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Complete Financial Plans as a Way to Determine Returns and Terminal Values of Property Investments

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Keywords: Terminal Value, Property Investment Analysis,
Residential Property, Complete Financial Plans

Case Study (Simple Assumptions)

- Apartment (floor space 71 qm)
in Hamburg

- Cash Flows

+ Rental Income	p.a.	15.553,00
- non transferable operating cost	p.a.	1.327,00
= Cash Flow	p.a.	14.226,00

- Capital invested

349.440,00

Simple enough for DCF?

(you only need the term and the discount rate)



Case Study (Full Data 1)

Apartment in the suburb of major German City with parking space

Ready for use: 31.10. year t_0

Buying Date: 1. December year t_0

First month of renting: January year t_1

Planned date of sale: 31. December year t_{12}

Rate of inflation: 2 % p.a.

Monthly rental income in t_1:	per month	DM	1,296.08
	per year	DM	15,553.00
(rental growth about the rate of inflation, meaning 2 % p.a.)			

operating cost:			
management fee t_1:	p.a.	DM	475.00
(assumption of 2% increase per year)			

Maintenance:	t_1 till t_5	per month	DM	71.00
		per year	DM	852.00
	t_6 till t_{12}	per month	DM	106.50
		per year	DM	1,278.00

expected appreciation in value of the apartment: 2 % p.a.

Case Study (Full Data 2)

Capital Investment

1.	<i>Purchase price</i>		
	price for land	57,600.00	
	price for building	262,400,00	
	sum		320,000.00
2	<i>Other charges:</i>		
	Brokerage fee	14,400.00	
	Legal Charges		
	and Property tax	15,040.00	
	sum		29,440.00
	Total capital investment		349,440.00

Case Study (Full Data 3)

Financing

1. Mortgage

Face Value of debt	310,000.00	
Discount (9.2%) (payable at the December of t_0) payment	28,520.00	
		281,480.00

Take up date of mortgage :	1. December of year t_0
Nominal interest rate:	4.00 %
Term of a loan:	12 years
Interest rate fixing period:	10 years
Calculation per:	end of period
Effective interest rate:	5.38 %
Interest rate in t_{11} and t_{12} :	7.5 %

Fixed payment loan with 1 % starting amortisation

2. Equity	67,960.00
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Total capital investment	349,440.00
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Case Study (Full Data 4)

