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Are you sure about what you mean by 'uncertainty'? The actor's perspective vs. the institutional perspective

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Abstract

This paper explicates theoretical and methodological differences between Archival Environmental Uncertainty (AEU) and Perceived Environmental Uncertainty (PEU). Conceptually, we discuss the controversial development of the concepts in a literature review. We propose a reconciling framework which emphasizes that AEU and PEU differ due to the specificity of the decision unit, the predictability of change, and the use of leading indicators. We conclude that future conceptual work could further refine AEU- and PEU-measures; especially a better distinction between AEU and 'risk' is warranted.

Empirically, we are the first ones to investigate the statistical association between prevailing measures of AEU (Tosi et al., 1973; Dess and Beard, 1984) and PEU (Miller, 1993). Our analysis combines archival data on AEU (annual reports) with survey data on PEU from top executives of the 110 largest listed German companies (55% response rate) by using time series-, factor- and correlation-analyses. Our findings show—as predicted—that AEU and PEU correlate moderately on a significant level. Yet, adjustment of the AEU-measure for predictable changes does not increase the strength of this correlation. This implies that future empirical work should focus more on the specificity of the decision unit and the use of leading indicators than on adjusting the predictability of change.

Keywords: Environmental uncertainty; perceived; archival; methodology; objective; correlation.

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Are you sure about what you mean by 'uncertainty'?

The actor's perspective vs. the institutional perspective

The Actor-Reality Perspective in a Global Economy
(Second Conference)

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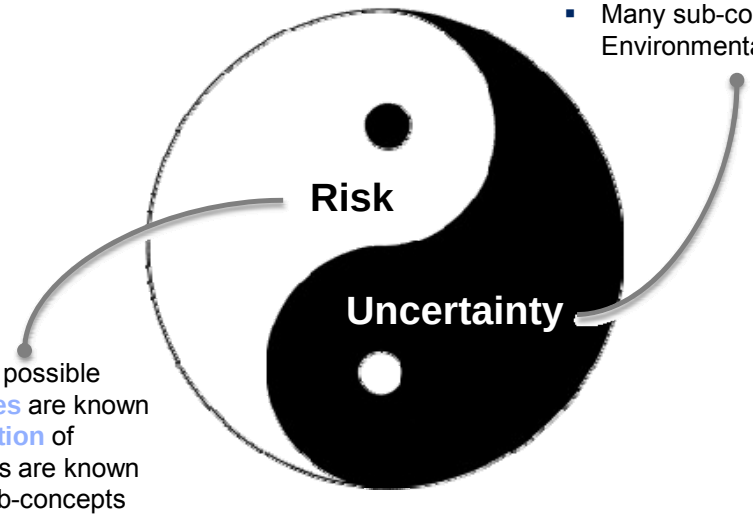
Boris Borisov & Rainer Lueg | Aarhus University

Uncertainty is the counterpart of risk

Uncertainty vs. risk

- Outcomes **un**known
- Distribution **un**known
- Many sub-concepts, e.g., Environmental Uncertainty



- Different possible outcomes are known
- Distribution of outcomes are known
- Many sub-concepts

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Environmental uncertainty splits into archival (AEU) and perceptive measures (PEU) – *SHOULD and DO they share reality???*

Research question

Archival
Environmental Uncertainty

- Values: positivistic
- Uncertainty exists independently from the perceptions of the actor
- Based on facts
- Communication: volatility of accounting data

Perceived
Environmental Uncertainty

- Values: constructivist
- Uncertainty results from the interplay of an actor with the environment
- Based on facts and possibilities
- Communication: intuition, experience

RQ: What is the relationship between AEU and PEU?

Relevance?
- External validity
- Permanent revisions of 'evergreens'

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AEU is assessed by accounting measures, PEU by a survey – they are both measured at the industry-level

Instruments AEU and PEU

Archival
Environmental Uncertainty *

10-year volatility of…
- Sales
- Earnings before interests and taxes (EBIT)
- Employment levels (in full-time equivalents, FTEs)
- Earnings After Taxes (EAT)
- Equity (book value)
- Total assets

Perceived
Environmental Uncertainty

"How predicable is the environment in which your company operates?
- The production/service technology is not subject to very much change and is well established (e.g. steel production).
- Demand and consumer tastes are fairly easy to forecast (e.g. milk industry).
- The rate at which products and services are getting obsolete in the industry is very slow (e.g. commodities like oil).
- Actions of competitors are quite easy to predict (e.g. pure price competition)."

