Risk analysis of three loan types in real estate

Master Thesis

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Preface

After a joyful time at a real estate company I hereby present you my master thesis “Risk analysis of three loan types in real estate”. This thesis finalizes my Master Industrial Engineering and Management with the specialization Financial Engineering and Management. I learned a lot during my time as a student and I am looking forward to new challenges in the field of finance.

I want to thank my supervisor of the real estate company for the opportunity to graduate. Moreover, I would like to thank all the colleagues for answering questions and providing me with practical insights in the field of real estate. I am glad that despite the pandemic, I was able to spent quite some time at the company and have meetings in person. Moreover, I think that it was very interesting to actually visit the real estate properties in the Netherlands. The production processes of tenants, which I could observe, is also a subject in the bachelor and master of Industrial Engineering and Management.

Next, I would like to thank Berend Roorda and Reinoud Joosten of the University of Twente for their guidance. The meetings at the University improved my content and supported me in maintaining the structure and consistency.

Finally, I want to thank my parents, girlfriend, and friends for the support during my thesis.

Wilco Nieuwenhuis

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Management Summary

In this thesis, we analyze the case of a real estate company considering to enlarge their asset portfolio using loans. The company made a set-up of three loan types, loans A, B, and C, with durations of 5, 10, and 15 years respectively. The company wants to repay them at maturity using the cumulative cash flow. The loans consist of a yearly direct interest, a yearly storage (increase of principal amount), the possibility of an early retraction, a possible bonus interest, and default priority rules. The potential types each have a maximum principal value of 10% of the market value of the company's portfolio. The remainder of the portfolio is financed with a bank loan of 50% and 20% of company equity. The bank has the first right of mortgage, the loans ABC, with the second right of mortgage, are subordinated to the bank loan, and the company is repaid last in case a default occurs.

In the set-up of the company, the duration, principal value, and default priority rules of the loans A, B, and C are already finalized. We analyze the direct interest, storage, and bonus interest of which the yearly values of the initial set-up are shown in the table. In the right column we added the corresponding IRRs. We analyze the option of early retraction separately.

Loan type	Direct interest	Storage	Bonus interest	IRR
A	4%	0%	0%	4%
B	2%	4%	0.1%	6.21%
C	2.75%	4%	0.1%	6.95%

The goal of this thesis is to design a tool to support the company in setting the parameters in the loans ABC. We base the analysis on three parts, first the assessment of the asset portfolio with in particular its valuation and forecasted income, secondly the liquidity requirements for the company, and third the competition which is the opportunity cost for an investor.

To analyze the first part, the asset portfolio, we discuss literature regarding the valuation of real estate. Based on the literature, we define factors for the valuation of a real estate portfolio and a basic method to approximate a property value. We discuss the factors with the management of the company which result in the focus on three factors: contract duration, creditworthiness, and the diversity of the assets and tenants. Based on these factors, we create an overview of the portfolio to enable a portfolio assessment and decide upon the input parameters for the scenario analysis.

The scenario analysis consists of two parts, namely intuitive scenarios and a Monte Carlo scenario. To create the scenarios, we first define the costs of the portfolio. Based on an increase or decrease of rental income, we calculate the costs. The intuitive scenarios are a decrease of income of 10%, a break-even rental income, and the potential situation in which all currently vacant objects are leased. In the Monte Carlo simulation we generate per simulation 1000 times the yearly rent of the portfolio over a time span of 15 years. In order to simulate this time span we generate tenants, vacancy periods, and defaults.

To analyze the second part, the liquidity requirement, we first define the yearly cash flow of the loans ABC and the possibility of an early retraction. Secondly, we create a model to assess the liquidity position of an individual fictional real estate property financed with loans ABC. To analyze the incorporated storage, we compare the initial set-up with the case of direct interest only in which we set the storage and bonus of all three loans to 0% and the direct interest to the value of the IRR of the initial set-up. The case of direct interest only consists thus of a direct interest of 4%, 6.21%, and 6.95% for loans A, B, and C respectively and no storage or bonus.

We base the third part of the thesis, the competition, on a comparison with debt and equity investments. We use debt investments in the comparison since this is similar to loans ABC and equity is widely available in the field of real estate. We base the debt comparison on corporate bonds and we divide the equity investments in investment funds, individual real estate investments, and investing in stocks.

