



DVfVW 2016

A Walk through the Graveyard:
Which Insurance Companies Have to Leave the Market?

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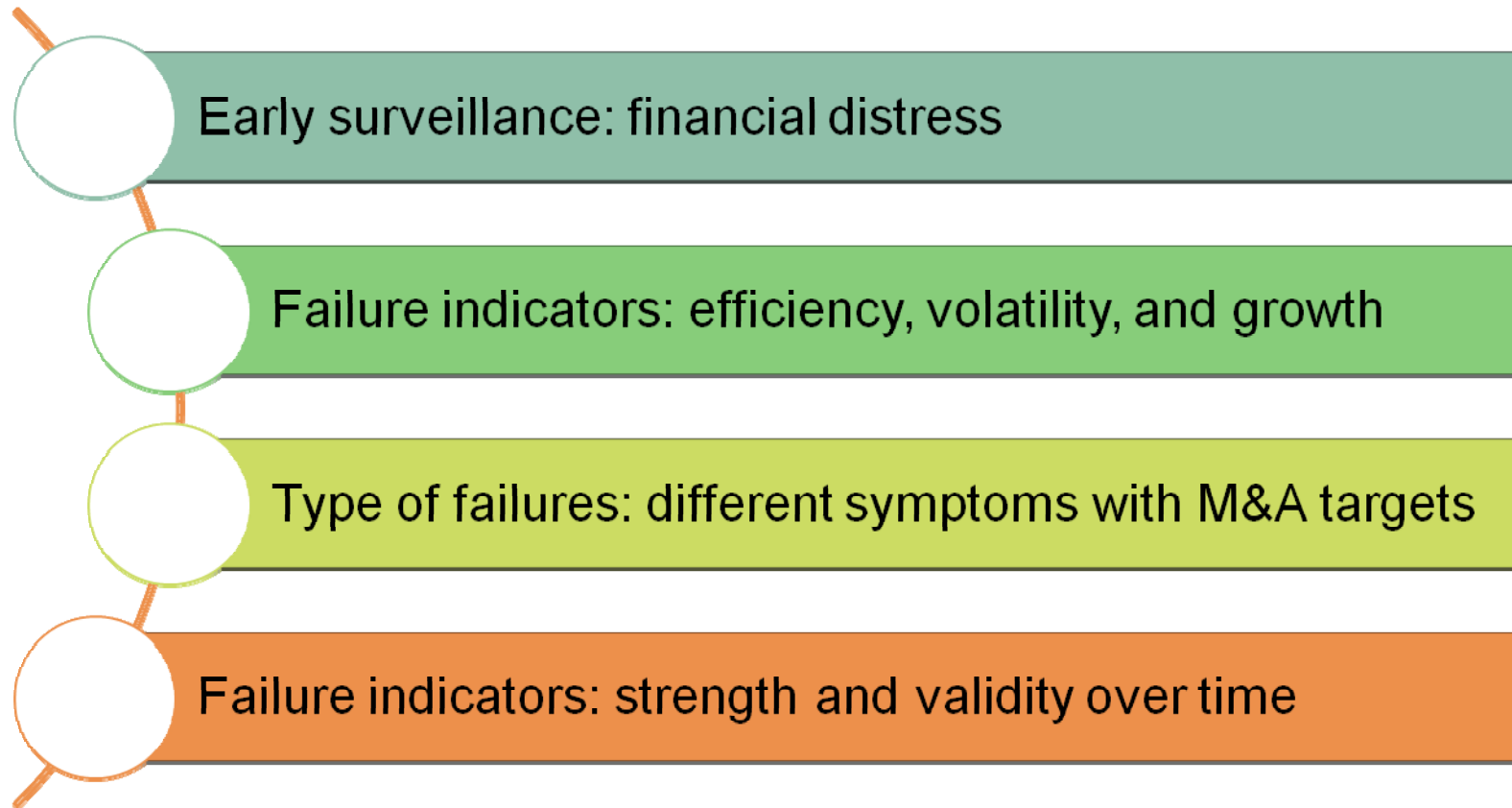


How many insurance companies leave the market?

