

MEASURING REAL ESTATE RISK

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MASTER CLASS AT THE UNIVERSITY OF NAIROBI
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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**

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.

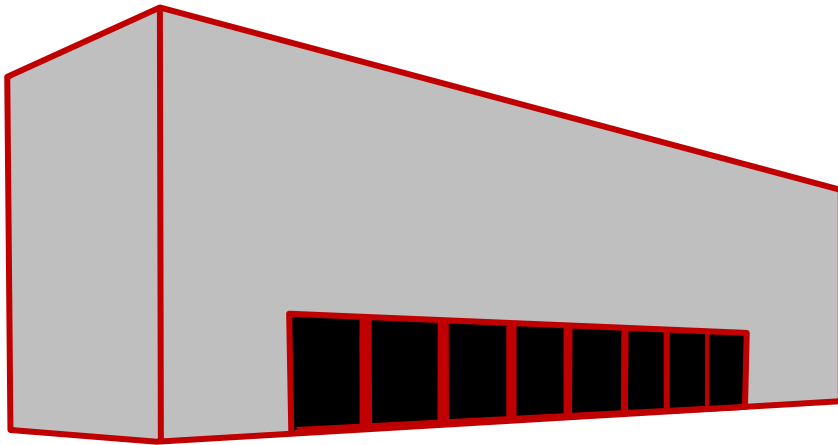
Examples:

- 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)

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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.

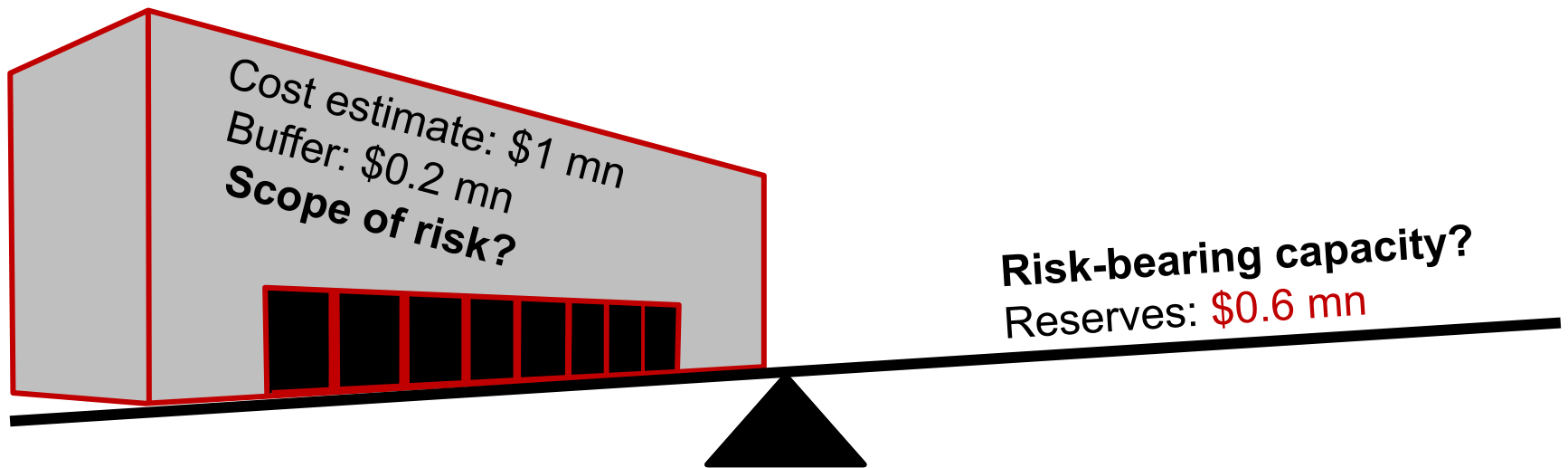
One possible cause: insolvency of the construction company



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)

	Evaluation	Weight	Partial Score
Reputation	3 (good)	30%	0.9
Index	8 (very high)	20%	1.6
Total costs	2 (low)	50%	1.0
Score			3.5