* Tosi et al (1973): Standard error around the mean (includes predictable trends)
Dess & Beard (1984): Standard error of 10-year regression line divided by the mean (excludes predictable trends)

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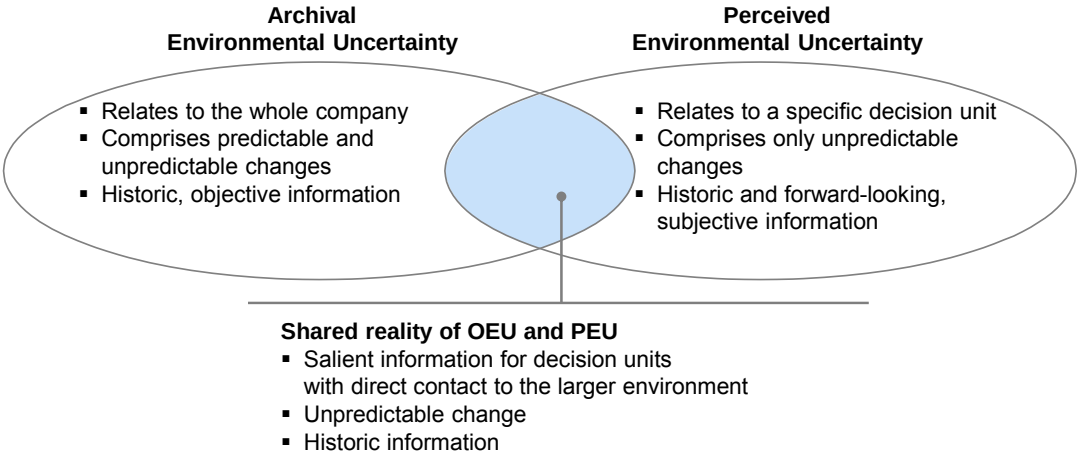
Based on the conceptualization, the relationship should be significant, but only moderately strong

Hypotheses 1: The relationship between AEU and PEU



H1: There is a weak but significant positive relationship between AEU and PEU.

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Evidence on the relationship of AEU and PEU is inconclusive

Hypothesis 2: Adjustments in AEU (1/2)

No relationship

- Tosi et al. (1973, p. 31) vs. Lawrence & Lorsch (1967): "***low and inconsistent correlation***".
- Snyder & Glueck (1982, p. 191) vs. Tosi et al. (1973) : "***biasing effect of individual differences***".

Relationship

- Sharfman & Dean (1991, p. 689) vs. Dess & Beard (1984): "***in general, the correlations were significant and in the proper direction***"
- Karimi, Sommers & Gupta (2004) with Miller (1993) vs. Dess & Beard (1984) "***The results further challenge the notion that CEOs perceptions are inclined to be imprecise, erroneous***."

Suggested solution

"It is not change per se, or even a fast rate of change, that creates uncertainty about the environment; rather, it is ***unpredictable change*** that will be associated with this type of uncertainty. Thus, a lack of correlation between measures of environmental volatility and perceived environmental uncertainty is not, in and of itself, reasonable grounds for claiming that the perceptual measures are invalid."

--Milliken (1987, p. 135)

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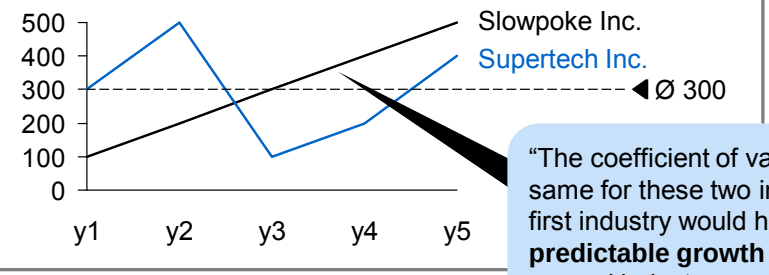
Is 'unpredictable' vs. 'predictable' change the missing link?

Hypothesis 2: Adjustments in AEU (2/2)

Sales variation

Illusrative



"The coefficient of variation would be the same for these two industries. However, the first industry would have a perfectly **predictable growth trend**, whereas the second industry would have a highly **unpredictable growth pattern**."

--Boyd et al. (1993, p. 208)

H2: Adjusting* measures of AEU for predictable change will improve the relationship of AEU and PEU.

* Tosi et al (1973): Standard error around the mean (includes predictable trends)
Dess & Beard (1984): Standard error of 10-year regression line divided by the mean (excludes predictable trends)

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Data come from the annual reports and a top management survey of the German HDAX companies

Data source

Employees		Sales (in mio. EUR)		Market capitalization (in mio. EUR)		Industry (1-digit-SIC)		Respondents (by function)	
< 500	2	< 500	2	< 500	8	Manufacturing	33	Accounting, Control & Finance	34
< 1,000	7	< 1,000	13	< 1,000	7	Finance, insurance, real estate	8		
< 5,000	11	< 5,000	18	< 5,000	21			Investor Relations	13
< 10,000	10	< 10,000	7	< 10,000	6	Services	7		
< 50,000	14	< 50,000	15	< 50,000	14	Trade	6	Corporate Development	8
< 100,000	8	< 100,000	4	< 100,000	4	Transportation & public utilities	6		
< 250,000	4	< 250,000	1					Executive Board	5
< 500,000	4								
n =	**60**		**60**		**60**		**60**		**60**

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PEU correlates significantly with almost all AEU measures, and the strength is just moderate

