Market reactions to credit rating changes: The impact of using value-based performance measures

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Agenda

1. Motivation
2. Hypotheses
3. Sample and research design
4. Results
5. Additional analyses and limitations
6. Conclusion

1. Motivation

» Value-based management (VBM)

- Aims at maximizing the shareholder value (SHV) (Rappaport, 1998; Scheipers et al., 2003)
- Instrument to align the interests of managers and shareholders (Ryan/Trahan, 2007)
- Operationalized by VB performance metrics as main component of VBM systems (Stewart, 1995; Scheipers et al., 2003)
- SHV increases if the generated return exceeds the cost of capital (Fruhan, 1979)

» Credit rating changes

- Reflect changes in the financial prospects and the inherent (default) risk (Heinke, 2000; Braun, 2002; Ashbaugh-Skaife et al., 2006)
- Resulting from external effects or management decisions (amongst others)
- Associated with the cost for debt (Fridson/Garman, 1998; Heinke, 1998) and under certain cicumstances with the cost for equity (Holthausen/Leftwich, 1986)
- Associated with shareholder and debt value (Kliger/Sarig, 2000)

1. Motivation

» **Value-based management (VBM)** ⟷ » **Credit rating changes**

» Related literature

- Mixed results on the performance effects of implementing a VBM system
  (e.g., Hogan/Lewis, 2005; Rapp et al., 2011; Ryan/Trahan, 2007)
- A few studies on the performance effects of corporate decisions (e.g., Knauer et al., 2017)
- Studies on the effect of VBM on the cost of capital (Ryan/Trahan, 2007) resp. of VBM and VB reporting on the cost of capital (Schultze et al., 2017)
- Negative abnormal returns following a rating downgrade
  (e.g., Bannier/Hirsch, 2010; Chung et al., 2012; Ederington/Goh, 1998; Holthausen/Leftwich, 1986)
- Non-significant influence of rating upgrades on the stock's performance
  (e.g., Bannier/Hirsch, 2010; Dichev/Piotroski, 2001; Griffin/Sanvicente, 1982; Holthausen/Leftwich, 1986)

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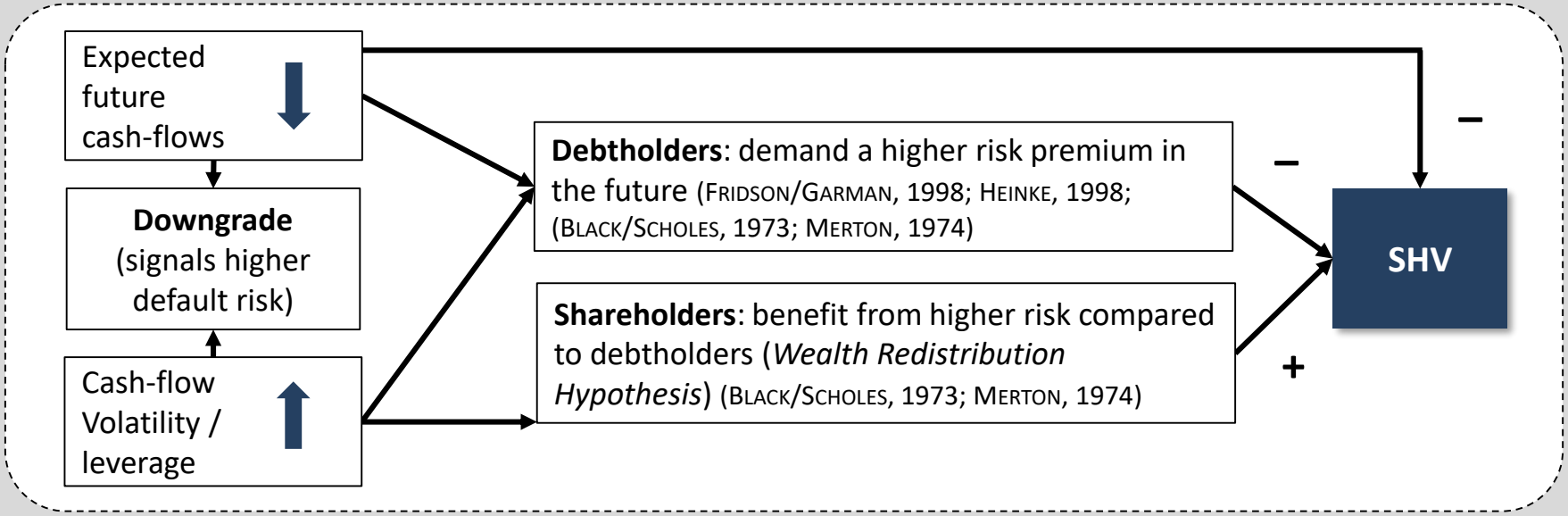
Research Question: How does the use of VB performance metrics affect the shareholder value effect of credit rating changes?