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

Probability

100%

2: Estimate/guess the expected value
→ Safety illusion

0%

\$0

\$1 mn

Costs



QUANTITATIVE RISK MEASUREMENT

Probability

100%

50%

25%

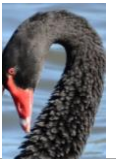
0%

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

0.8
mn

1
mn

1.7
mn



Best Case:
\$0.2mn less

Range:
\$0.9 mn

Worst Case:
\$0.7 mn more



QUANTITATIVE RISK MEASUREMENT

Probability

100%

4: Scenario analysis with subjective probabilities → closer to reality

Slight under- or overrun:
20% probability each

Serious overrun:
20% total probability

50%

30%

20%

0%

0.8
mn

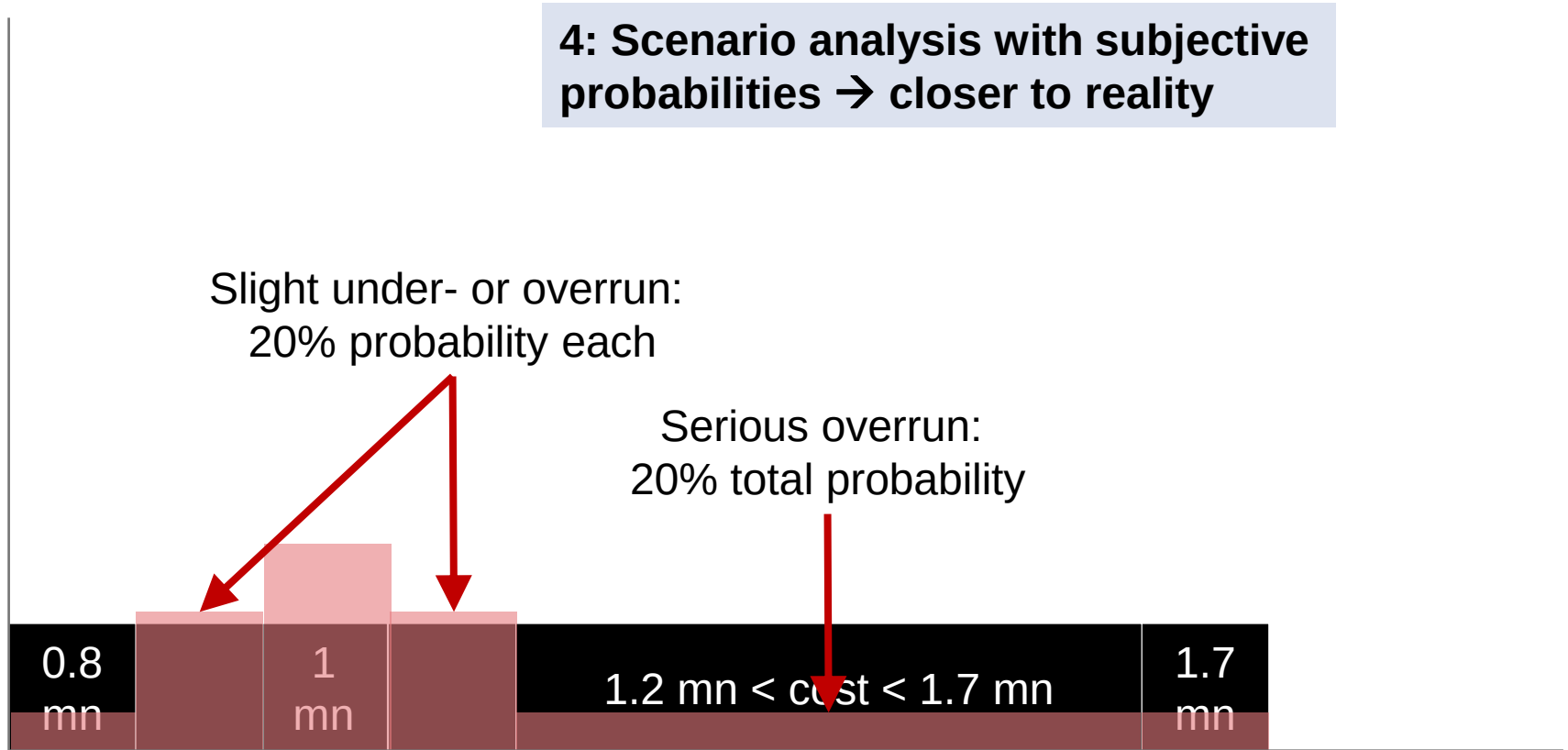
1
mn

1.2 mn < cost < 1.7 mn

1.7
mn

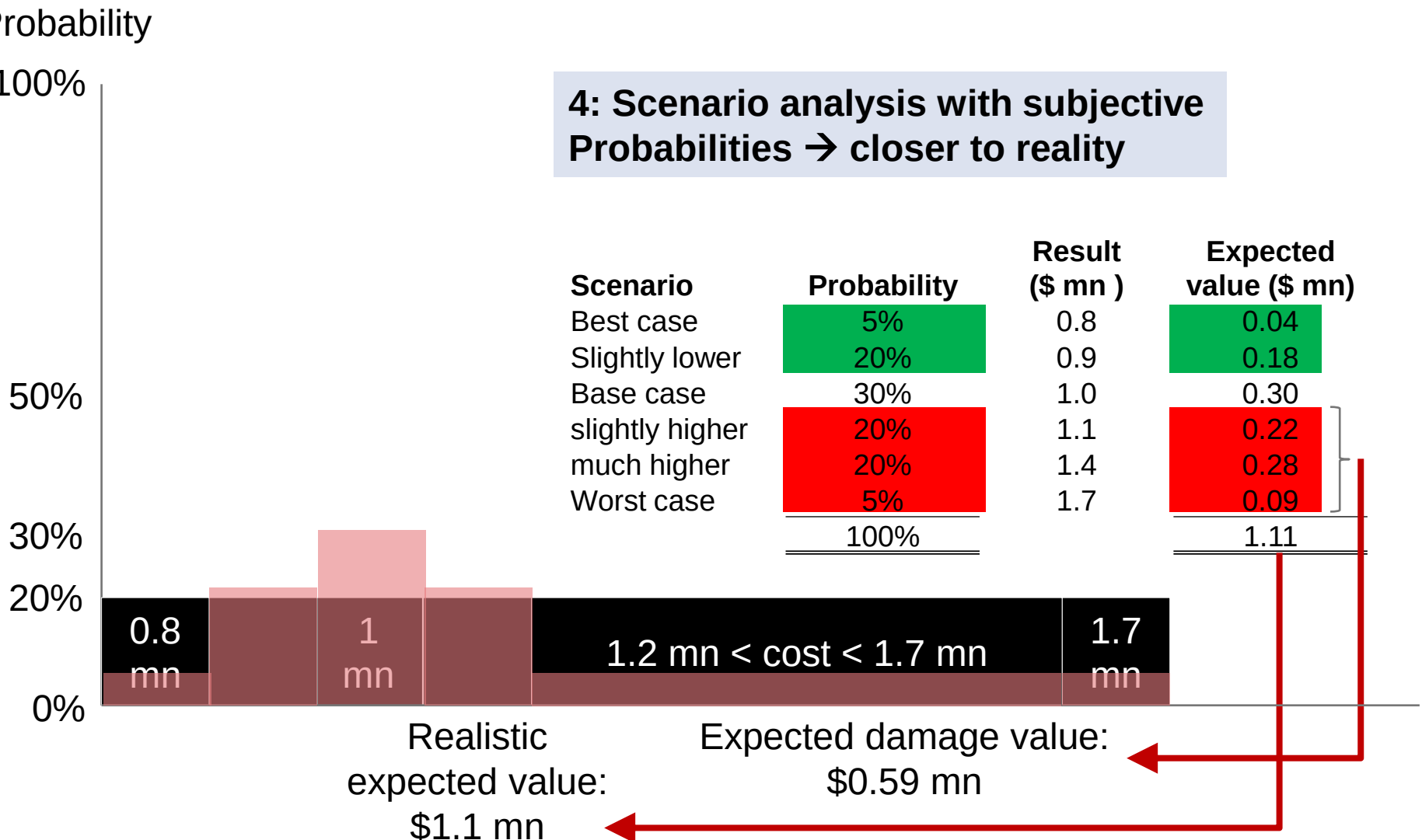
Best Case:
5% probability

Worst Case:
5% probability



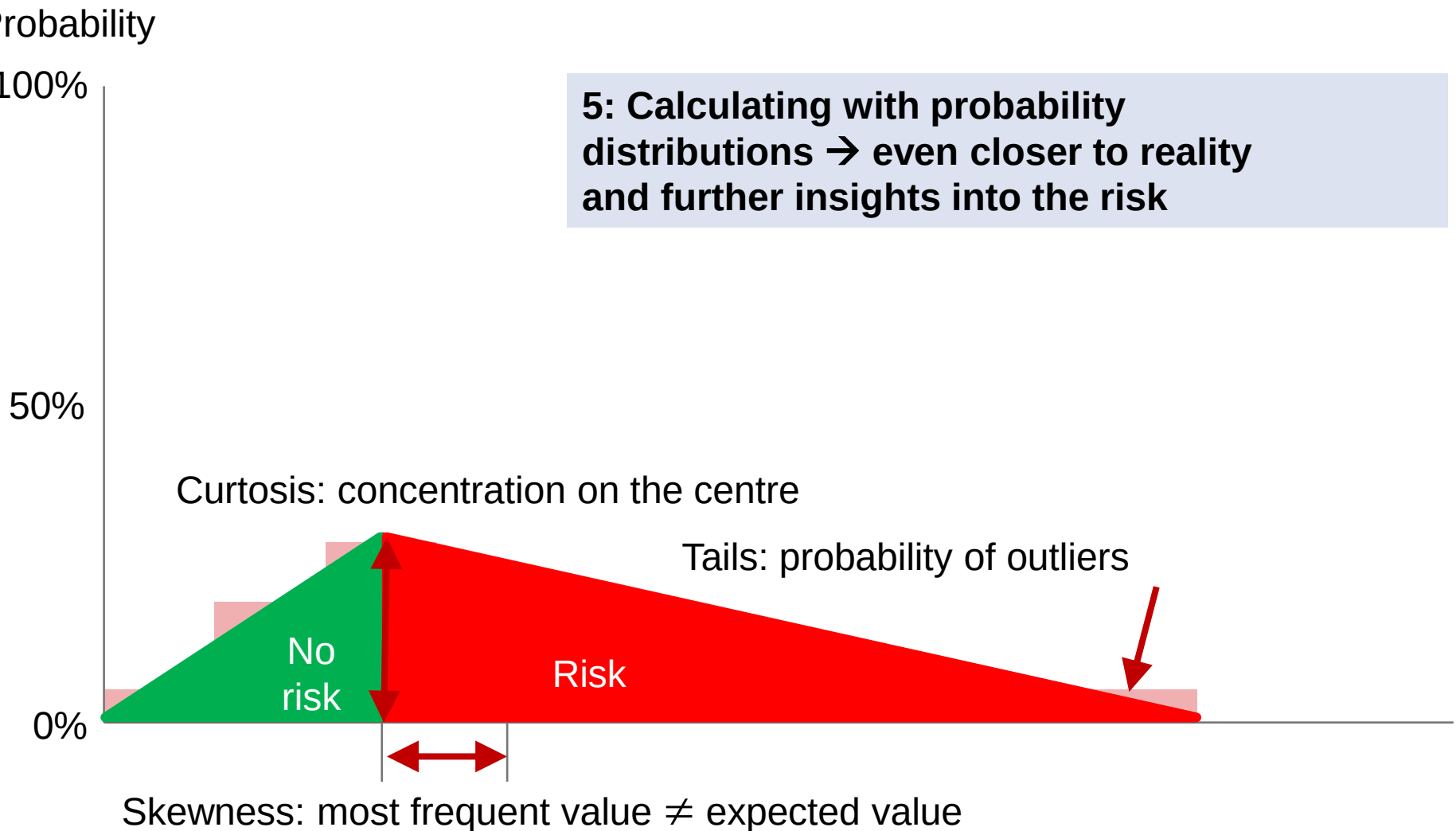
QUANTITATIVE RISK MEASUREMENT

4: Scenario analysis with subjective Probabilities → closer to reality



QUANTITATIVE RISK MEASUREMENT

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



QUANTITATIVE RISK MEASUREMENT

Probability

100%

50%

0%

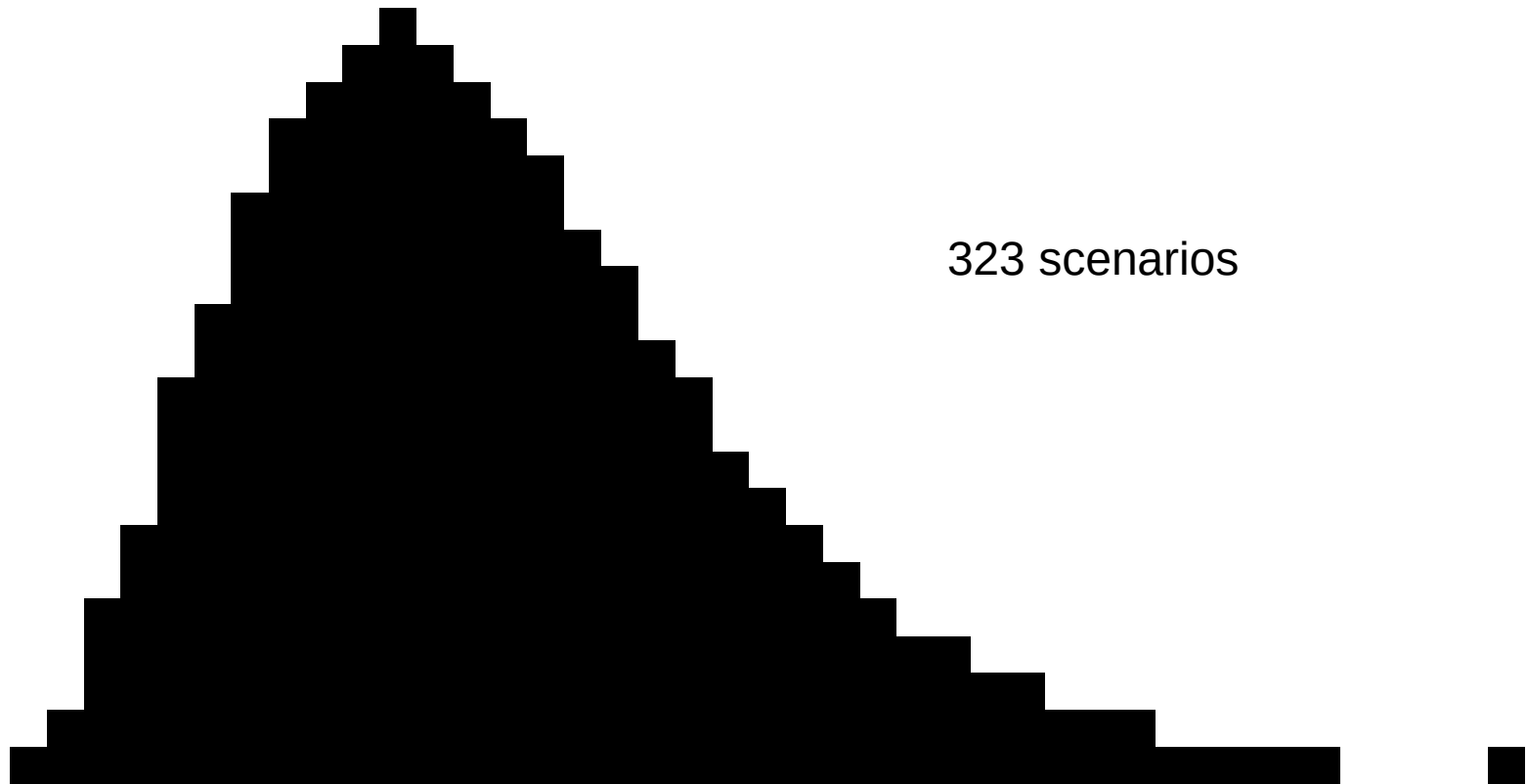
6: Monte Carlo Simulation
→ mapping of reality