We conclude about the portfolio on the three parts. Based on the competition, we argue that the company should increase the IRR of loan type A to 5%, and the IRRs of 6.21% and 6.95% for loans B and C respectively do not have to be changed. We include loans ABC in the model of the fictional real estate property and the Monte Carlo scenario using the initial set-up and the set-up incorporating direct interest only. We assess both the interest percentages of the initial set-up and the percentages that we define in the competition assessment. Based on the model of the fictional property, we conclude that it is possible to implement the set-up of loans ABC. This contradicts the result of the implementation of the loans ABC in the Monte Carlo simulation, which shows that the initial set-up is not viable for implementation. This is because the fictional property has lower costs compared to the portfolio.

In the Monte Carlo simulation, we analyze whether the repayment of loans A, B, and C in years 5, 10, and 15 respectively is possible using the cumulative cash flow. The implementation of the initial set-up of the company and the set-up based on direct interest only in the Monte Carlo simulation results in the following percentages in which the loans can be repaid:

Year	5	10	15
Initial set-up	73.2%	34%	7.1%
Set-up based on direct interest only	0.2%	11.8%	73.5%

We conclude that both set-ups are not viable because the percentages are too low. That is why we analyze three set-ups incorporating a refinancing structure for loans ABC. We conclude that the loans ABC can be incorporated in case either loan A and B or all three loans are refinanced at maturity, instead of repaid using cumulative cash flow. In these scenarios the liquidity position of the company is almost 100% in every year.

In the initial set-up, the company incorporated a storage of which we conclude that it should be reconsidered. Based on the assessment of the fictional property and the Monte Carlo simulation, we conclude that the cumulative cash flow can not be reinvested over the years. The company should consider reinvesting acquired equity instead of increasing their equity percentage of the portfolio, in order to maintain their leverage position.

Contribution of the research:

- Portfolio assessment of a real estate company based on a selection of factors.
- Liquidity assessment of a real estate portfolio using loans with time spans of 5, 10, and 15 years and an incorporated storage.
- Monte Carlo Model to simulate the implementation of loan types in a real estate portfolio by generating new tenants, vacancy periods, and defaults.

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List of Abbreviations

LTV:	Loan to value.
CLTV:	Combined loan to value.
AFM:	Dutch Authority of the Financial Markets.
Ltd:	Limited.
BV:	Dutch translation for Ltd, but minor differences: “Besloten Vennootschap”.
NPV:	Net present value.
GIY:	Gross initial yield.
NIY:	Net initial yield.
BAR:	Dutch translation of GIY; “Bruto Aanvangsrendement”.
NAR:	Dutch translation of NIY; “Netto Aanvangsrendement”.
WACC:	Weighted Average Cost of Capital.
CAPM:	Capital Asset Pricing Method.
IRR:	Internal Rate of Return.
EVS:	European Valuation Standards.
IFRS:	International Financial Reporting Standards.

Introduction

1.1 The lead case

We develop and analyze a case based on the considerations within a real estate company. The case is made fictitious due to privacy and confidentiality. The portfolio in this case consists of commercial and industrial real estate. We assume that the management are experts in purchase, management, sale, and development of real estate. The goal of the management is to exploit the portfolio long term. In this thesis, we refer to the lead case as the company.

Real estate funds can be structured with various descriptions of promised and actual returns. The return of a real estate investment fund consists of the rent and change in value of the properties. Who will receive this return or has to pay it, if it is negative, depends on the structures and contracts in the fund.

The received rent, current contracts, and expected rent for the coming year are known to the company. This is common knowledge within a real estate fund since this is included in the rental agreements. The current knowledge regarding the properties consists of taxation records. These provide a valuation and data of certain parameters, but take time, cost money, and have to be performed for all the properties in the portfolio.

In this case, the portfolio consists of properties with a market value of approximately 50 million euros of which 30 million euros is funded by the bank and 20 million euros is equity of the company. The company considers to enlarge the portfolio using three loan types and additional bank funding. The loans, types A, B, and C, will have a maximum principal of 10 million euros per type in the potential situation. The additional bank funding in this situation is 20 million euros which results in a total value, of the portfolio, of 100 million euros. The company has to combine selling loans and purchasing properties to grow the portfolio. The potential situation of the portfolio is shown in Figure 1. In this thesis, we will refer to the three loan types A, B, and C as loans ABC and the potential investors as the potential lenders.