Alternative investment

Purchase of a government bond

Interest rate 4.5 %
Term 10 years

Continued investment

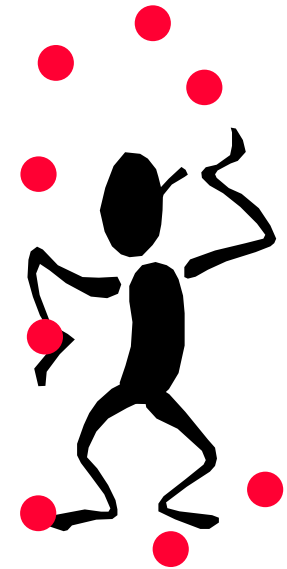
Interest rate 3.5 %
Term 2 years

Assumption: all income is taxable

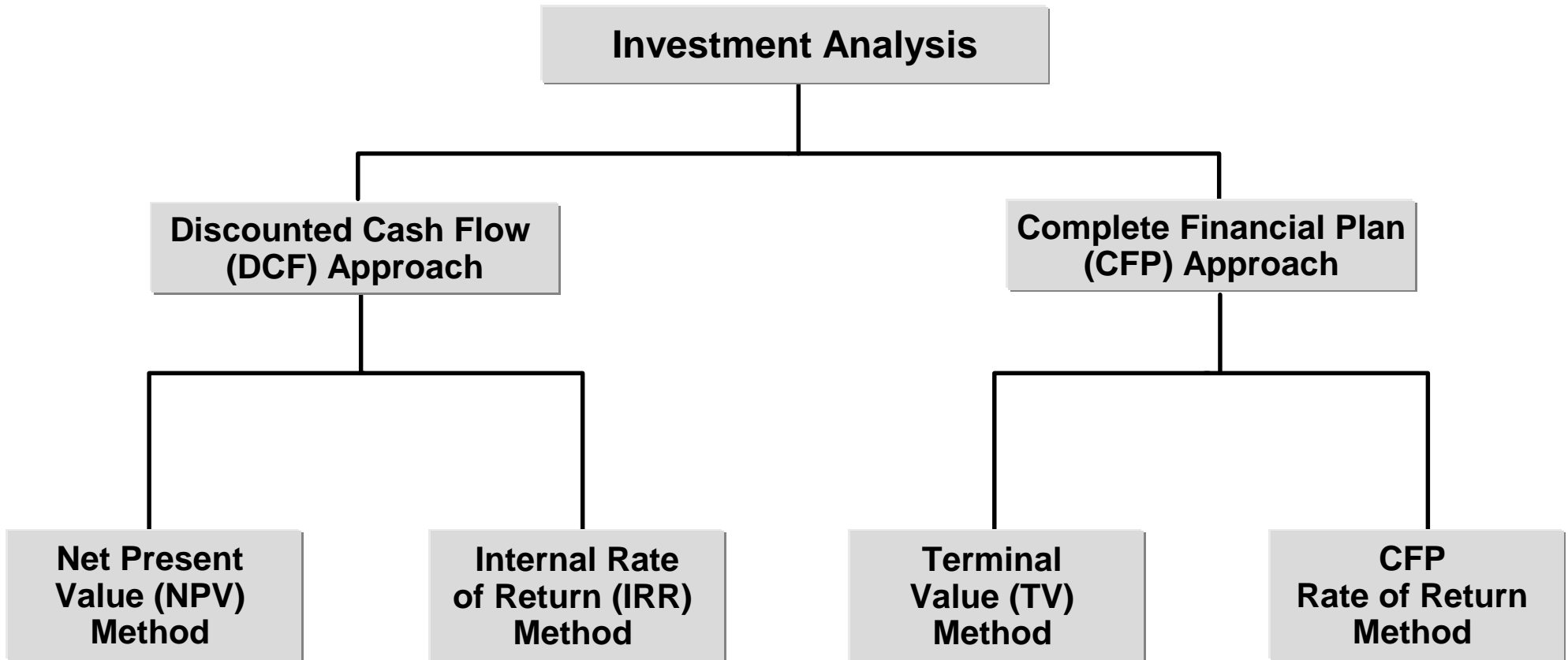
Reinvestment assumption

All income can be reinvested at the certificate of deposit rate of 3.5% per year

May be not simple enough after all?



Investment Analysis Methods



Payments related to a property investment

Direct payments

Initial capital investment at time 0 (cf_0)

Estimated cash flows in period t (cf_t)

Sale price of asset at the end of projection period (cf_n)

Indirect payments

Use of free liquidity from project

Financing of liquidity gaps

Income and asset taxes

Terminal Value Method

- The value of an asset at the end of an investment period (n) is considered the terminal value (TV). For an investment decision, the terminal value of a property investment TV_n^P can be compared to the terminal value of a financial investment TV_n^F . The property investment is more favourable if:

$$TV_n^P > TV_n^F$$

P=Property investment; F=Financial investment

- The property investment is more (less) favourable if the terminal value of the property investment TV_n^P is higher (lower) than the terminal value of the financial investment TV_n^F . If $TV_n^P = TV_n^F$ the alternatives are equally favourable.
- The most favourable property investment of different investment alternatives has the highest terminal value.