1st spin: \$1.03 mn
2nd spin: \$1.29 mn
3rd spin: \$0.95 mn



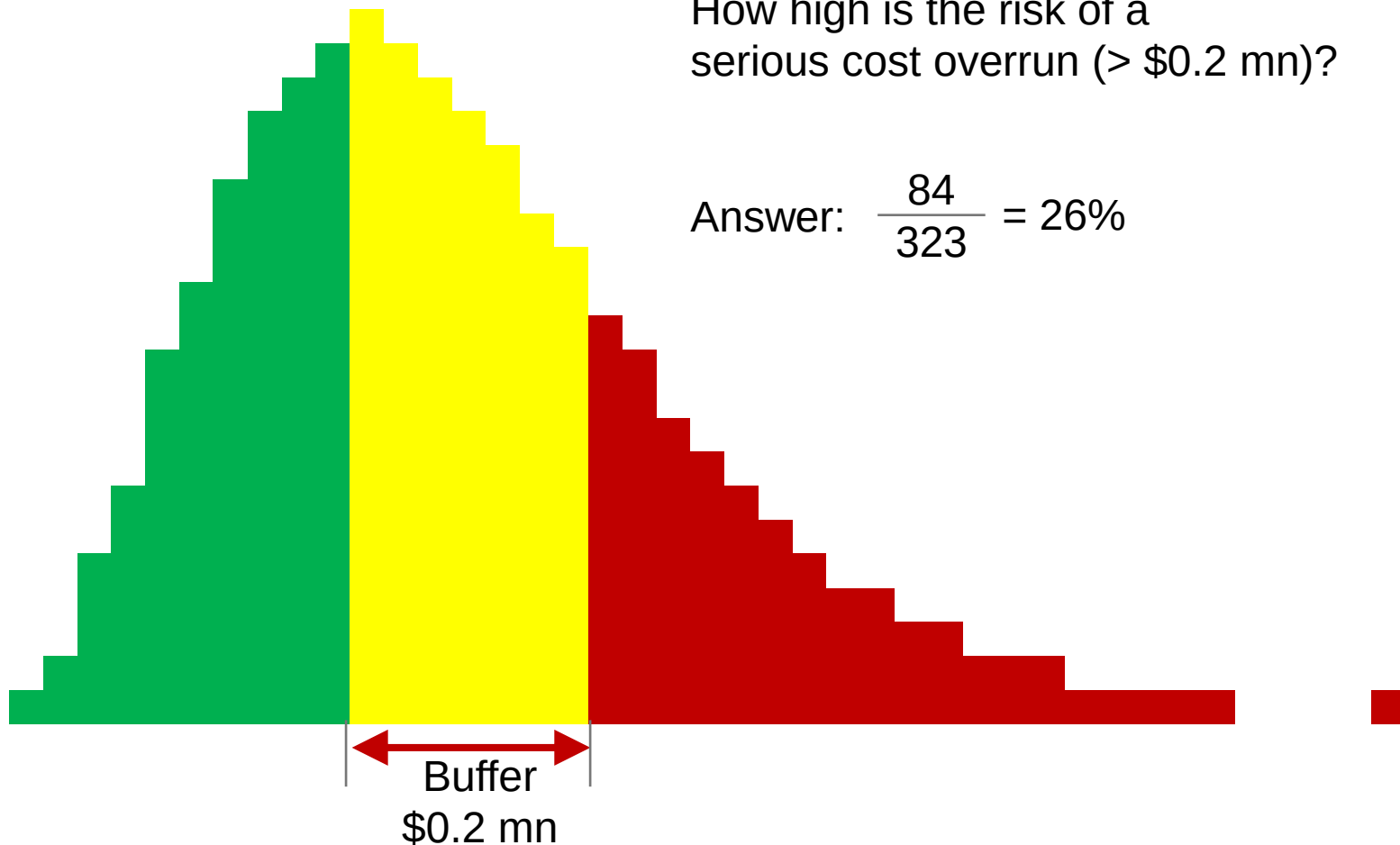
MONTE CARLO SIMULATION



MONTE CARLO SIMULATION

