Project analysis - Case ”House 1”

Per Eneborg, 2010-09-28

Introduction

As senior manager I received a project-forecast regarding the real estate “House 1” for assessment.
The building was first built in the fifties and the majority of the structure is original, such as the roof, furnace and pipes, it is now starting to show signs of wear and tear. The idea is to replace all the pipes, rebuild kitchens and bathrooms and renovate the electricity-wiring in the building.

Sqm	**375**		
Rent, SEK/sqm/year	**1000**	**Increased revenue**	112.5
Expected rent, SEK/sqm/year	**1300**		
		Savings/ year	
Costs		Maintenance	40
Bathroom	120		
Kitchen	100		
Living room	20		
Bedroom	15		
Hallway	10	**Net cash flow**	**152.5**
Infrastructure			
Electricity	35		
Water and sewage pipes	40		
Sum apartment 1,3 & 5	**340**	**Initial yield**	**7.31%**
Sum apartment 2,4 & 6	**355**	**Life expectancy**	**20**
Total project cost	**2085**		

All values in 1000 SEK

This forecast shows a decent initial yield and seems to be well thought through, given the detailed cost forecast, but when calculating net present value (NPV) it does not look quite as good. The discount rate is given at 6% and inflation is 2%.

$$NPV = \sum_{t=1}^{T} \frac{C_t}{(1+r)^t} - C_0$$

Using this formula I get a NPV of -38930 SEK.
It seems that the right choice would be to cancel this project, but with the knowledge about this buildings future maintenance needs and the costs it will incur, I decided to further investigate the possibilities of giving this project the go-ahead.

Assessing the forecast

Sensitivity Analysis

The next step is to assess the variables in the project.
The sensitivity analysis recognizes the principal uncertainties when calculating each variable's effect on the project's outcome.
When checking with the project manager in charge, the forecast is based on estimates from both contractor's and rent-negotiator's and seems to be accurate to within +- 5%. The estimate gave a 10% chance or risk that any scenario other than the expected will occur.

Pessimistic scenario		**Expected scenario**		**Optimistic Scenario**	
Total project cost	2189,25	**Total project cost**	2085	**Total project cost**	1980,75
Net Cash Flow	144,88	**Net Cash Flow**	152,5	**Net Cash Flow**	160,13
Yield	6.62%	**Yield**	7.31%	**Yield**	8.08%
NPV	-245,48	**NPV**	-38,93	**NPV**	167,63

NPV					
Pessimistic scenario		**Expected scenario**		**Optimistic Scenario**	
Cost	-143,18	**Cost**	-38,93	**Cost**	65,32
Net cash flow	-141,23	**Net cash flow**	-38,93	**Net cash flow**	63,38

The table above shows that only when costs or cash flows exceed expectations, will this project have a positive NPV. Since this only has a 10% chance, this project is still struggling and the risk of the pessimistic scenario is equally as great.

Scenario analysis

A sensitivity analysis has its' limitations in its' method of analyzing the variables one by one. It is not unlikely that if the negotiators receive an increased rent more than anticipated, for example due to economic wealth, then costs will also increase for the same reasons. Therefore, I conducted a scenario analysis which analyzed the correlations between the variables and how the outside world impacted the project.
In this case the only outside variable that would affect the cash flow over time, since it has no variable costs, is inflation; but, nothing we can assess today states any dramatic changes.

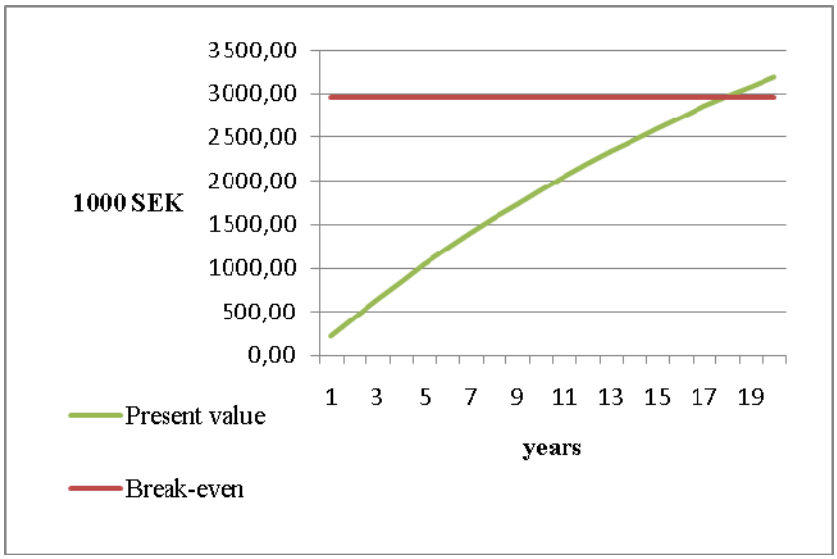
However, when discussing the variables we cannot affect, the concern of higher energy costs emerged.
Instead of making cutbacks in the project to lower costs, we decided to expand it by including both energy and cost-effective measures. The estimated savings in maintenance and heating costs adds up to 125,000 SEK. This adding to the investment costs, but by including the savings these measures rendered in the cash flow, the project would surely pay off.