Complete Financial Plan for an apartment investment before tax

	t ₀	t ₁	t ₂	t ₃	t ₄	t ₅	t ₆	t ₇	t ₈	t ₉	t ₁₀	t ₁₁	t ₁₂
Direct Payments													
Capital investment	-349.440												
Rental income		15.553	15.864	16.181	16.505	16.835	17.172	17.515	17.866	18.223	18.587	18.959	19.338
Operating cost		-1.327	-1.337	-1.347	-1.357	-1.367	-1.803	-1.814	-1.825	-1.836	-1.847	-2.284	-2.296
Net cash flow		14.226	14.527	14.834	15.148	15.468	15.369	15.701	16.041	16.387	16.740	16.675	17.042
Sales Price													405.837
Indirect Payments													
Face Value of Mortgage	310.000												
Discount	-28.520												
Equity	67.960												
Interest on debt	-1.033	-12.400	-12.276	-12.147	-12.013	-11.873	-11.728	-11.578	-11.421	-11.257	-11.088	-20.459	-20.254
Amortisation		-3.100	-3.224	-3.353	-3.487	-3.627	-3.772	-3.922	-4.079	-4.243	-4.412	-2.728	-270.053
Repayment of reinvestment		-1.033	-2.344	-3.398	-4.183	-4.682	-4.877	-5.179	-5.159	-4.799	-4.081	-2.983	-9.599
Interest on reinvestment		-36	-82	-119	-146	-164	-171	-181	-181	-168	-143	-104	-336
Reinvestment	1.033	2.344	3.398	4.183	4.682	4.877	5.179	5.159	4.799	4.081	2.983	9.599	0
Terminal Value	0	0	0	0	0	0	0	0	0	0	0	0	122.638
Outstanding Debt	310.000	306.900	303.676	300.323	296.836	293.209	289.438	285.515	281.436	277.193	272.781	270.053	0

Face interest rate mortgage	4%	4,0%	4,0%	4,0%	4,0%	4,0%	4,0%	4,0%	4,0%	4,0%	4,0%	4,0%	7,5%	7,5%
Reinvestment interest rate	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%
Increase in rental income and operating costs	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%
Appreciation of apartment	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%

CFP RoR Property Investm.	5,04%
CFP RoR Financial Investm.	4,19%
Difference in Terminal Values	11.404,78

Complete Financial Plan for a financial investment before tax

	t ₀	t ₁	t ₂	t ₃	t ₄	t ₅	t ₆	t ₇	t ₈	t ₉	t ₁₀	t ₁₁	t ₁₂
Direct Payments													
Capital investment	-67.960												
Interest income		3.058	3.058	3.058	3.058	3.058	3.058	3.058	3.058	3.058	3.058		
Principal repayment											67.960		
Indirect Payments													
Equity	67.960												
Tax payment	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment reinvestment		0	3.058	6.223	9.499	12.890	16.399	20.032	23.791	27.682	31.709	103.837	107.471
Interest from reinvestment		0	107	218	332	451	574	701	833	969	1.110	3.634	3.761
Reinvestment	0	-3.058	-6.223	-9.499	-12.890	-16.399	-20.032	-23.791	-27.682	-31.709	-103.837	-107.471	0
Interest income f. principal Investment	0	3.058	3.058	3.058	3.058	3.058	3.058	3.058	3.058	3.058	3.058	0	0
Interest income f. reinvestment	0	0	107	218	332	451	574	701	833	969	1.110	3.634	3.761
Earnings before tax	0	3.058	3.165	3.276	3.391	3.509	3.632	3.759	3.891	4.027	4.168	3.634	3.761
Tax	0	0	0	0	0	0	0	0	0	0	0	0	0
Terminal Value	0	0	0	0	0	0	0	0	0	0	0	0	111.233
Tax Rate	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Reinvestment interest rate	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%

CFP-Rate of Return

- The CFP-rate of return reflects the interest rate with which the invested equity is compounded to its capital value:

$$EQ_0 \times (1 + r_{cfp})^n = TV_n$$

$$r_{cfp} = \sqrt[n]{\frac{TV_n}{EQ_0}} - 1$$

where:

EQ_0 = initial equity,

TV_n = terminal value at n-th period,

n = investment horizon,

r_{cfp} = CFP-rate of return.

