MEASURING REAL ESTATE RISK

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1. What are the most important real estate risks and the best measures for them?
2. Example for measuring a real estate risk
3. Conclusion
WHAT ARE THE MOST IMPORTANT REAL ESTATE RISKS? WHAT DOES THE RESEARCH SAY?

A general answer is not possible because ...

- ...risks are not clearly defined
  e.g., the risk of construction cost overruns can also be employee risk (cause: incorrect planning) or the risk of fluctuating prices

- ...risks are situation-dependent
  e.g., in a down market vacancy is a risk, in an up market it is not

- ...are perceived differently from person to person
  e.g., a pessimistic person regards a probability of 80% as high, an optimistic person sees it as a 20%-opportunity

- ...risks usually occur together with others
  e.g., the tenant default risk often goes hand in hand with the rent default risk and the vacancy risk

- ...there are different ways to measure risks
WHAT ARE THE BEST MEASURES FOR REAL ESTATE RISK? WHAT DOES THE RESEARCH SAY?

Again, a general answer is not possible because the risk measure has to fit what you want to measure.

Examples:

- Tenant default → Probability of default → Rating grade
- Change in market prices → Fluctuation → Volatility/Variance
- Vacancy risk → Expected point in time when lease contracts will end → Weighted average remaining lease term (WALT)
1. What are the most important real estate risks and the best measures for them?

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EXAMPLE: COST OVERRUN RISK

Case: A developer plans to build a warehouse for US$1 million, fully financed with a bank loan. Company reserves are $0.6 mn.

One possible cause: insolvency of the construction company

One common risk: cost overruns

One possible consequence: existence of the development company is threatened
Central question: How severe is the risk?

a) Negligible (0-10%, the risk disappears in the project budget)
b) Significant (11-20%, risk reduces the return on investment)
c) Serious (21-60%, the risk can be covered by the reserves)
d) Critical (>60%, the risk is higher than the reserves)

More precisely: **How much money do I need to cover the risk?**
QUALITATIVE RISK MEASUREMENT

1: Scoring → suitable for risks that are difficult to express in numbers or for which there is not enough data; not readily suitable for producing a number

Dependent variable: Cost overrun

Independent variables: Contractors (proxy: reputation), building material costs (proxy: cost index increase), complexity (proxy: total costs)

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>Weight</th>
<th>Partial Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reputation</td>
<td>3 (good)</td>
<td>30%</td>
</tr>
<tr>
<td>Index</td>
<td>8 (very high)</td>
<td>20%</td>
</tr>
<tr>
<td>Total costs</td>
<td>2 (low)</td>
<td>50%</td>
</tr>
<tr>
<td>Score</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Scale: 1-2 = negligible, 3-5 = significant, 6-8 = serious, 9-10 = critical

Result: The project has a significant risk; costs may be 11-20% higher than expected
2: Estimate/guess the expected value → Safety illusion
3: Worst / Most Likely / Best Case Scenario → Overestimation of extreme events, underestimation of surprising events

Best Case: $0.2 \text{ mn less}$

Range: $\$0.9 \text{ mn}$

Worst Case: $\$0.7 \text{ mn more}$
QUANTITATIVE RISK MEASUREMENT

4: Scenario analysis with subjective probabilities → closer to reality

Slight under- or overrun:
20% probability each

Serious overrun:
20% total probability

Best Case:
5% probability

Worst Case:
5% probability
4: Scenario analysis with subjective Probabilities → closer to reality

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Probability</th>
<th>Result ($ mn)</th>
<th>Expected value ($ mn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best case</td>
<td>5%</td>
<td>0.8</td>
<td>0.04</td>
</tr>
<tr>
<td>Slightly lower</td>
<td>20%</td>
<td>0.9</td>
<td>0.18</td>
</tr>
<tr>
<td>Base case</td>
<td>30%</td>
<td>1.0</td>
<td>0.30</td>
</tr>
<tr>
<td>slightly higher</td>
<td>20%</td>
<td>1.1</td>
<td>0.22</td>
</tr>
<tr>
<td>much higher</td>
<td>20%</td>
<td>1.4</td>
<td>0.28</td>
</tr>
<tr>
<td>Worst case</td>
<td>5%</td>
<td>1.7</td>
<td>0.09</td>
</tr>
</tbody>
</table>

Realistic expected value: $1.1 mn
Expected damage value: $0.59 mn

1.2 mn < cost < 1.7 mn

100%
5: Calculating with probability distributions → even closer to reality and further insights into the risk

Curtosis: concentration on the centre

Tails: probability of outliers

Skewness: most frequent value ≠ expected value
QUANTITATIVE RISK MEASUREMENT

6: Monte Carlo Simulation
→ mapping of reality

1st spin: $1.03 mn
2nd spin: $1.29 mn
3rd spin: $0.95 mn
MONTE CARLO SIMULATION

323 scenarios
MONTE CARLO SIMULATION

How high is the risk of a serious cost overrun (> $0.2 mn)?

Answer: \( \frac{84}{323} = 26\% \)
What costs (in $) do I have to bear in the rare 1%-case, i.e. once per hundred such investments?

Answer:

$1.6 \text{ mn} = \text{Value at Risk (VaR)}
What **loss** (in $) do I have to bear beyond that, i.e. when my reserve is used up?

**Answer:**

- **Conditional Value at Risk (CVaR):** $0.1 mn
- **VaR (Sim. worst case):** $1.6 mn
- **Sim. worst case:** $2.0 mn
The developer faces a significant risk of cost overrun (scoring), mainly resulting from price increases of building material. The outcome can be expected to be between $-0.2 and $0.7 mn (range), most likely $0.1 mn (scenario). The developer should have reserves of $0.6 mn to cover the cost that will occur with 99% probability (VaR). Furthermore, it would be wise to hold excess capital of $0.1 mn to avoid going bankrupt in the remaining 1%-case (CVaR).
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CONCLUSION

There is no certainty in an uncertain world
→ get away from investment calculations with pseudo-accurate estimates, strive for a true risk assessment with scenarios/simulations!

The greatest risk is not to measure risks
→ get away from risk ignorance, strive for explicit risk measurement as the basis for calculating risk-bearing capacity and risk provisions

Risks can be (and should be) measured in different ways, there is no best or universal indicator → overview is important

Users differ in their requirements, preferences, knowledge, etc.
→ important for the selection: Which measures do I understand? Which ones do I trust? Which ones do experts recommend?

Risk measurement is only a tool and does not prevent wrong decisions. But it does prevent us from being unprepared!
→ „Invest in preparedness, not in prediction“ (Nassim Taleb)
SELECTED REFERENCES


PERSONAL INFORMATION

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CURRICULUM VITAE
2008–today  Full professor of real estate, esp. real estate banking,
Nürtingen-Geislingen University, Geislingen
1998–2005  Management consultant, Oliver Wyman, Munich
1994–1998  Teaching and research assistant, Chair of banking, Hohenheim University, Stuttgart;
doctoral dissertation on "The Real Estate Market Risk of German Banks"
1989–1993  Studies in business administration and economics (Hohenheim University) and Finance
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1986–1989  Trainee, Westdeutsche Landesbank, Dortmund and Tokyo

OTHER ACTIVITIES
Honorary professor, University of Cape Town, Department of Construction Economics & Management
Lectureships at several institutions of higher education
Society of Property Researchers (gif), co-chair competence group on real estate risk management,
Management consultant with a focus on real estate risk management and -portfolio management for
companies in the real estate and financial sector