Year	Number of firms with a failure event ^a	Number of firms without a failure event	Failure Rate ^b
2003	29	2,042	1.40%
2004	23	1,981	1.15%
2005	16	1,591	1.00%
2006	16	2,101	0.76%
2007	23	2,834	0.81%
2008	33	2,837	1.15%
2009	42	3,080	1.35%
2010	51	3,576	1.41%
2011	33	3,570	0.92%
2012	25	3,431	0.72%
2013	13	2,234	0.58%
Total	304^a	29,277	1.03%



Contributions





Hypothesis I: New failure indicators

1. **Management quality and operational efficiency**

- Microeconomic theory: firms that do not succeed in maximizing the input-output ratio will be forced to exit the market
- DEA technical efficiency is critical to a bank's probability of failures
- Efficiency in other measures negatively associates with insurance insolvency
- Probability of an insurer failure negatively associates with its technical efficiency

2. **Long term risk**

- Bank's performance in the 1998 financial crisis predicts its performance and chance of failure in the 2008 financial crisis
- Demand for long term risk measures
- Probability of an insurer failure positively associates with its business volatility

3. **Healthy growth**

- Philosophy of Solvency II emphasizes not “punishing” healthy growth
- However, over aggressiveness or cash flow underwriting must be accounted for
- U-shaped correlation between an insurer's growth and its probability of failure



Hypotheses II-IV: Failure types, timing, and crises

II. M&A targets vs. other types of failures

- Being acquired is considered as a special type of failure
- Not necessarily less profitable and less efficient
- The impact of business volatility and growth holds

III. How early do the warning signals arise?

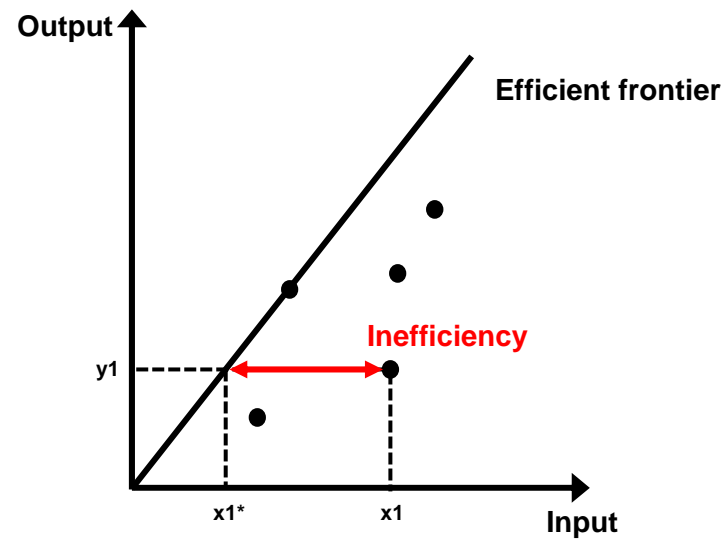
- Weakening magnitude of impact and/or level of significance?
- The warning signals from failure indicators become stronger as the failure event approaches

IV. Crisis vs. non-crisis

- Does the new failure indicators predict well during the financial crises?
- The failure indicators identified are robust across financial crisis



Frontier Efficiency Methodology



- Firm performance relative to the best-practices of a group of leading firms in the industry
- Global frontier vs. regional frontiers



Summary Statistics

	Unit	N	Mean	Std. Dev.
<i>Panel A: Failures</i>				
Distressed	Dummy	29,581	0.021	0.14
Failure Event	Dummy	29,581	0.010	0.10
<i>Panel B: Firm Specific Factors</i>				
Technical Efficiency	1	29,581	0.77	0.19
ROE	1	29,581	0.095	0.18
ROA	1	29,371 ^a	0.025	0.048
sdROE	1	29,581	0.13	0.10
sdROA	1	29,449 ^a	0.030	0.026
Real Total Assets	1,000	29,581	8,225,319	59,601,326
Growth	1	29,581	0.11	0.25
Leverage Ratio	1	29,581	0.28	0.22
Life	Dummy	29,581	0.29	0.45
Composite	Dummy	29,581	0.17	0.38
Mutual	Dummy	29,581	0.16	0.37
Unaffiliated	Dummy	29,581	0.33	0.47



Results I: New Failure Indicators

<i>Logistic Regressions with Market-Year Fixed Effects</i>			
<i>Dependent Var: Distressed (1 if any failure event in the year or the next two years)</i>			
Technical Efficiency	-0.00143** (0.000630)		
ROE		-0.000974** (0.000464)	
ROA			-0.00479** (0.00220)
sdROE	0.00276*** (0.00104)	0.00249** (0.00108)	
sdROA			0.0112** (0.00559)
Growth	-0.00235*** (0.000487)	-0.00229*** (0.000499)	-0.00233*** (0.000532)
Growth ²	0.00198*** (0.000373)	0.00191*** (0.000382)	0.00196*** (0.000408)
Pseudo-R ²	0.170	0.170	0.169
Observations	29,581	29,581	29,307