Company	20%	Market value
C	10%	
B	10%	
A	10%	
Bank	50%	

Figure 1. Division of the market value of the portfolio.

The loan types A, B, and C have a duration of at least 5, 10, and 15 years respectively. Type A has an annual interest and repayment of the initial loan at maturity. This differs with type B and C which have an annual interest, an annual storage, and payment of the initial loan amount plus the storage at maturity.

The risk of the loans ABC is that the company is unable to pay its obligations, defaults and the properties of the portfolio have to be sold in an auction. The repayment can be described as follows, the bank has the first right of mortgage, the second right of mortgage is for the loans ABC, and the third right is for the company. If insufficient capital is acquired from the auction to

repay the loans ABC in full, default priority rules will be used which we explain in Chapter 3. In case of insufficient funds to repay the loans, this automatically means that the company does not receive any repayment at all, since they have the third right.

The company included an option for the lenders in the set-up of the loans ABC to retract a part of the principal of the loan, partly without costs and partly with costs. This option provides liquidity to the lender, but it requires liquidity from the company. Moreover, the company has to monitor the liquidity requirement with regard to the repayments of loans at maturity including potential storages and bonuses. The company also included the option to redeem loans (partly) in order to prevent uninvested capital after for example a sale of a property. Thus the loans are (partly) puttable and (partly) callable.

The company set the minimum amount for loans ABC at 250,000 euros. The reason is that contracts have to be made for a lender and legal actions have to be taken, like going to the notary. Moreover, the company does not want to attract numerous small lenders but aims to build relationships with a manageable number. To build these relationships, transparency with regard to the portfolio is mandatory.

The parameters of the loans ABC have an influence on the required liquidity and the default probability of the company and vice versa. That is why we assess these aspects both individually and combined.

The management of the company is located in an office building which is part of their portfolio. This building is an investment object of which they only use a limited amount of office space themselves, and all other spaces are leased. The moment the building was added to the portfolio, it had only a limited number of tenants. Currently the majority of the building is leased. This office building is often used as an example by the management team to explain their role and goal.

The asset portfolio

The asset portfolio in this case consists of 8 properties in the Netherlands. These locations are separated into offices, stores, and industrial spaces which adds up to 140 objects. A separate tenant can rent for example a separate office or a whole wing of a building. The company can combine or separate objects in case this is beneficial. This changes the number of tenants, the diversity, and the overall credibility. The same holds for industrial spaces, an industrial hall can be separated in compartments in case this is beneficial.

The asset portfolio can be described in order to advertise the loans ABC to lenders. Pictures of properties and information regarding the type of properties can give lenders a feeling about the portfolio. Besides the portfolio, an advertisement should contain all information regarding the risk and return.