Test H1: Correlations

H1 confirmed

No.	Variation of:	PEU	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a
1	**PEU [dynamism]** (Miller, 1993)	1											
2a	**Sales** (Tosi et al., 1973)	0.374 ** *0.002*	1										
2b	**Sales** (Dess & Beard, 1984)	0.326 * *0.007*	0.635 *** *0.000*	1									
3a	**EBIT** (Tosi et al., 1973)	0.281 * *0.020*	0.372 ** *0.003*	0.266 * *0.026*	1								
3b	**EBIT** (Dess & Beard, 1984)	0.049 *0.370*	0.230 *0.058*	0.090 *0.271*	0.875 *** *0.000*	1							
4a	**Employment** (Tosi et al., 1973)	0.353 ** *0.004*	0.785 *** *0.000*	0.491 *** *0.000*	0.186 *0.089*	0.120 *0.208*	1						
4b	**Employment** (Dess & Beard, 1984)	0.192 *0.078*	0.236 * *0.040*	0.273 * *0.021*	0.216 *0.059*	0.101 *0.247*	0.445 *** *0.000*	1					
5a	**Earnings** (Tosi et al., 1973)	0.277 * *0.025*	0.063 *0.330*	0.303 * *0.015*	0.360 ** *0.005*	-0.136 *0.187*	0.050 *0.363*	0.171 *0.115*	1				
5b	**Earnings** (Dess & Beard, 1984)	0.257 * *0.040*	-0.032 *0.416*	0.182 *0.110*	0.329 * *0.013*	0.402 ** *0.003*	-0.010 *0.473*	0.131 *0.190*	0.894 *** *0.000*	1			
6a	**Equity** (Tosi et al., 1973)	0.313 ** *0.010*	0.670 *** *0.000*	0.220 *0.053*	0.280 * *0.021*	0.052 *0.363*	0.645 *** *0.000*	0.342 ** *0.005*	0.066 *0.325*	-0.077 *0.303*	1		
6b	**Equity** (Dess & Beard, 1984)	0.360 ** *0.004*	0.423 ** *0.001*	0.179 *0.097*	0.312 * *0.012*	-0.290 * *0.024*	0.391 ** *0.002*	0.379 ** *0.002*	0.184 *0.103*	0.033 *0.413*	0.707 *** *0.000*	1	
7a	**Assets** (Tosi et al., 1973)	0.268 * *0.023*	0.742 *** *0.000*	0.244 * *0.035*	0.303 * *0.013*	0.178 *0.113*	0.684 *** *0.000*	0.407 ** *0.001*	-0.024 *0.435*	-0.132 *0.189*	0.744 *** *0.000*	0.455 *** *0.000*	1
7b	**Assets** (Dess & Beard, 1984)	0.303 * *0.012*	0.638 *** *0.000*	0.461 *** *0.000*	0.420 ** *0.001*	-0.015 *0.460*	0.577 *** *0.000*	0.516 *** *0.000*	0.155 *0.141*	0.026 *0.433*	0.629 *** *0.000*	0.784 *** *0.000*	0.612 *** *0.000*

p<0.1; * p<0.05; ** p<0.01; *** p<0.001 (one-tailed since hypotheses are directional).

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Both AEU measures explain PEU well – Yet, the trend-adjusted measure of Dess & Beard (1984) does not outperform Tosi et al. (1973)

Test H2: Regression*; dependent variable is PEU (Miller, 1993)

H2 rejected

Method not trend-adjusted…

Independent variables (Volatility of...)	Model 5a (Tosi et al., 1973)	Model 4b (Dess & Beard, 1984)
Sales	**0.392** ** *(0.766)*	**0.212** † *(16.719)*
EBIT		
Employment		
Earnings	**0.238** * *(0.191)*	**0.205** † *(0.260)*
Equity		**0.352** * *(7.065)*
Assets		
Constant	**2.977** *** *(.327)*	**3.032** *** *(.330)*
Adjusted R^2	**.197** **	**.185** *
D.f.	46	40

…but still most significant and highest R^2

* p<.1; * p<.05**; p<.01; *** p < .001 (one-tailed)

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AEU and PEU are not perfect substitutes, but valid proxies at the level of the industry / top executives

Implications

Researchers

AEU and PEU **should correlate** moderately, **but differ** for three reasons:

- Specificity to decision unit
- Predictability of changes ➔ We reject this empirically!
- Leading indicators

'Real' uncertainty does hardly exist

- Lacking correlation = inadequacy of PEU?
- Existing correlation = executives' 'correct' understanding of AEU?

➔ Based just ***a-priori beliefs***, not on the empirical tests!

Executives

- **Across** decision units: **AEU**
  - Factual measures facilitate discussion
- **Within** one decision unit: **PEU**
  - Context specific
  - More easily available data
  - Ex-post data OK for evaluation, but not for decision making

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We just investigate how facts and possibilities create shared realities – Future research should critically challenge values and communication

Limitations and future research

Values

- Rethink old measures of AEU/PEU
- Adjust uncertainty to context
- Look at other levels (hierarchies, functions, society)
- Clarify the difference of AEU and risk

Communication

- Do executives use different types of information on uncertainty (AEU, PEU) for different purposes like scanning, decision making, control and evaluation?
- How do external stakeholders (define and) communicate uncertainty, e.g., shareholders, banks, analysts or rating agencies?

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