Case Study (Full Data 5) Taxation Details

The capital investment can be divided as follows:

	Building	Land
Purchase Price	262,400	57,600
Legal charges and Property tax	12,333	2,707
Brokerage fee	11,808	2,592
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Total	286,541	62,899

In Germany apartments can be depreciated according to the following schedule:

- 5.0 % for first 8 years
- 2.5 % for the following 6 years
- 1.25 % for the remaining 36 years

Even so the apartment has been bought in December, a full year depreciation can be used in the year t_0 . One month worth of interest is also set against income in that year.

The assumption calls for an investor with a tax rate of 35%.



Definitely not simple enough!

Complete Financial Plan for an apartment investment after tax

	t ₀	t ₁	t ₂	t ₃	t ₄	t ₅	t ₆	t ₇	t ₈	t ₉	t ₁₀	t ₁₁	t ₁₂
Direct Payments													
Capital investment	-349.440												
Rental income		15.553	15.864	16.181	16.505	16.835	17.172	17.515	17.866	18.223	18.587	18.959	19.338
Operating cost		-1.327	-1.337	-1.347	-1.357	-1.367	-1.803	-1.814	-1.825	-1.836	-1.847	-2.284	-2.296
Net cash flow		14.226	14.527	14.834	15.148	15.468	15.369	15.701	16.041	16.387	16.740	16.675	17.042
Sales Price													405.837
Indirect Payments													
Face Value of Mortgage	310.000												
Discount	-28.520												
Equity	67.960												
Interest on debt	-1.033	-12.400	-12.276	-12.147	-12.013	-11.873	-11.728	-11.578	-11.421	-11.257	-11.088	-20.459	-20.254
Tax payment (-) tax redemption (+)	15.358	4.200	4.009	3.812	3.607	3.396	3.326	3.103	365	157	-58	3.210	3.028
Amortisation		-3.100	-3.224	-3.353	-3.487	-3.627	-3.772	-3.922	-4.079	-4.243	-4.412	-2.728	-270.053
Repayment of reinvestment		14.325	17.752	21.410	25.305	29.446	33.840	38.219	42.861	45.267	47.895	50.754	49.229
Interest on reinvestment		501	621	749	886	1.031	1.184	1.338	1.500	1.584	1.676	1.776	1.723
Reinvestment	-14.325	-17.752	-21.410	-25.305	-29.446	-33.840	-38.219	-42.861	-45.267	-47.895	-50.754	-49.229	0
Rental Income	0	15.553	15.864	16.181	16.505	16.835	17.172	17.515	17.866	18.223	18.587	18.959	19.338
Operating cost	0	-1.327	-1.337	-1.347	-1.357	-1.367	-1.803	-1.814	-1.825	-1.836	-1.847	-2.284	-2.296
Depreciation	-14.327	-14.327	-14.327	-14.327	-14.327	-14.327	-14.327	-14.327	-7.164	-7.164	-7.164	-7.164	-7.164
Interest income	0	501	621	749	886	1.031	1.184	1.338	1.500	1.584	1.676	1.776	1.723
Interest payments	-1.033	-12.400	-12.276	-12.147	-12.013	-11.873	-11.728	-11.578	-11.421	-11.257	-11.088	-20.459	-20.254
Disagio	-28.520												
Sales price													(0)
Total book value													(0)
Earnings before tax	-43.880	-12.000	-11.455	-10.890	-10.306	-9.702	-9.502	-8.866	-1.043	-450	165	-9.171	-8.652
Tax payment	-15.358	-4.200	-4.009	-3.812	-3.607	-3.396	-3.326	-3.103	-365	-157	58	-3.210	-3.028
Terminal Value	0	0	0	0	0	0	0	0	0	0	0	0	186.552
Outstanding Debt	310.000	306.900	303.676	300.323	296.836	293.209	289.438	285.515	281.436	277.193	272.781	270.053	0

