

Production Portfolio Theory - Risk Evaluation and a New Industrial Application (IA)

Production
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Evaluation
and a New
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Application
(IA)

B. Heiden &
B.
Tonino-Heiden

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Results,
Limits,
Conclusions
and Outlook

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Introduction

Motivation and Introduction:

- Portfolio theory Markowitz
- Production portfolio theory [HT23a; HT23b]
- Sustainability in production
- Improve and systematize risk consideration

Method and Goal:

- Use production portfolio theory
- First industrial application

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Production Portfolio Theorie Application

Production Portfolio Theory Application I

Scenarios	Probability
Scenario 1 - linear extrapolation	10
Scenario 2 - moderate growth	50
Scenario 3 - green deal	10
Scenario 4 - perpetual crisis	20
Scenario 5 - global stability	10

Figure 1: Risk matrix (slightly pessimistic). The scenarios (SC) are given by an overall hypothesised economic growth, calculated by the DCF method.

Production Portfolio Theory Application II

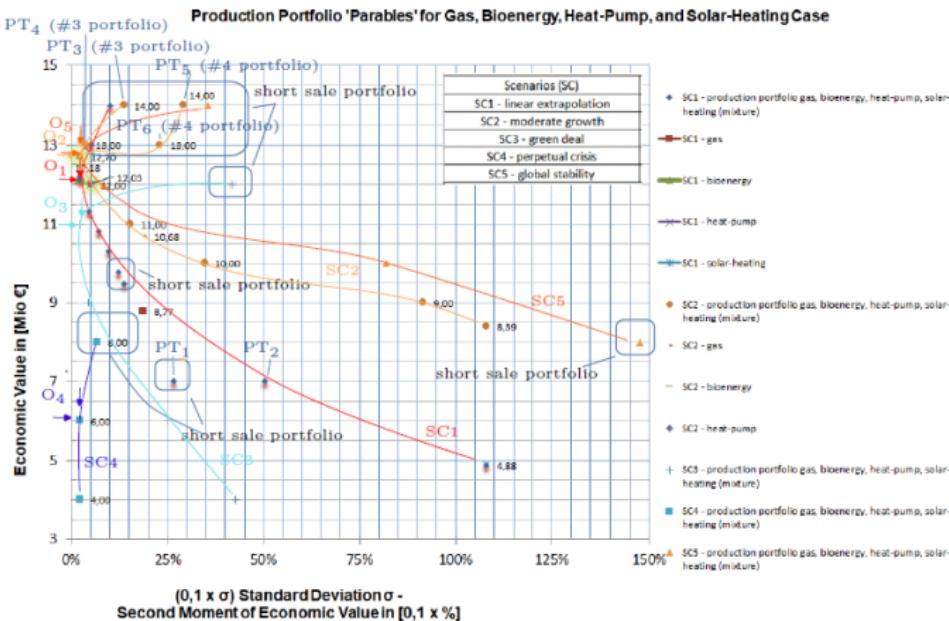


Figure 2: Production portfolios of all scenarios (SC) and all investment variants under IA of the above-given risk in Figure 1.

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Conclusion and Outlook

Results/Methodology I

- Theoretic/Methodical: Two types of risk considered
- Practical/Computational: Scenarios defined as growth rates → DCF project values
- Numerical/Computational: With risk-weighted project values, according to the risk matrix in Figure 1, the normal distribution is fitted, yielding two dimensions, return and risk, for (a) each investment case and (b) the scenarios
- Practical/Computational: Production investment project-value → 'market' → parable-like shapes for each scenario (limited by real possible solutions) → solution is weighted combination of technical options (e.g. fraction of heat pump, bio gas, solar thermal in 'production portfolio')
- Practical/Managerial: Investment decision based on optimal ratio or fraction

Results, Limits, Conclusions and Outlook

Results and Limits:

- Result: Practical method → quantifies risk systematically
→ applied to industrial case
- Limits:
 - (1) According to portfolio theory (e.g. normal distribution)
 - (2) practical infeasibility of technical combinations (e.g. dilemmas)
 - (3) Future risk prediction → AI

Conclusion:

- New method & application that allows for explicit economic risk calculation & evaluation for the first time

Outlook:

- Dynamic risk consideration
- Include, integrate, combine AI for risk prediction
- New world applications

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Thank you cordially for your attention!



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PS.: The presentation can later also be found at:

<http://www.dr-heiden.com/Vortraege.htm>

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