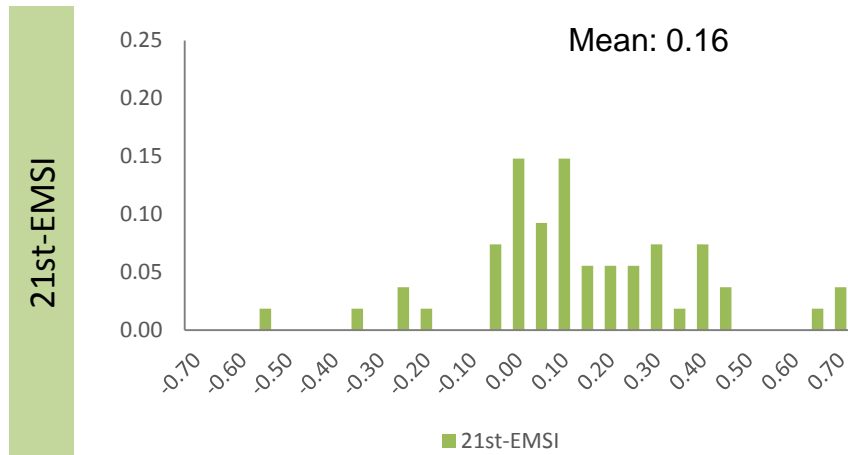
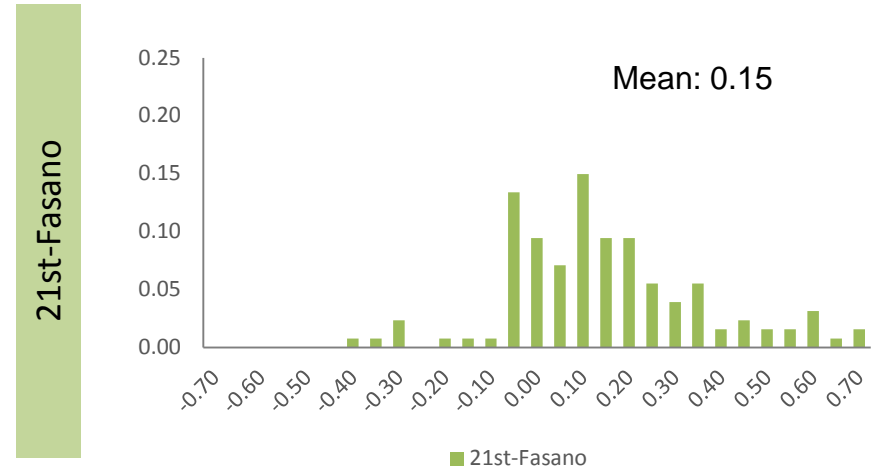
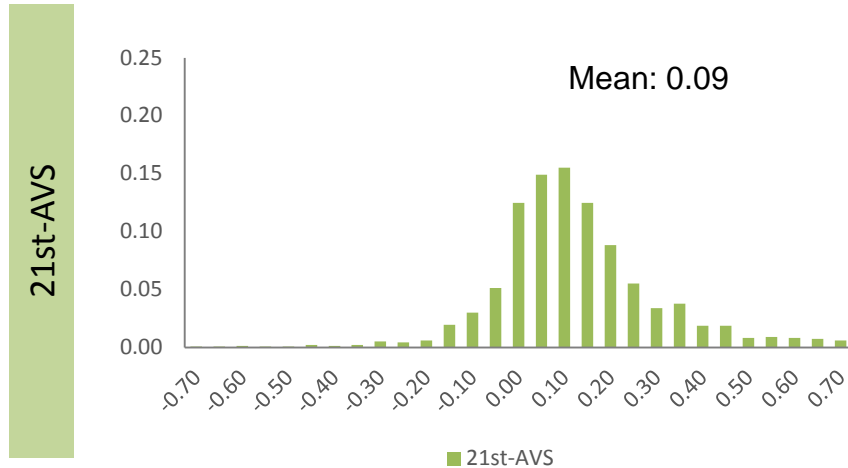
Corrections of the standard LE over time

A) On average, standard LEs seem to have been corrected more strongly in the secondary market



Differences in the (implied) IRRs

21st Services IRRs are, on average, higher than those of other underwriters



What are potential reasons for these differences?

Diverging incentives and consequences

- Sell side has incentives to pick medical underwriters with shorter LEs
- Investors have a strong interest in accurate LEs (to limit longevity risk)
- Hence, medical underwriters can compete on accuracy or through “shorter average LEs”
- The latter strategy remains viable as long as the market does not demand A/E-ratios

Potential solutions? Increase transparency!

- Establish a ranking system (based on market data) that signals longevity risk to investors
- Underwriters with consistently shorter LEs and no A/E ratios would receive a lower rank

Why should investors be aware of the differences?