	t ₀	t ₁	t ₂	t ₃	t ₄	t ₅	t ₆	t ₇	t ₈	t ₉	t ₁₀	t ₁₁	t ₁₂
Depreciation	5,0%	5,0%	5,0%	5,0%	5,0%	5,0%	5,0%	5,0%	2,5%	2,5%	2,5%	2,5%	2,5%
Depreciation base	286.541	286.541	286.541	286.541	286.541	286.541	286.541	286.541	286.541	286.541	286.541	286.541	286.541
Book value building	272.214	257.887	243.560	229.233	214.906	200.579	186.252	171.925	164.761	157.598	150.434	143.271	136.107
Book value land	62.899	62.899	62.899	62.899	62.899	62.899	62.899	62.899	62.899	62.899	62.899	62.899	62.899
Total book value	335.113	320.786	306.459	292.132	277.805	263.478	249.151	234.824	227.660	220.497	213.333	206.170	199.006
<hr/>													
Tax rate	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%
Face interest rate mortgage	4%	4,0%	4,0%	4,0%	4,0%	4,0%	4,0%	4,0%	4,0%	4,0%	4,0%	7,5%	7,5%
Reinvestment interest rate	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%
Increase in rental income and operating costs	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%
Appreciation of apartment	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%	2,0%

CFP RoR Property Investm.	8,78%
CFP RoR Financial Investm.	2,75%
Difference in Terminal Values	92.408,95

Complete Financial Plan for a financial investment after tax

	t ₀	t ₁	t ₂	t ₃	t ₄	t ₅	t ₆	t ₇	t ₈	t ₉	t ₁₀	t ₁₁	t ₁₂
Direct Payments													
Capital investment	-67.960												
Interest income		3.058	3.058	3.058	3.058	3.058	3.058	3.058	3.058	3.058	3.058		
Principal repayment											67.960		
Indirect Payments													
Equity	67.960												
Tax payment	0	-1.070	-1.095	-1.120	-1.145	-1.171	-1.198	-1.225	-1.253	-1.281	-1.311	-1.103	-1.128
Repayment reinvestment		0	1.988	4.021	6.100	8.227	10.402	12.626	14.901	17.228	19.608	90.002	92.049
Interest from reinvestment		0	70	141	214	288	364	442	522	603	686	3.150	3.222
Reinvestment	0	-1.988	-4.021	-6.100	-8.227	-10.402	-12.626	-14.901	-17.228	-19.608	-90.002	-92.049	0
Interest income f. principal Investment	0	3.058	3.058	3.058	3.058	3.058	3.058	3.058	3.058	3.058	3.058	0	0
Interest income f. reinvestment	0	0	70	141	214	288	364	442	522	603	686	3.150	3.222
Earnings before tax	0	3.058	3.128	3.199	3.272	3.346	3.422	3.500	3.580	3.661	3.744	3.150	3.222
Tax	0	1.070	1.095	1.120	1.145	1.171	1.198	1.225	1.253	1.281	1.311	1.103	1.128
Terminal Value	0	0	0	0	0	0	0	0	0	0	0	0	94.144
Tax Rate	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%
Reinvestment interest rate	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%	3,5%

Summary of results

	CFP Terminal Value	CFP Rate of Return
○ Apartment Investment		
<input type="checkbox"/> before tax	122,638	5.04%
<input type="checkbox"/> after tax	186,552	8.78%
○ Financial Investment		
<input type="checkbox"/> before tax	111,233	4.19%
<input type="checkbox"/> after tax	94,144	2.75%

The apartment investment is before and after tax more favourable than the financial investment!