1.2 The problem

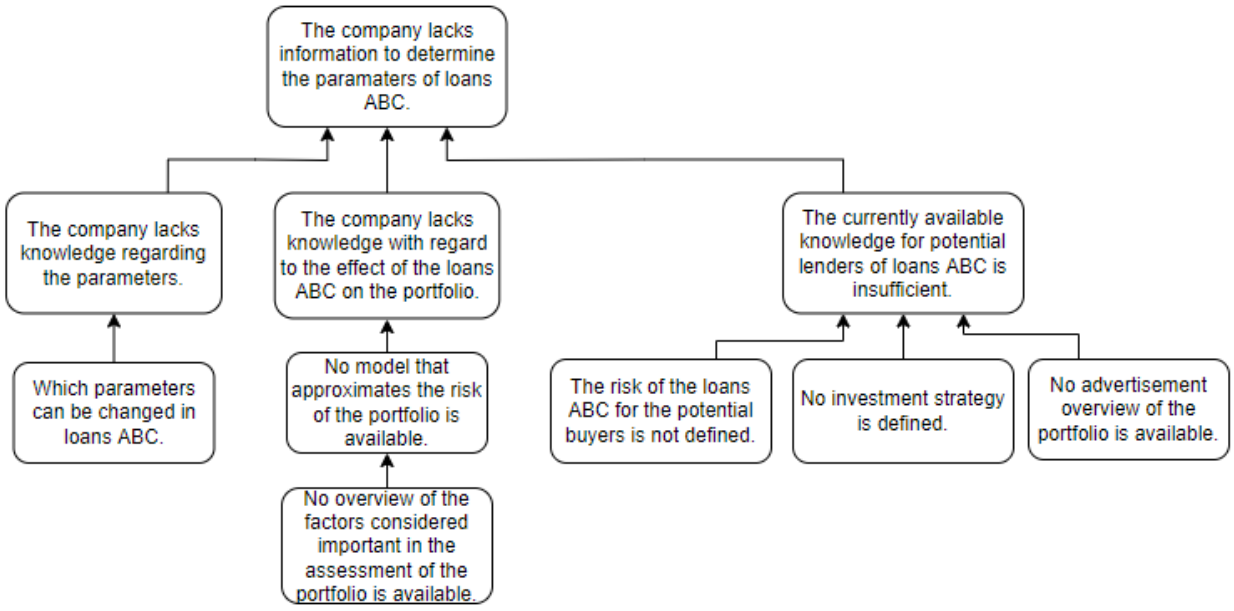


Figure 2. Problem cluster of the company.

The main problem is that the company lacks information to determine the parameters of loans ABC. We divide this problem into subproblems as shown in the problem cluster in Figure 2. The division is in three parts, namely the parameters, the effect on the asset portfolio, and the knowledge for potential lenders of the loans ABC.

1.3 Research objective

Our objective is to support the company in the decisions regarding the parameters and implementation of loans ABC. We analyze the asset portfolio, the liquidity requirements, and the competition of the company. Our first objective, with regard to the asset portfolio, is to analyze the portfolio based on factors important in the valuation and forecasted rental income of a real estate portfolio. The second objective is that we analyze the liquidity position of the company to understand the effect of the loans on the portfolio. In the last part of the objective, the competition, we discuss competition of loans ABC. We combine the analysis of the competition with the available information for potential lenders of loans ABC. Based on these three parts, we aim to support the company and give some recommendations for the parameters of loans ABC and the potential implementation.

1.4 Research questions

Based on the research objective we formulate the following research questions.

1. Which parameters can be changed within the set-up of the loans ABC?

In this research question, we determine the parameters concerning the portfolio and loans ABC. We analyze a part of these parameters and the remainder are already set at a defined value by the company.

2. What information is currently available for potential lenders of the loans ABC?

In this chapter, we first define the currently available information of the portfolio and the set-up defined by the company. This set-up consists of the interest, storage, the default priority rules, and the option of an early retraction of a part of the principal of loans ABC.

3. What is the risk of the loans ABC for potential lenders?

In order to analyze the risk of loans ABC, we analyze the defined set-up of the company. At first, we define the cash flow of the individual loan types A, B, and C. Secondly, we discuss three broad scenarios which also incorporate the default priority rules. Third, we define the option of early retraction using equations.

4. What is the effect of the loans ABC on the portfolio of the company?

To analyze the effect of loans ABC on the portfolio, we first discuss literature on portfolio level. This literature includes both the capitalization and discounted cash flow method. Secondly, we discuss the LTV and corresponding leverage Third, we create a model to approximate the LTV of a real estate portfolio. Fourth, we define the costs of the portfolio of the case. Fifth, based on the equations, we analyze the case of a fictional real estate property financed using loans ABC. This example shows the thought process of a single property with loans ABC, the corresponding cash flow, and required liquidity. Sixth, we discuss the factors important in the assessment of the portfolio after which we analyze the contract duration and creditworthiness of tenants. At last, based on the preceding, we perform a scenario analysis.

5. How can the parameters be set for loans ABC?

To be able to discuss the parameters, we first discuss literature regarding the CAPM and IRR. Secondly, we analyze the competition of loans ABC which is the opportunity cost for a potential lender.

6. How can the company implement loans ABC?

In order for the company to implement loans ABC, we first define the strategy of the company. Secondly, we give some recommendation about the parameters in the loans ABC based on the asset portfolio, liquidity, and competition assessment. At last, we discuss the limitations of this research and topics for future research.