Results II: M&A targets

<i>Subsample</i>	<i>Mergers and Acquisitions</i>			<i>Other Types of Failures</i>		
<i>Variables</i>	<i>Distressed (1 if any failure event in the year or the next two years)</i>					
Technical Efficiency	0.00327 (0.00199)			-0.0117*** (0.00246)		
ROE		0.000566 (0.00136)			-0.00593*** (0.00166)	
ROA			0.00837 (0.00589)			-0.0299*** (0.00690)
sdROE	0.00541** (0.00247)	0.00566** (0.00254)		0.0131*** (0.00372)	0.0104*** (0.00403)	
sdROA			0.0342*** (0.0131)			0.0270 (0.0185)
Growth	-0.00576*** (0.00159)	-0.00594*** (0.00165)	-0.00569*** (0.00157)	-0.00630*** (0.00169)	-0.00561*** (0.00172)	-0.00512*** (0.00175)
Growth ²	0.00290* (0.00163)	0.00286 (0.00175)	0.00278* (0.00166)	0.00648*** (0.00139)	0.00612*** (0.00140)	0.00575*** (0.00143)
R ²	0.076	0.074	0.078	0.116	0.120	0.111
Observations	29,581	29,581	29,307	29,581	29,581	29,307



Results: How early do the warning signals arise ?

Variables	Failure Event (1 if any defined failure event occurs in the year)								
	No time lag			One year lag			Two years lag		
Technical Efficiency	-0.00812*** (0.00162)			-0.00484*** (0.00152)			-0.00158 (0.00123)		
ROE		-0.00350*** (0.00105)			-0.00178** (0.000758)			-0.00121** (0.000613)	
ROA			-0.0192*** (0.00468)			-0.0118*** (0.00377)			-0.00508** (0.00250)
sdROE	0.0109*** (0.00232)	0.00937*** (0.00251)		0.00553*** (0.00199)	0.00501** (0.00214)		0.00236 (0.00159)	0.00178 (0.00175)	
sdROA			0.0361*** (0.0123)			0.0189* (0.00999)			0.0119* (0.00649)
R ²	0.159	0.151	0.151	0.157	0.149	0.153	0.165	0.165	0.170
Obs.	29,581	29,581	29,307	22,826	22,826	22,629	18,812	18,812	18,665



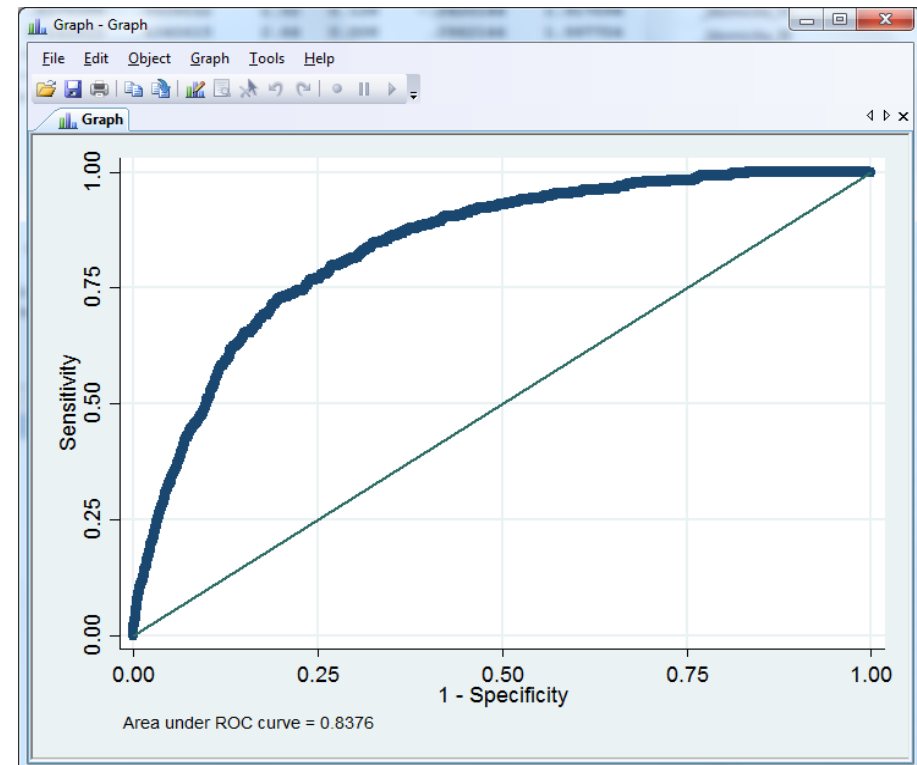
Results: Robustness across crises

Variables	Failure Event (1 if any defined failure event occurs in the year)								
Crisis	0.00228 (0.00233)	0.00153** (0.000737)	0.00166** (0.000758)	0.00255** (0.00115)	0.00254** (0.00115)	0.00226** (0.00111)	0.00279* (0.00158)	0.00297* (0.00165)	0.00296* (0.00164)
Technical Efficiency *crisis	-0.000731 (0.00249)								
ROE*crisis		-0.000314 (0.00175)							
ROA*crisis			-0.00672 (0.00728)						
sdROE*crisis				-0.00483 (0.00435)	-0.00563 (0.00440)				
sdROA*crisis						-0.0163 (0.0170)			
Growth*crisis							0.00230 (0.00209)	0.00275 (0.00218)	0.00275 (0.00221)
Growth ² *crisis							-8.04e-05 (0.00202)	-0.000473 (0.00200)	-0.000314 (0.00213)
R ²	0.161	0.153	0.153	0.161	0.153	0.153	0.161	0.153	0.153
Observations	29,581	29,581	29,307	29,581	29,581	29,307	29,581	29,581	29,307