2. Hypotheses – Rating downgrades

» The effect of rating changes on SHV can be positive or negative (GOH/EDERINGTON, 1993)



» Firms have to trade-off the potential negative and positive SHV effect of rating changes
- VB performance metrics align management decisions and shareholder interests (RAPPAPORT, 1998)
- VB reporting decreases information asymmetries (SCHULTZE ET AL., 2017)
- Investors have greater confidence in VB metric users (RAPP ET AL., 2011; STEWART, 1991)

2. Hypotheses – Rating downgrades

Downgrade

H1a: The average capital market reaction to the announcement of a rating downgrade is non-negative for VB metric users.

H1b: The capital market reaction to the announcement of a rating downgrade is positively associated with use of VB performance metrics.

2. Hypotheses – Rating upgrades

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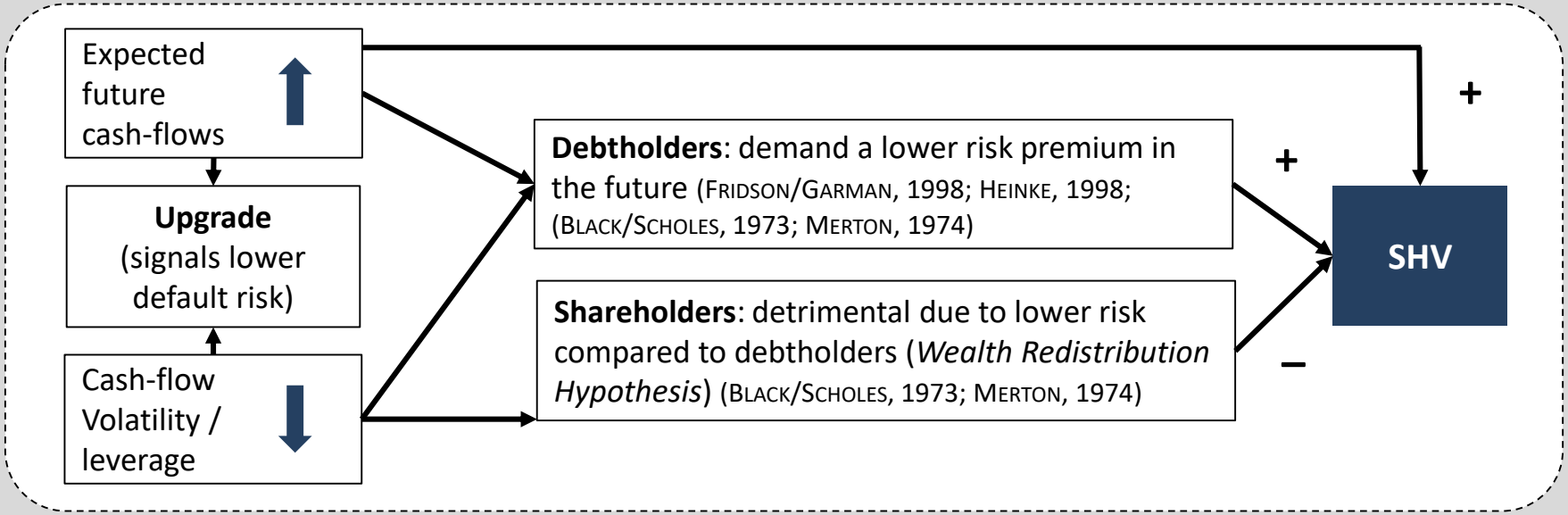

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- VB performance metrics align management decisions and shareholder interests (RAPPAPORT, 1998)
- Investors have greater confidence in VB metric users (RAPP ET AL., 2011; STEWART, 1991)
- Information asymmetries are expected to be low (EDERINGTON/GOH, 1998; HOLTHAUSEN/LEFTWICH, 1986; KIM/NABAR, 2007) and thus VBM less effective

2. Hypotheses – Rating upgrades

Upgrade

H2a: The average capital market reaction to the announcement of a rating upgrade equals zero for VB metric users.