1.5 Deliverables

The deliverables of this thesis are some recommendations for the implementation of the loans ABC and a tool to analyze a real estate portfolio. The tool is a Monte Carlo simulation which shows potential results of the implementation of loans in a real estate company for a time span of 15 years.

The Monte Carlo simulation starts with the contracts of the current tenants. In the model, we simulate a time span of 15 years by generating tenants, vacancy periods, and defaults. For every scenario of 15 years, we calculate the yearly rental income of the company and the corresponding result. Based on the financial result per year, in which we incorporate the obligations of loans ABC, we calculate the liquidity position of the company, The liquidity positions of the company in the years 5, 10, and 15 show whether the company was able to repay loans A, B, and C in the scenario. We visualize this result in a table which we use in the analysis of the set-ups.

The file of the Monte Carlo simulation is available. All the information of the case is deleted from the file, but it is possible to insert tenants and run the simulation.

1.6 Scope

The goal is that the recommendations and tool can be used by real estate companies, but we do not discuss the general applicability separately. We discuss the input parameters of the Monte Carlo simulation, but we do not define all parameters in detail. Moreover, we assume that averages can be used for certain parameters in order to keep the simulation comprehensible.

The advertisement of the loans ABC which consists of the asset portfolio is not part of this thesis. This is a final step that the company should perform after choices with regard to the implementation are made.

1.7 Research approach

To answer the research questions, we conduct both quantitative and qualitative research. In Research Questions 3, 5, and 6 we start with a literature review of necessary knowledge. The Research Questions build on each other and end with Research Question 6 which includes a conclusion and recommendation.

The first two Research Questions define the parameters that we consider in this research and the current set-up of the loans ABC. In Research Questions 3 and 4 we analyze the risk of the loan types for the potential lenders and the company. In the fifth Research Question we focus on the values of the parameters. In the last Research Question, we combine the preceding information and give some recommendations for the potential implementation of the loans ABC.

2. The parameters in the set-up of the loans ABC

The loans ABC have several parameters in the set-up of which some are already determined. We analyze the parameters which are not finalized which can be seen in Table 1. We analyze the result of changes in parameters and support the company in their final decisions about the parameters.

Table 1. Parameters in the initial set-up.

Parameter	
Annual interest of the loan types A, B, and C	Part of this research
Annual storage of the loan types A, B, and C	Part of this research
Bonus interest of the loan types A, B, and C	Part of this research
Percentage of loan type retractable without costs of early retraction	Part of this research
Percentage of loan type retractable with costs of early retraction	Part of this research
Cost of early retraction	1.5% per year until the early retraction
Notice period for an early retraction without costs	3 months
Notice period for an early retraction with costs	6 months
LTV based on the bank loan	50%
Interest paid on the bank loan	2.75%
Redemption bank loan	6.67% based on an annuity with a duration of 15 years
Maximum equity percentage of the portfolio of loan type A, B, and C	10% for each type
Minimum duration of a loan type	5, 10, and 15 years for loan A, B, and C respectively
Default priority rules of loan types A, B, and C	Defined in Section 3.2
Equity percentage of the portfolio owned by the company	20%

The bank allows the set-up of Figure 1 because their risk is based on their equity percentage of 50%. If the company would default, the probability that properties are sold for a value less than 50% of the initial market value is low, meaning that the risk for the bank is minimal.

The interest and redemption paid to the bank is an annuity based on a repayment period of 15 years and an interest of Euribor with a minimum of 2.75%. The value paid per interval is constant, but the interest is decreasing over time while the redemption increases. This relation is shown in Figure 11 in Section 5.6.

The durations of loans A, B, and C are 5, 10, and 15 years respectively. The bank loan and loans ABC are repaid at maturity using cumulative cash flow, meaning that the equity percentage of the company increases from 20% to 100% in 15 years.

In case the liquidity position in a certain year is negative, the company has to decide how to deal with this. We focus on a tool to analyze the implementation of the loans ABC. We analyze the parameters in the loans and give some recommendation to the company about their possibilities. That is why we focus on the liquidity position over the years. If the liquidity position is negative during the time span, thus the set-up of the company is not suited. The company can decide to refinance loans or acquire other funding.