Costs	**2085**
Streamlining measures	
Windows	350
Heating source	175
Roof + additional insulation	350
Total project cost	**2960**
Increased revenue	112.5
Savings/ year	
Maintenance	75
Heating costs	50
Net cash flow	**237.5**
Initial yield	**8.02%**
NPV	**226.51**

The NPV is now 226,510 SEK and the project seems to be profitable.

Break-even

In projects with variable costs it is common to calculate the break-even point; this is when in terms of units sold or years, the revenues barely covers the costs.
In this case the following graph stresses the need of accuracy in the assessment of life expectancy. The break-even point occurs at 17.95 years.



In this project different measures have different expected life expectancies. Wallpaper and floors may need refurbishments after 20 years or less, but the roof should exceed that limit by far.

Summary

In this case study I have shown a number of ways of ensuring the accuracy of the expected outcome in this investment proposal.
By calculating the NPV, I learned that this project would not be profitable and when conducting a sensitivity analysis it was shown that only in an optimistic scenario the outcome would change. The next step included a scenario analysis which opened up for the idea of expanding the project and it resulted in a project that would be profitable. When calculating the break-even point it emphasized the importance of assessing life expectancy and the graph visualized the margins of the project. The final decision was to approve the revised forecast.

The lesson to be learned, in my opinion, is that it is crucial to know if the assumptions used in the forecast are correct, to explore what can go wrong and to find out the effect of mistaken assumptions.
Another important fact is the willingness to explore other possibilities and find ways of making this project profitable, not only gave it a positive NPV, but also increased the value of the property by increasing the net operating income. If the real estate value is not a variable in assessing whether to go ahead on a project or not, it should at least be considered seeing that the increase of value opens up for further opportunities to invest.

Project analysis - Group work

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Tasks

Forecast assessment

A rough preliminary cash-flow forecast was received from a project manager.

Investment	2150.00
Increased revenue	110
Savings in maintenance	45
Net Cash Flow	155
Initial yield	7.21%

All values in 1000 SEK.

Our company has decided to use a 6% discount rate, inflation is 2% and lifetime expectancy is estimated to 20 years.

Question 1: Calculate Net present value. Is this project profitable?

Sensitivity analysis

In the following sensitivity analysis the scenarios have a +- 5% deviation of the expected scenario. Discount rate, inflation and life expectancy is as in question 1.

Pessimistic scenario		**Expected scenario**		**Optimistic Scenario**	
Total project cost	2257.50	**Total project cost**	2150.00	**Total project cost**	2042.50
Increased revenue	123.50	Increased revenue	130	Increased revenue	136.50
Savings in maintenance	47.50	Savings in maintenance	50	Savings in maintenance	52.50
Net Cash Flow	171.00	**Net Cash Flow**	180	**Net Cash Flow**	189.00

NPV					
Pessimistic scenario		**Expected scenario**		**Optimistic Scenario**	
Cost	157.54	**Cost**	265.04	**Cost**	372.54
Net cash flow	144.28	**Net cash flow**	265.04	**Net cash flow**	385.79

In the lower table you can see each variables effect on the NPV when the other is as expected.

Assume that the pessimistic scenario is biased and the project manager underestimated the risk. The savings in maintenance is reassessed to deviate 17%, the increased revenues 7% and the estimated cost 12 % of the expected scenario.

Question 2: Recalculate the pessimistic scenario. Which variable is most dangerous, total project cost or net cash-flow and why is that?

Scenario analysis

When conducting a scenario analysis an optimistic scenario was given. This resulted in a forecast similar to the optimistic scenario in the sensitivity analysis above with one exception, total project cost. The assumptions were:

> Economic growth in society is stimulating inflation and causing prices of construction to increase by 10%. Inflation also causes higher maintenance-costs and rental costs making revenues and savings higher.

The recalculated forecast as follows.

Total project cost	2365.00
Increased revenue	136.50
Savings in maintenance	52.50
Net Cash Flow	189.00

Question 3: What is the effect of this scenario? Compare it to the optimistic scenario in the sensitivity analysis.

Answers

Question 1:
Net present value = - 70.39 (- 70,390 SEK)

Question2:

Pessimistic scenario		**Expected scenario**		**Optimistic Scenario**	
Total project cost	2408.00	**Total project cost**	2150.00	**Total project cost**	2042.50
Increased revenue	107.90	Increased revenue	130	Increased revenue	136.50
Savings in maintenance	46.50	Savings in maintenance	50	Savings in maintenance	52.50
Net Cash Flow	154.40	**Net Cash Flow**	180	**Net Cash Flow**	189.00

NPV					
Pessimistic scenario		**Expected scenario**		**Optimistic Scenario**	
Cost	7.04	**Cost**	265.04	**Cost**	372.54
Net cash flow	-78.44	**Net cash flow**	265.04	**Net cash flow**	385.79

The net cash-flow is the most dangerous variable.
If total costs is 2,408,000 SEK the projects net present value is still positive but if the net cash-flow is 154,400 SEK the net present value is – 78,440.

Question 3:
The net present value is 170,790 SEK.
Compared to the sensitivity analysis it has a lower net present value due to the assumption of higher construction-costs.
It shows the correlation of variables, in this case the correlation between increased revenues and higher prices on construction.