H2b: The capital market reaction to the announcement of a rating upgrade will not differ for VB metric users and non-users.

3. Sample and research design

» Sample

- Rating changes of firms listed on the German HDAX or SDAX (Moody's website)
- Investigation period: 1996 - 2014
- Long-term issuer rating or comparable issue rating
- Elimination of 36 confounding events (HOLTHAUSEN/LEFTWICH, 1986)
- **Final sample:** 115 observations (72 downgrades, 43 upgrades; 38 different firms)

Tab. 1: Distribution of rating changes

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Downgrades	1	1	1	1	2	5	4	10	2	4	1	2	6	14	1	3	5	6	3	72
Upgrades	1	0	0	0	0	0	0	0	6	4	1	6	3	1	3	5	4	4	5	43
thereof VBM	1	1	0	1	0	3	0	7	3	4	1	4	6	12	1	7	5	5	6	67

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» Collection of VBM data

- Analysis of annual reports
- VB metrics: Profit- or cash flow-based residual income, corresponding return ratios (e.g., EVA spread, CFROI spread) and other return metrics if explicitly compared to the cost of capital

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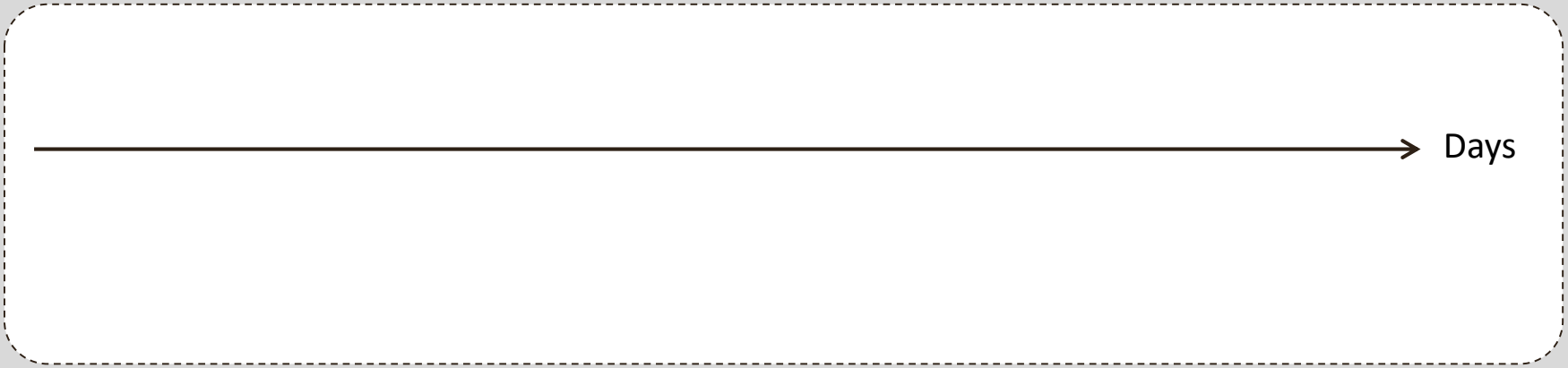
3. Sample and research design

» Event study framework to measure the capital market reaction

- $AR_{i,t} = R_{i,t} - E(R_{i,t})$
- $R_{i,t}$ via total return index (Thomson Reuters Datastream)
- $E(R_{i,t})$ via market model (CDAX)