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

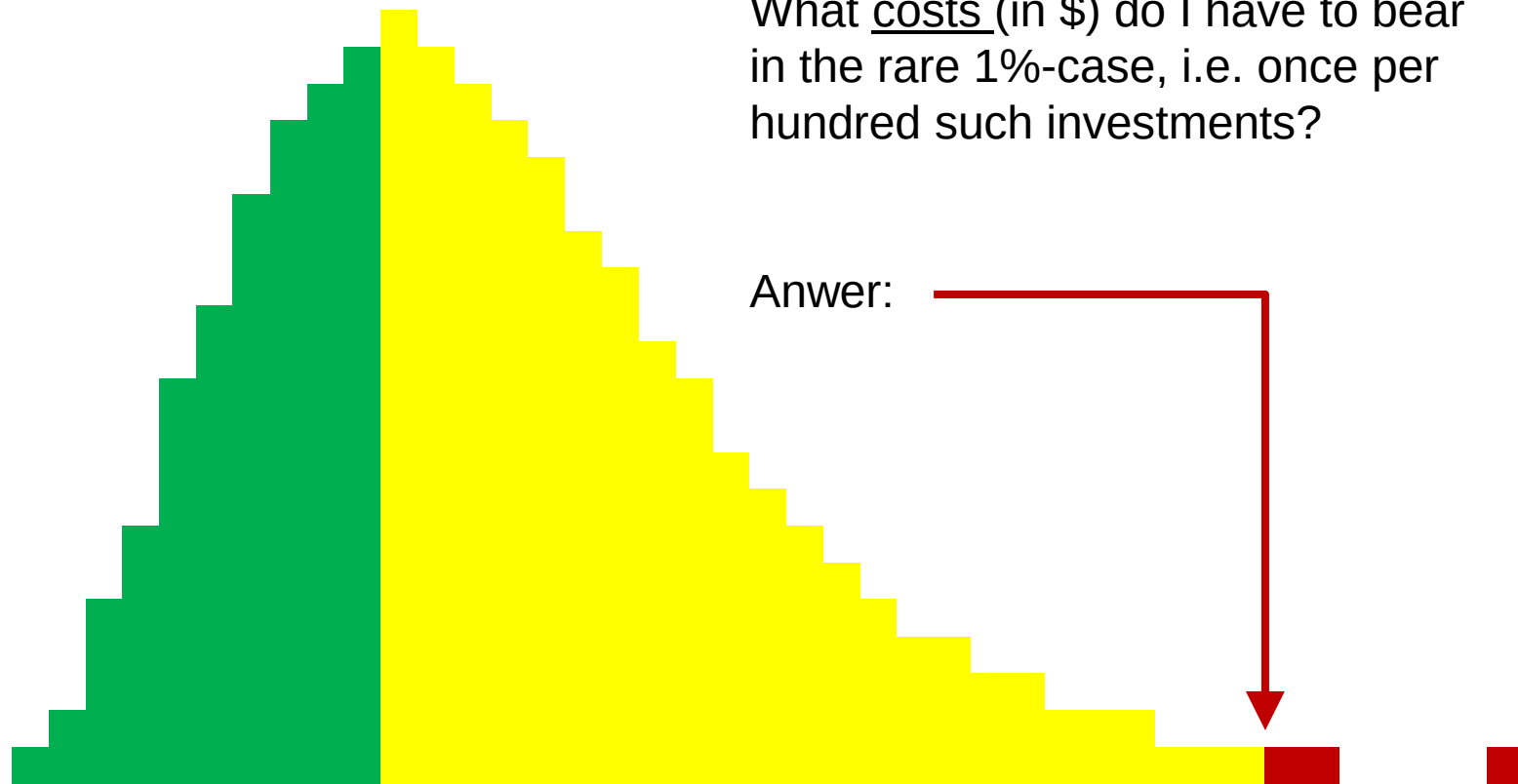
Answer: $\frac{84}{323} = 26\%$



MONTE CARLO SIMULATION

What costs (in \$) do I have to bear