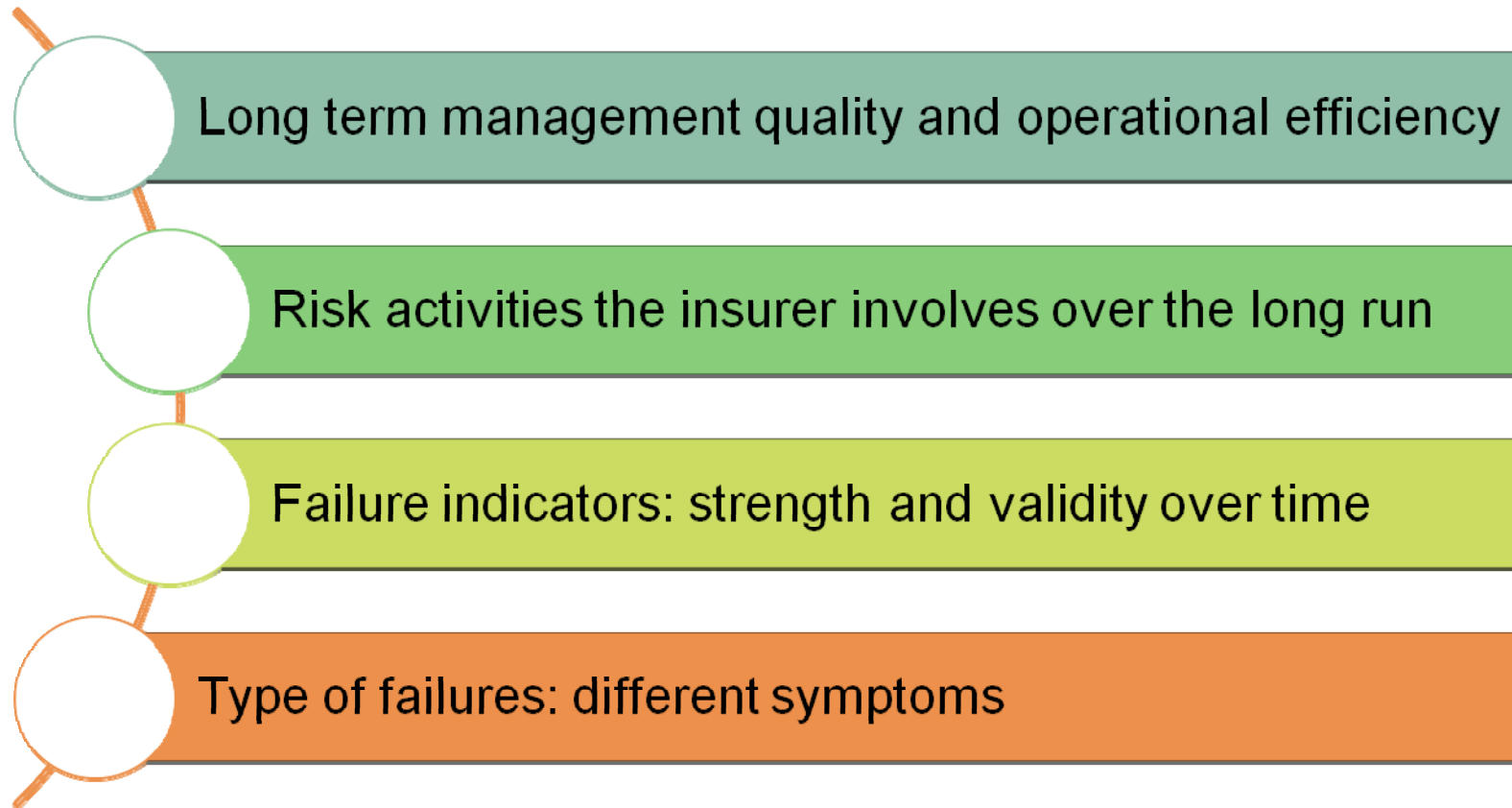
Discussion

1. Rare events logistic regression (King and Zeng, 2001)
2. Predictability
 - Receiver Operating Characteristic (ROC)
 - Tradeoff between Type I and Type II Errors
 - Pursuit of high predictability





Implications





Discussion and Questions