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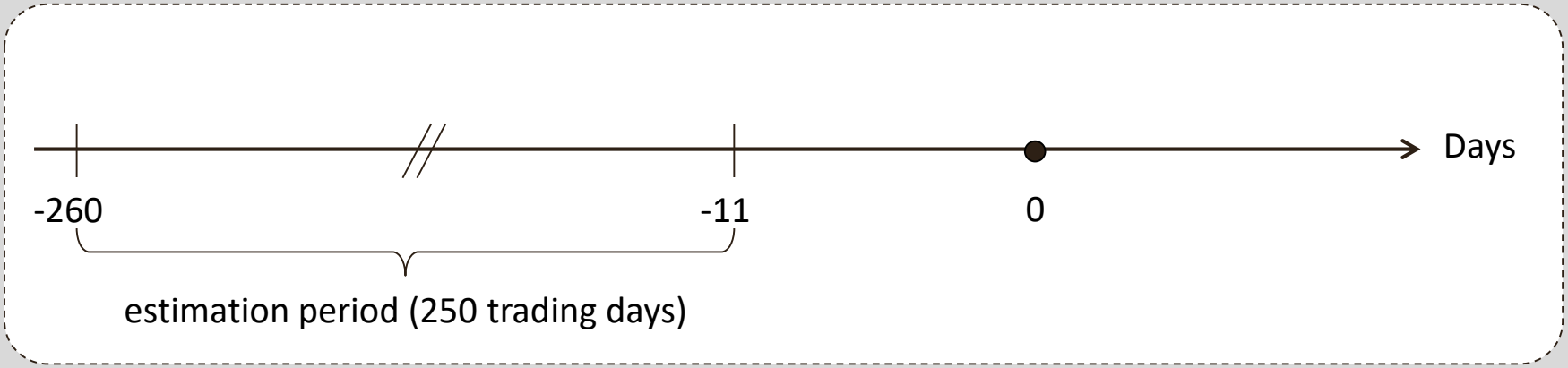

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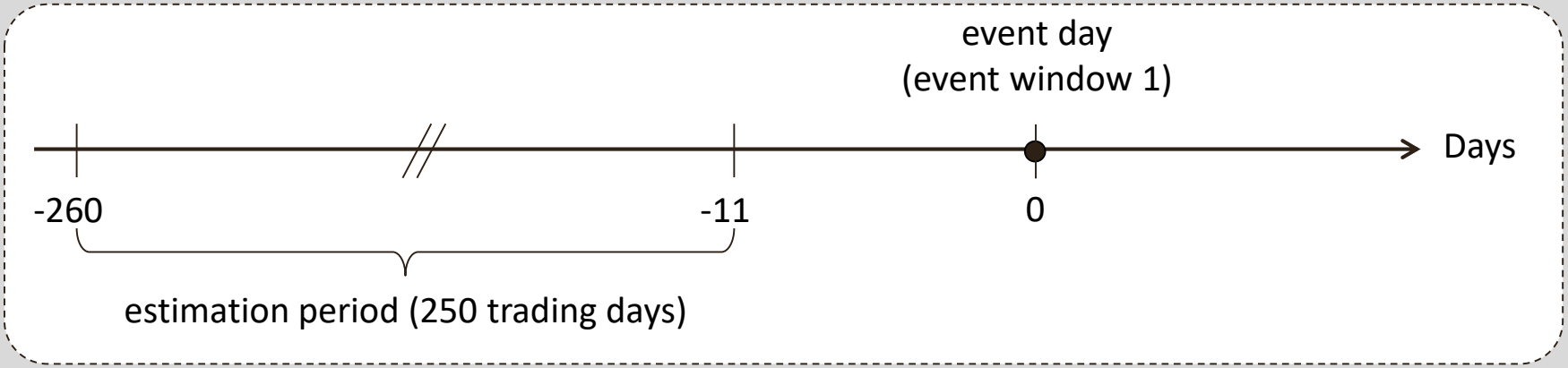