Market-consistent valuation crucially depends on the correct usage of model inputs

- Econometric models: LEs used for calibration and application need to be consistent

$$P_0 = \alpha + \beta \cdot LE + \gamma \cdot \mathbf{X} + \epsilon$$

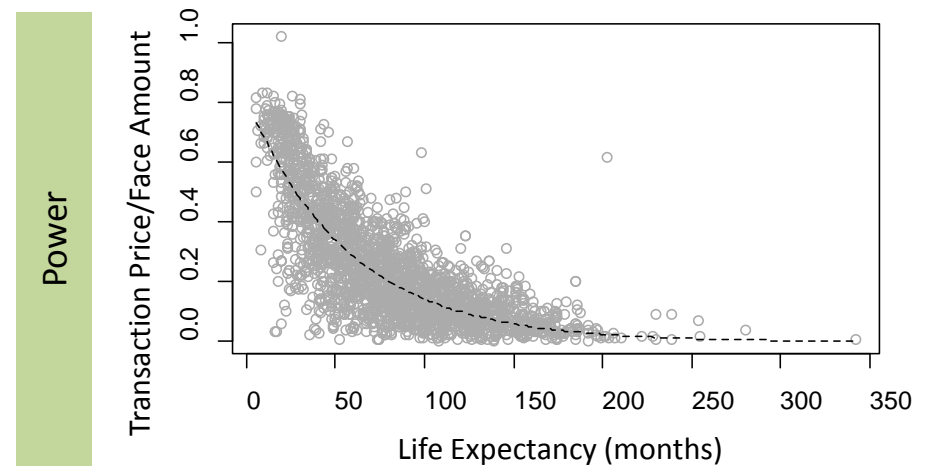
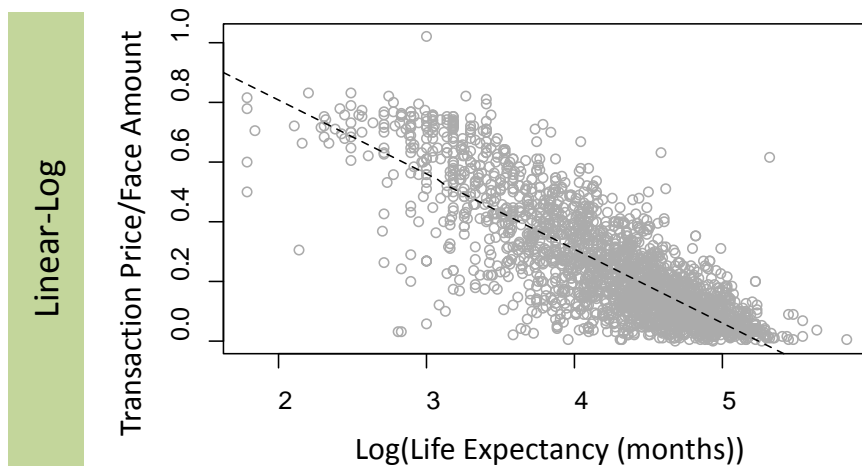
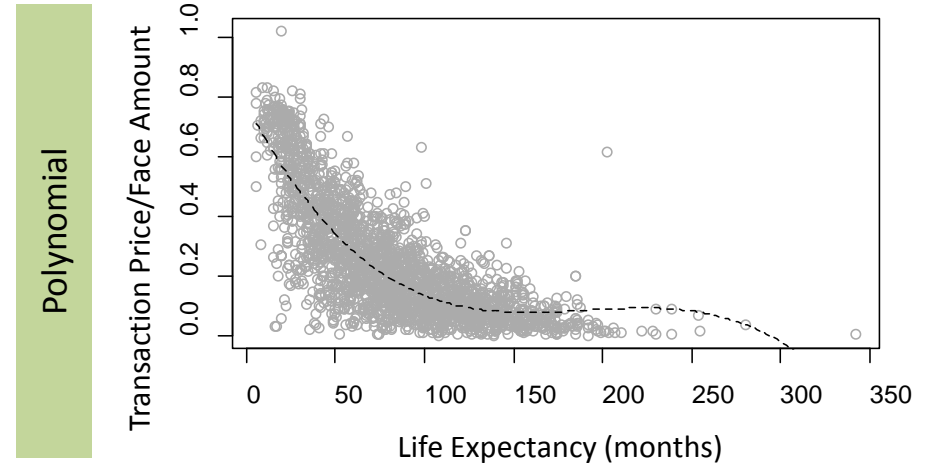
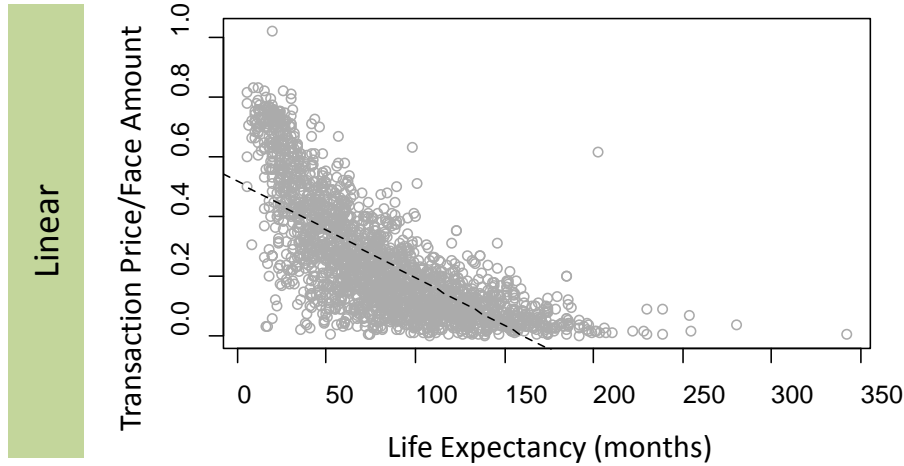
- Example: must not insert a 21st Services LE when beta has been derived based on AVS LEs
 - Reason: beta estimates for AVS LEs are more negative (because AVS LEs tend to exhibit higher values)
 - If the model is calibrated with blended LEs, their time varying composition may be taken into account
- Probabilistic models: discount rate needs to be consistent with LE (mortality rates)