in the rare 1%-case, i.e. once per
hundred such investments?

Answer:



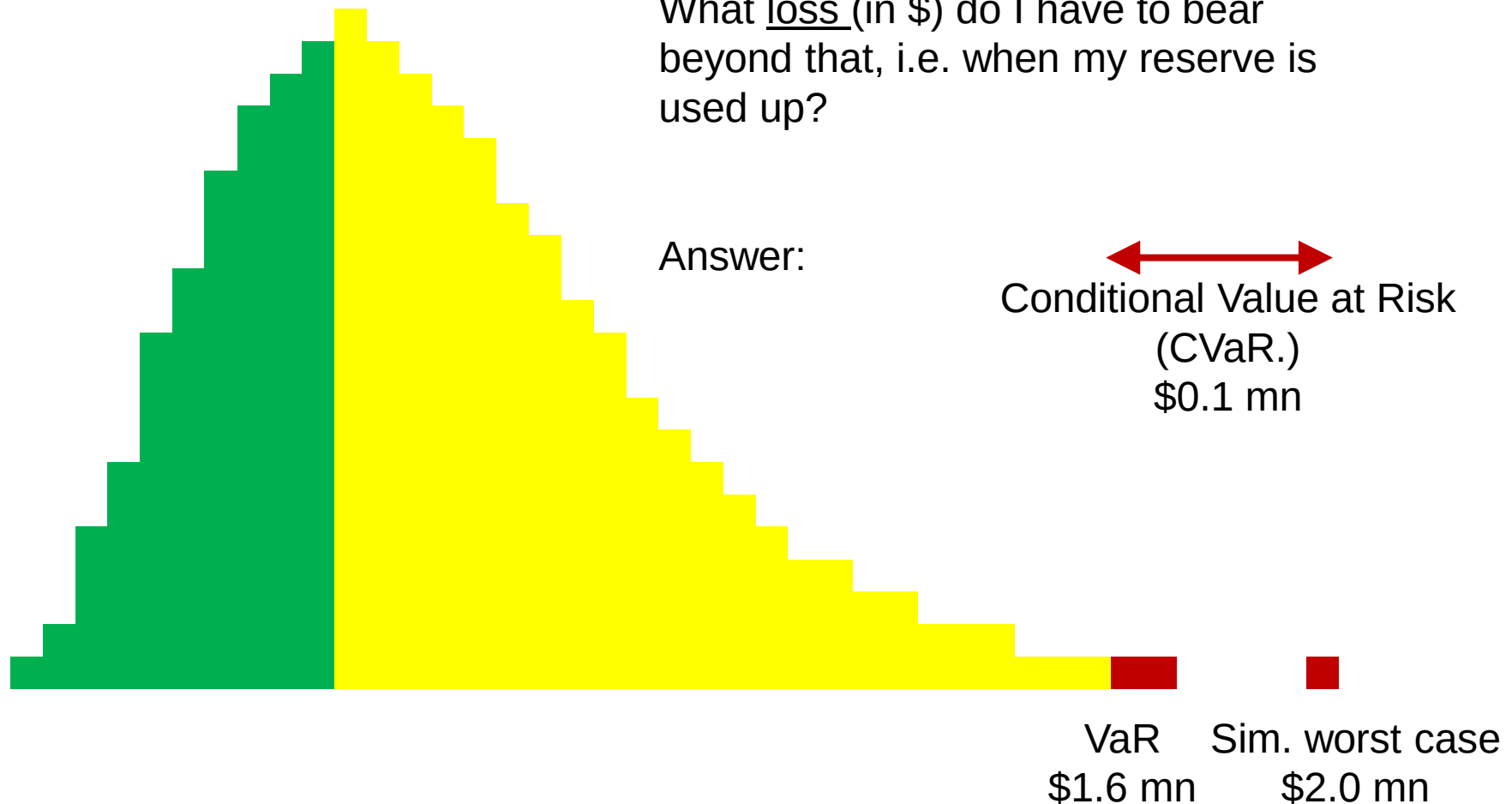
\$1.6 mn
= Value at Risk (VaR)