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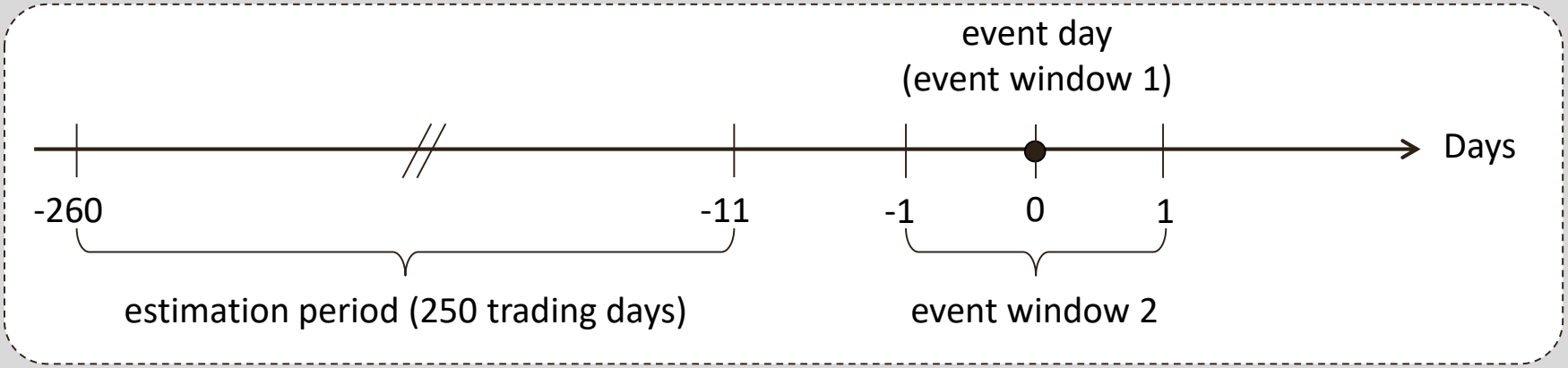

3. Sample and research design

» Univariate test of market reaction

- Test of abnormal and cumulative abnormal returns
  (two-tailed t-test, BOEHMER/MUSUMECI/POULSEN-test, non-parametric Wilcoxon signed rank test)
- Test for group differences (VBM user vs. non-user)
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» Multivariate test of market reaction

- $(C)AR_{i,t} = \alpha + \beta_1 * VBM_{i,t}^{CS} + \beta_2 * VBM_{i,t}^{MC} + 16\ control\ variables + \varepsilon_{i,t}$
- Rating change specific control variables: e.g., $lnDAYS, GRADES, WLOLOR$
- Firm specific financial control variables: e.g., $lnSIZE, DELTAROA, DELTABETA$
- Industry effects: $FINANCIAL$
- Year fixed effects: $CRISIS1, CRISIS2$
- Total-, downgrade- and upgrade-model

4. Univariate results

Tab. 2: Capital market reactions to announcements of rating changes (AR_0)

	Downgrades (n = 72)	Upgrades (n = 43)
Mean	**-0.004**	**0.001**
t-test	0.197	0.552
BMP test	0.139	0.631
SR test	0.067*	0.837

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Tab. 3: Capital market reactions differentiated by the use of VB metrics (AR_0)

		Downgrades (n = 72)	Upgrades (n = 43)
(1) VBM user	n	45	22
	Mean	**0.001**	**0.004**
	t-test	0.810	0.218
	BMP test	0.866	0.374
	SR test	0.800	0.615
(2) VBM non-user	n	27	21
	Mean	**-0,013**	**-0,002**
	t-test	0.022**	0.548
	BMP-Test	0.019**	0.692
	VR-Test	0.008***	0.768
(1)-(2)	t-test	0.038**	0.181
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H1b

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H1a H1b H2b H2a

4. Multivariate results

Tab. 4: Factors influencing the capital market reactions (AR_0)

Variable	Downgrades (n = 72)	Upgrades (n = 43)
VBM^{CS}	0.023***	0.001
VBM^{MC}	-0.009	0.011
$control\ variables$	Yes	Yes
$constant$	-0.081	-0.007
$\bar{R}^2$	0.261	-0.018
F-test	<0.001***	<0.001***
VIF_{max}	1.91	4.53

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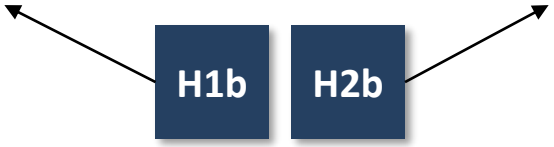

5. Additional analyses and limitations

» Robustness tests

- $E(R_{i,t})$ via CARHART 4-factor model (CARHART, 1997) with German factor set (BRÜCKNER ET AL., 2015)
- Winsorizing of non-binary variables (1st and 99th percentile levels)
- Bootstrapped bias-corrected confidence intervals to verify H1b and H2b
- Nearest neighbor propensity score matching
- Additionally: alternative coding of $lnDAYS$, $CRISIS1$, $CRISIS2$; control variable for initial rating level; exclusion of $FINANCIAL$ firms