$$P_0 = \sum_{t=0}^{\infty} \frac{{}_t p_x \cdot q_{x+t} \cdot DB}{(1+r)^{t+1}} - \sum_{t=0}^{\infty} \frac{{}_t p_x \cdot \pi_t}{(1+r)^t}$$

- Example: must not employ a 21st Services LE when the IRR has been derived based on an AVS LE
- Reason: average IRR for 21st LEs (46%) is higher than for AVS LEs (33%) (as the former LEs tend to be shorter)

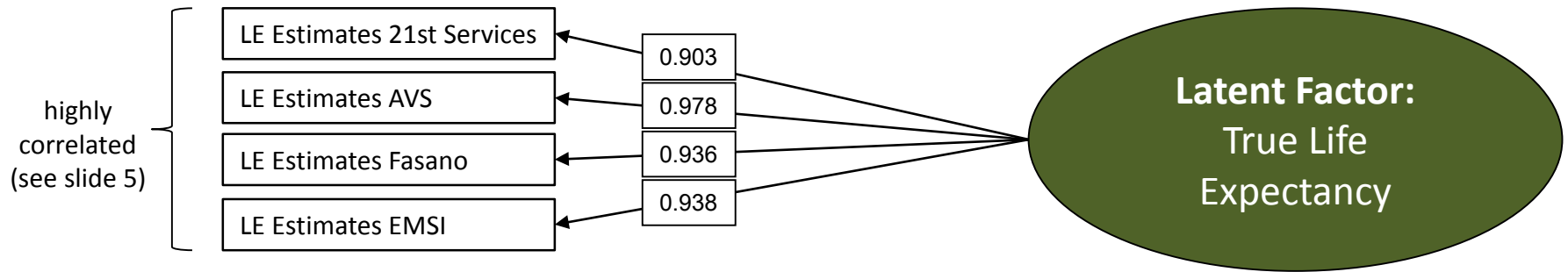
Econometric models

A graphical illustration



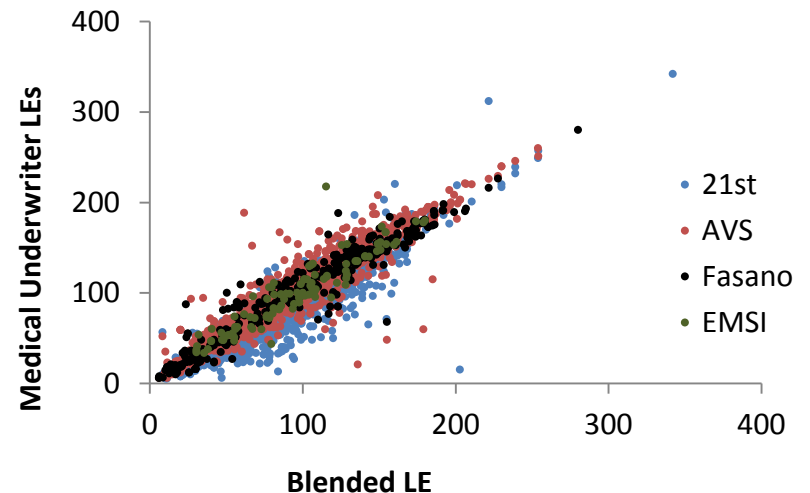
What do we know about the true LE?

Principal components analysis allows the derivation of an underlying factor score



Problem: missing values (incomplete correlation matrix)

- Solution: imputation by regression (assumes functional relationship between known and unknown LEs)
- When relying on the blended LE, time variation in the regression betas could be taken into account to increase precision



Summary and conclusion

Main findings

- Market shares and thus composition of the LE used for closing are not stable over time
- LE estimates of 21st Services are (still) systematically shorter than those of competitors
- LE differences are mirrored by IRRs: this needs to be taken into account for valuation

Consequences

- Sellers (and fund managers) have incentives to pick underwriters with shorter LEs
- Systematically distorted LEs imply a heightened degree of longevity risk for investors
- The absence of A/E-ratios conceals these issues but could be mitigated through rankings

Thank you for your attention!