MONTE CARLO SIMULATION

What loss (in \$) do I have to bear beyond that, i.e. when my reserve is used up?

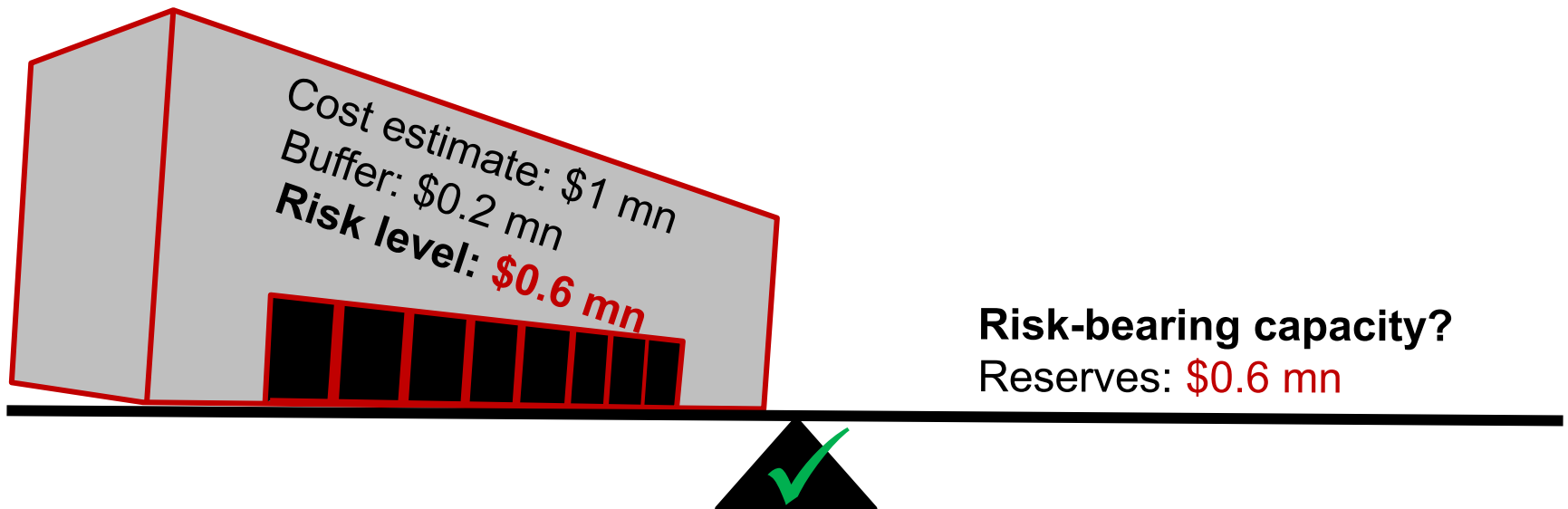
Answer:

Conditional Value at Risk
(CVaR.)
\$0.1 mn



FINAL RESULT

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?

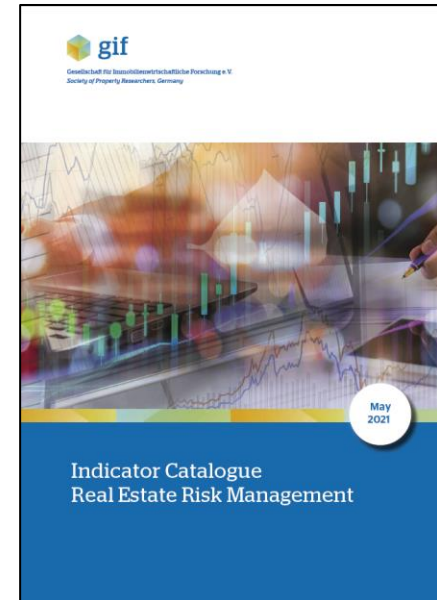
Risk measurement is only a tool and does not prevent wrong decisions. But it does prevent us from being unprepared!

→ „Invest in preparedness, not in prediction“ (Nassim Taleb)

SELECTED REFERENCES

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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
(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
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