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» Limitations

- General caveats of the event study methodology (BOWMAN, 1983; MCWILLIAMS/SIEGEL, 1997; PETERSON, 1989)
- Representativeness of the German sample
- VBM data collection method
- Distinction between different levels of VBM sophistication (BURKERT/LUEG, 2013)

6. Conclusion

Downgrade

H1a ✓

H1b ✓

- VBM largely offsets the negative effect of downgrades
- Indicates improved managerial decision-making
- Reduced information asymmetries and mitigation of risks associated with managerial self-interest
- Investors trust the firm's management

Upgrade

H2a ✓

H2b ✓

- No distinction between VB metric users and non-users
- Upgrades do not bring any new information to the market, or
- Investors already believe in optimal decision-making by VB metric users

» **The implementation of a value-based management system can positively influence risk-taking and/or -communication and its effect on the firm's SHV**

Thank you very much for your attention!

Back-up – Sample distribution

Tab. 5: Migration matrix

	New rating								
	Aaa	Aa	A	Baa	Ba	B	Caa	Ca	C
Old rating									
Aaa		**3**							
Aa		6	8						
A		2	**15**	8					
Baa			7	**25**	4				
Ba				5	**17**	2			
B				1	3	**6**	2		
Caa						1			
Ca									
C									

Tab. 6: Number of rating changes per rating subject

Number of rating changes	1	2	3	4	5	6	≥ 7	Total
Number of rating subjects	8	14	6	2	4	0	4	38

Tab. 7: Number of rating changes per stock index and average year of implementation

Stock index	DAX	MDAX	SDAX	TecDAX	Total
Number of rating changes	63	49	3	0	115
Avg. year of implementation	1999	2003	2004	-	

Back-up – Descriptive statistics (1/2)

Tab. 8: Descriptive statistics of the non-binary independent variables differentiated by the direction of the rating change

	Downgrades ($n = 72$)			Upgrades ($n = 43$)				
Variable	$\bar{x}$	$Median$	SD	$\bar{x}$	$Median$	SD	t-test	RS test
$DAYS$ (in days)	677.436	321.000	746.316	799.900	675.500	715.832	0.548	0.337
$GRADES$ (in notches)	1.208	1.000	0.442	1.140	1.000	0.516	0.450	0.165
$SIZE$ (in thousand €)	16,617,171	6,680,337	29,973,948	16,303,589	8,793,750	18,920,366	0.951	0.444
MTB	1.473	1.321	0.911	1.828	1.909	1.216	0.078	<0.001
$DELTASIZE$	-0.118	-0.147	0.399	0.383	0.287	0.397	<0.001	<0.001
$DELTAROA$	-1.207	-0.299	9.062	0.208	0.203	1.973	0.315	0.004
$DELTAIC$	-0.035	-0.080	1.065	0.440	0.337	1.052	0.022	<0.001
$DELTADEBT$	0.105	0.016	0.438	-0.095	-0.118	0.143	<0.001	<0.001
$DELTABETA$	-0.035	-0.001	1.464	0.107	0.036	0.542	0.543	0.979

Back-up – Descriptive statistics (2/2)

Tab. 9: Descriptive statistics of the binary independent variables for the total sample and differentiated by the direction of the rating change

	Total (n = 115)		Downgrades (n = 72)		Upgrades (n = 43)		
Variable	n	in %	n	in %	n	in %	χ^2-test
VBM^{CS}	67	58.3	45	62.5	22	51.2	0.233
VBM^{MC}	30	26.1	18	25.0	12	27.9	0.731
FA	4	3.5	4	5.6	0	0.0	-
RS	6	5.2	0	0.0	6	14.0	-
$CRISIS1$	18	15.7	18	25.0	0	0.0	<0.001
$CRISIS2$	8	7.0	6	8.3	2	4.7	0.453
$FINANCIAL$	18	15.7	14	19.4	4	9.3	0.148
$WLOLOR$	98	85.2	68	94.4	30	69.8	<0.001

