MEASURING REAL ESTATE RISK

CARSTEN LAUSBERG,
MASTER CLASS AT THE UNIVERSITY OF NAIROBI
12TH SEPTEMBER 2023
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 $\rightarrow$ Probability of default $\rightarrow$ Rating grade
• Change in market prices $\rightarrow$ Fluctuation $\rightarrow$ Volatility/Variance
• Vacancy risk $\rightarrow$ Expected point in time when lease contracts will end $\rightarrow$ Weighted average remaining lease term (WALT)
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
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><strong>Score</strong></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
QUANTITATIVE RISK MEASUREMENT

2: Estimate/guess the expected value → Safety illusion

Probability

100%

$0

$1 mn

Costs
QUANTITATIVE RISK MEASUREMENT

3: Worst / Most Likely / Best Case Scenario →
Overestimation of extreme events, underestimation of surprising events

Probability

100%

50%

25%

0%

Best Case: $0.2mn less

Range: $0.9 mn

Worst Case: $0.7 mn more
1.7 mn

1.2 mn < cost < 1.7 mn

0.8 mn

1 mn

1.7 mn

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 \(\rightarrow\) closer to reality
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
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
6: Monte Carlo Simulation

→ mapping of reality

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

323 scenarios
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?

Anwer:

$1.6 \text{ mn} = \text{Value at Risk (VaR)}$
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
$1.6$ 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).
CONTENT

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
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

CONTACT
Dr Carsten Lausberg
Nürtingen-Geislingen University
Parkstraße 4, 73312 Geislingen, Germany
Phone +49 17 18 17 66
carsten.lausberg@hfwu.de
www.hfwu.de/lausberg

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
            (Texas A&M University)
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