

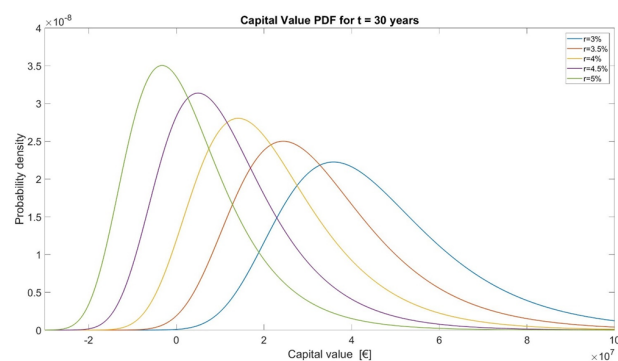
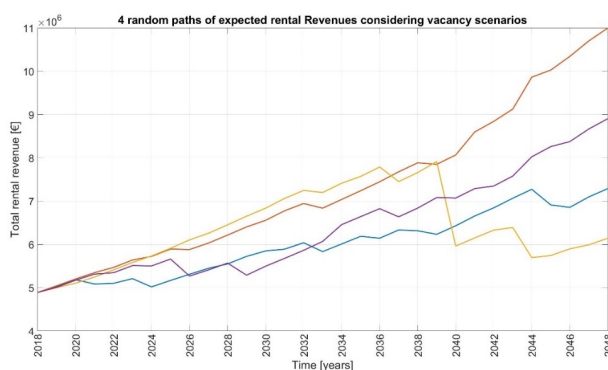
MSc thesis

Stochastic Discounted Cash Flow Analysis for Valuation of a Commercial Real Estate Investment

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Background

Taking a different approach from the deterministic discounted cash flow analysis for the valuation of commercial real estate investments, this thesis focused on the development of a probabilistic model that considers the inherent uncertainty of the market and of the future cash flows of the investment. The resulting valuation method defines the value of the property asset, its amortization period and the profit after selling with probabilities rather than with fixed values. Until now, valuation methods have insufficiently integrated risk analysis. This work therefore illustrates how the incorporation of risk assessment and risk analysis contributes to the creation of more robust valuation methods.



*Left: Simulated rental revenue over the duration of the investment, considering market and vacancy risks.
Right: Resulting probability distributions for the value of the commercial real estate asset at the end of the investment period.*

Methodology

This work is based on the commercial real estate market data of Munich. A linear regression analysis defined the relationship between the factors of demand and supply and the average market rent. Using this model and geometric Brownian motion, the future average rent is simulated, with which the future rental revenues of an investment are simulated. Operative costs representing the outflows are modelled with the help of stationary random processes and vacancy risk is modelled applying the concept of availability.

Conclusion

The stochastic discounted cash flow analysis associates the value of the asset, the payback period and the profit with probabilities. For each discount rate scenario and year of investment, a probability distribution describes the value of the asset and the payback period. In contrast to its deterministic counterpart, this valuation approach provides more flexibility and is more informative regarding the potential risks and opportunities of the investment.