Back-up – Univariate results

Tab. 10: Capital market reactions differentiated by the direction of rating change and the use of VB metrics

	Total ($n = 115$)		**Downgrades ($n = 72$)**		**Upgrades ($n = 43$)**	
	AR_0	$CAR_{[-1;1]}$	AR_0	$CAR_{[-1;1]}$	AR_0	$CAR_{[-1;1]}$
(1) $VBM^{CS} = 1$						
n	67	67	45	45	22	22
$\bar{x}$	0.002	0.004	0.001	0.003	0.004	0.006
$Median$	-0.002	-0.003	-0.003	-0.003	-0.000	0.002
t-test	0.483	0.443	0.810	0.696	0.218	0.338
BMP test	0.484	0.358	0.866	0.773	0.374	0.282
SR test	0.950	0.446	0.800	0.481	0.615	0.570
(2) $VBM^{CS} = 0$						
n	48	48	27	27	21	21
$\bar{x}$	-0.008	-0.008	-0.013	-0.008	-0.002	-0.008
$Median$	-0.005	-0.002	-0.007	-0.003	-0.000	-0.002
t-test	0.019**	0.128	0.022**	0.282	0.548	0.287
BMP test	0.028**	0.148	0.019**	0.322	0.692	0.287
SR test	0.022**	0.264	0.008***	0.269	0.768	0.664
(3) Differences (1) - (2)						
t-test	0.024**	0.104	0.038**	0.292	0.181	0.148
RS test	0.067*	0.188	0.034**	0.277	0.610	0.544

Back-up – Multivariate regression results (1/2)

Tab. 11: Factors influencing capital market reactions to the announcements of rating changes

Variable	Total ($n = 115$)		Downgrades ($n = 72$)		Upgrades ($n = 43$)	
	AR_0	$CAR_{[-1;1]}$	AR_0	$CAR_{[-1;1]}$	AR_0	$CAR_{[-1;1]}$
α	-0.037	-0.088**	-0.081	-0.138**	0.002	-0.021
VBM^{CS}	0.015**	0.019**	0.023***	0.026**	0.011	0.023
VBM^{MC}	-0.010	-0.013	-0.009	-0.013	-0.007	-0.016
$lnDAYS$	0.000	0.001*	0.001*	0.001**	-0.000	-0.001
$GRADES$	-0.012*	-0.006	-0.018**	-0.008	0.001	-0.004
FA	0.037*	0.034	0.036**	0.034	-	-
RS	0.014***	0.026***	-	-	-0.003	0.007
$lnSIZE$	0.003	0.005*	0.006*	0.008**	-0.000	0.002
MTB	-0.001	0.003	0.004	0.007	-0.001	-0.002
$WLOLOR$	-0.005	0.003	-0.033*	-0.025	-0.000	0.004
$DELTAlnSIZE$	-0.066	-0.400***	-0.253**	-0.595***	-0.008	-0.350**

Back-up – Multivariate regression results (2/2)

Variable	Total ($n = 115$)		Downgrades ($n = 72$)		Upgrades ($n = 43$)	
	AR_0	$CAR_{[-1;1]}$	AR_0	$CAR_{[-1;1]}$	AR_0	$CAR_{[-1;1]}$
$DELTAROA$	-0.000	-0.000	-0.000	-0.000	0.000	-0.002
$DELTAIC$	-0.001	-0.002	-0.002	-0.003	-0.000	0.002
$DELTADEBT$	0.004	-0.004	0.004	-0.002	-0.037	-0.018
$DELTABETA$	0.004***	0.002	0.003**	0.000	0.009	0.009
$FINANCIAL$	0.003	0.001	0.007	0.006	0.018	0.008
$CRISIS1$	0.002	0.000	0.000	-0.004	-	-
$CRISIS2$	-0.005	-0.036	-0.014	-0.051	-0.006	-0.015
$DOWNGRADE$	-0.009**	-0.011	-	-	-	-
$\bar{R}^2$	0.125	0.035	0.261	0.065	-0.018	-0.192
F-test	<0.001***	<0.001***	<0.001***	<0.001***	<0.001***	<0.001***
VIF_{max}	2.18	2.18	1.91	1.91	4.53	4.53

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