3. The currently available information for potential lenders of the loans ABC

In this chapter we state the data provided by the company to potential lenders about the portfolio and the loans ABC. The loans ABC are explained based on the returns, the repayment in case of a default of the company, and the option of an early retraction of a part of the principal.

3.1 Provided data of the portfolio

The company provides the lenders an overview of the total received rent for the past years which is shown in Table 2. The rent of 2021 includes an expectation of the remainder of the year.

Table 2. Rental income of the past years.

2016	2017	2018	2019	2020	2021
€4,275,000	€4,425,000	€4,550,000	€4,625,000	€4,775,000	€5,000,000

Besides the rent, the company provides a more detailed Excel sheet which contains the following data based on rental agreements:

- Object.
- Tenant.
- Rent per year.
- Potential (In case of vacancy).
- Starting date of current tenant.
- End date of current tenant.
- Notice period.
- Extension period.
- Indexation date.
- Expectation of the rent next year (current rent, corrected for indexation).

Past taxation records

Based on taxation records available within the company we created an overview of the asset portfolio in Figure 3. This corresponds to a market value of 41,715,000 euros in 2016.

Property	Year	Market value
Home furniture shopping mall	2016	€ 14,800,000
Store	2016	€ 4,150,000
Store	2016	€ 2,275,000
Store	2016	€ 2,600,000
Office building	2016	€ 3,575,000
Office building	2016	€ 4,470,000
Industrial space /corresponding office	2016	€ 4,225,000
Industrial space /corresponding office	2016	€ 5,620,000
		€ 41,715,000

Figure 3. Taxation values of 2016.

3.2 Set-up of the loans ABC as defined by the company

The duration, yearly direct interest, yearly storage, and bonus rent of the loan types A, B, and C as set by the company are shown in Table 3.

Table 3. Return per loan type in the initial set-up.

Loan type	Duration at least	Yearly direct interest	Yearly storage	Bonus interest (no compound interest)
A	5 years	4%	0%	0%
B	10 years	2%	4%	1% (0.1% per year)
C	15 years	2.75%	4%	1.5% (0.1% per year)

The differences in the loans ABC are with regard to the direct yearly payout, the yearly storage, and the bonus rent (no compound interest). The direct yearly payout is the amount of interest that is paid every year. This is 4%, 2%, and 2.75% for the types A, B, and C respectively.

The yearly storage is interest that is not paid to the lender but is added to the loan. The loan increases with this percentage every year. The type B and C loans have a yearly storage which is 4%. This yearly storage results in compound interest. The types B, and C have lower periodic interest payments than A, but a larger payout at the end of the duration. It is important to note that the direct interest of type B and C are based on the loan value plus the storage.

The types B and C have a certain bonus rent. This bonus rent is based on the principal value and will be added to the payment at maturity, meaning that no compound interest is paid over the bonus rent.

Default priority rules of loans ABC

The default priority rules as defined by the company are as follows: the bank has the first right of mortgage, the second right of mortgage is for the lenders, and the third right is for the company. The bank has the first right on money received from an auction, the lenders the second right according to the structure in Table 4, and at last the company. In case of a default, the company is most likely to lose equity, which corresponds to incurring the most risk.

Table 4. Repayment of principal of loans ABC in case of a default.

Type	Auction value between 100% - 80%	Auction value between 80% - 50%	Auction value below 50%
A	100%	100% - (15% * Shortage * 10)	0%
B	100%	100% - (35% * Shortage * 10)	0%
C	100%	100% - (50% * Shortage * 10)	0%

In case the loans are incorporated and the structure of Figure 1 is present, the first 50% of the market value, in case of an auction, is received by the bank. Subsequently, the lenders will receive their money, decreased with a percentage of the possible shortage as indicated in Table 4. Loan A, B, and C are decreased with 15%, 35%, and 50% respectively. The shortage is a percentage of the portfolio, while the loans are 10% of the portfolio. That is why the decrease of repayment for loans ABC is multiplied by 10.

The company provided the information of Table 4. To analyze this set-up we define the shortage, which is also indicated as a percentage of the initial market value in the potential situation, as follows:

If auction value:

- >= 80% then: $S = 0\%,$ (1)
- 50% < Auction value < 80%: $S = 80\% - AV,$ (2)
- <= 50%: $S = 30\%,$ (3)

with

- S: Shortage in percentage of principal value of the lenders' capital.
- AV: Auction value percentage of initial market value.