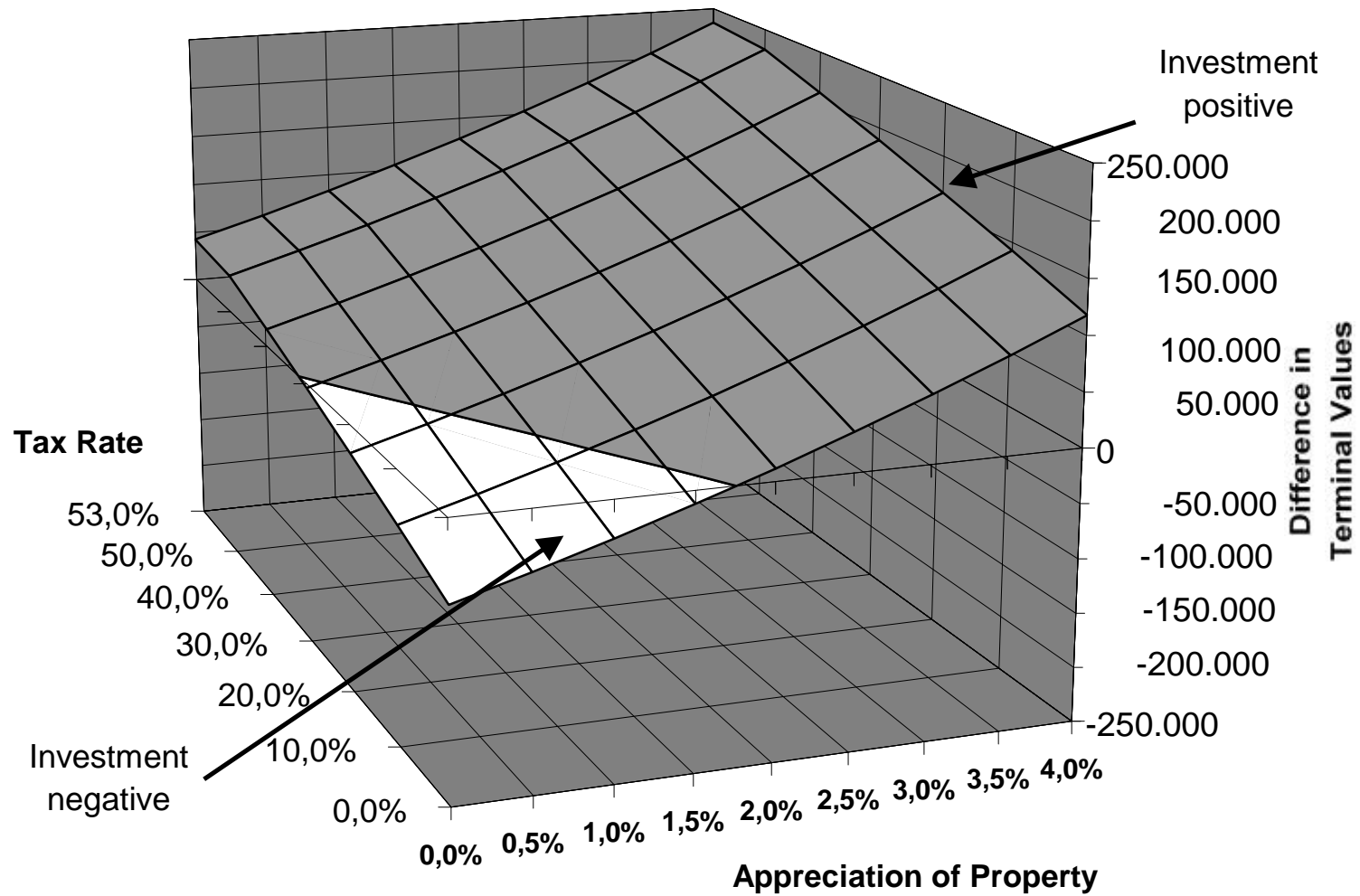
Risk Analysis

- Quantifying risk
- “What if ... ?” questions (sensitivity/scenario-analysis)



Risk Analysis 1

Decision Criteria Difference in Terminal Values
depending on Tax Rate and Appreciation of Property



Risk Analysis 2

Impact of Different Parameters on the CDP Rate of Return of the Apartment Investment