To show the default priority rules, we give an example for the case in which the auction value is 60%. Using Equation 2, the corresponding shortage is 20%. This results in the following repayment percentage for loan B:

- Repayment of principal of loan B = 100% - (15% * 20% * 10) = 70%.

Option of an early retraction

The loans ABC are repaid at maturity, but the company considers an early retraction of a part of the principal to provide liquidity to the lender which means that the loans are partly puttable. Table 5 defines the maximum percentage of the loan that can be retracted each year, without costs. Table 6 defines the percentages that can be retracted each year with a cost. This cost is described by the company in the set-up as an interest review over the duration until the retraction. We define the cost in detail in Chapter 4.

Table 5. Maximum early retraction without costs.

Type	Max% of principal per year	Notice period
A	20%	3 months
B	10%	3 months
C	5%	3 months

Table 6. Maximum percentage of principal that can be retracted with a cost.

Type	Percentage	Notice period	Interest correction over the duration until retraction
A	>20%	6 months	1.5%
B	10% – 20%	6 months	1.5%
C	5% - 10%	6 months	1.5%

The company wants to be able to pay a part of the possible early retractions using the yearly cash flow. If this is not sufficient, an increase of the bank loan should enable the company to pay the liquidity requirements. In Section 5.6, we discuss the required liquidity of an individual fictional property. In the Monte Carlo scenario we analyze the case in which all possible early retractions take place.

Option of early redemption

Besides the option for the lender to retract a part of the principal, the company wants to be able to redeem the loan (partly) which means that the loans are (partly) callable. The company argues that this is common in the field of real estate because properties in a portfolio can be sold in case this is beneficial. If that capital can not be reinvested directly into other properties, loans should be redeemed. Otherwise, the company has to pay interest on capital that is not invested. In Chapter 6, we discuss the opportunity costs for an investor. This consists of the competition of which several have similarities in the debt or equity investment.

4. Risk of the loans ABC for potential lenders

Based on the provided information by the company, we analyze the structure in more detail. First, based on the set-up in Chapter 3, we define equations for the cash flow of loans ABC. Secondly, we discuss three broad scenarios, good, neutral, and bad. Subsequently, we analyze the option of early retraction and the combination of different loans.

Cash flow of loans ABC

We define the equations for the yearly cash flow based on a duration of 5, 10, and 15 years for types A, B, and C respectively. The yearly cash flow in the years before maturity are as follows:

$$CF_{A,n} = P_A * 4\%, \qquad n = 1, \dots, 4 \qquad (4)$$

$$CF_{B,n} = (P_B * (1 + 4\%)^n) * 2\%, \qquad n = 1, \dots, 9 \qquad (5)$$

$$CF_{C,n} = (P_C * (1 + 4\%)^n) * 2.75\%, \qquad n = 1, \dots, 14 \qquad (6)$$

with

- $CF_{A,n}$: Cash flow of loan type A in year n.
- $CF_{B,n}$: Cash flow of loan type B in year n.
- $CF_{C,n}$: Cash flow of loan type C in year n.
- P_A: Principal of loan type A.
- P_B: Principal of loan type B.
- P_C: Principal of loan type C.

The cash flow of both types B and C consist of an annual interest, an annual storage, and a bonus interest. The annual storage and bonus of types B and C are paid at maturity. We define the equations for the cash flow at maturity for type A, B, and C in years 5, 10, and 15 respectively as follows:

$$CF_{A,n} = P_A * (1 + 4\%), \qquad n = 5 \qquad (7)$$

$$CF_{B,n} = (P_B * (1 + 4\%)\text{^}n) + (P_B * (1 + 4\%)\text{^}n * 2\%) + (P_B * 0.1\% * n), \qquad n = 10 \qquad (8)$$

$$CF_{C,n} = (P_C * (1 + 4\%)\text{^}n) + (P_C * (1 + 4\%)\text{^}n * 2.75\%) + (P_C * 0.1\% * n). \qquad n = 15 \qquad (9)$$

If we take the minimum value per loan type of 250,000 euros as an example, the yearly cash flows are as shown in Figure 4. For every loan type we show at least two cash flows in the years before maturity and the cash flow at maturity. The remaining years are hidden in this example to keep the figure compact.

Type A			
Principal	€ 250,000		
End of year	**1**	**2**	**5**
Interest	€ 10,000	€ 10,000	€ 10,000
Repayment			€ 250,000
Total payment	€ 10,000	€ 10,000	€ 260,000

Type B				
Principal	€ 250,000			
End of year	**1**	**2**	**5**	**10**
Interest	€ 5,200	€ 5,408	€ 6,083	€ 7,401
Loan value	€ 260,000	€ 270,400	€ 304,163	€ 370,061
Bonus				€ 2,500
Total payment	€ 5,200	€ 5,408	€ 6,083	€ 379,962

Type C					
Principal	€ 250,000				
End of year	**1**	**2**	**5**	**10**	**15**
Interest	€ 6,875	€ 7,150	€ 8,043	€ 9,785	€ 11,905
Loan value	€ 260,000	€ 270,400	€ 304,163	€ 370,061	€ 450,236
Bonus					€ 3,750
Total payment	€ 6,875	€ 7,150	€ 8,043	€ 9,785	€ 465,891

Figure 4. Yearly cash flow of loans ABC in the initial set-up.

Combining loan types

The loans ABC with a minimum amount of 250,000 euros each can be combined. For example, type A, 250,000 euros and type B 250,000 euros, which results in a combined interest, a storage, and repayments in years 5 and 10. We focus on the individual loan types and the market conformity. We assume that, based on market conformity for the individual types, a combination of types should also be market conform.

Three scenarios of loans ABC

We discuss three possible scenarios for the loans ABC. If the lenders receive their interest and the principal plus the storage and bonus at maturity, we classify the scenario as good. If the lenders do not receive the interest, which means that a default occurs, we classify the scenario as neutral in case the shortage is 0%. This is the case since no shortage means that the repayment to the lenders is at least the principal of their loan. We classify the third scenario, bad, in case the company defaults and an auction takes place that results in a shortage.

We design equations to calculate the repayment percentages based on Table 4 as follows: 60% < Auction value < 80%:

$$R_C = 100\% - 5 * (80\% - AV), \quad (10)$$

$$R_B = 100\% - 3.5 * (80\% - AV), \quad (11)$$

$$R_A = 100\% - 1.5 * (80\% - AV), \quad (12)$$

with

- R_C: Repayment percentage of loan type C.
- R_B: Repayment percentage of loan type B.
- R_A: Repayment percentage of loan type A.
- AV: Auction value percentage of initial market value.

We set these equations for an auction value between 60% and 80% because Equation 10 results in a repayment of 0% for loan type C for an auction value of 60%. We show the repayment percentages that can occur in Figure 5.

Repayment	**80%**	**78%**	**76%**	**74%**	**72%**	**70%**	**68%**	**66%**	**64%**	**62%**	**60%**
C	100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%
B	100%	93%	86%	79%	72%	65%	58%	51%	44%	37%	30%
A	100%	97%	94%	91%	88%	85%	82%	79%	76%	73%	70%

Figure 5. Repayment percentages for an auction value between 80% and 60%.

In Figure 6, we show an example with an auction value of 70% of the initial value of the portfolio and the corresponding repayments for the loans ABC.

Example portfolio	€	100,000,000	
Auction value	€	70,000,000	70%

	Initial financing structure		Repayment value		Repayment percentage
20% Company's equity	€	20,000,000	€	-	0%
10% Type C	€	10,000,000	€	5,000,000	50%
10% Type B	€	10,000,000	€	6,500,000	65%
10% Type A	€	10,000,000	€	8,500,000	85%
50% bank loan	€	50,000,000	€	50,000,000	100%

Figure 6. Default priority rules example in case of an auction value of 70%.

In Figure 5, the repayment for C is 0 for an auction value of 60% which means that for an auction value between 50% and 60% the Equations 10, 11, and 12 can not be used anymore. For an auction value between 50% and 60%, we change Equations 11 and 12 as follows:

$$R_B = 30\% - 7 * (60\% - AV), \quad (13)$$

$$R_A = 70\% - 3 * (60\% - AV). \quad (14)$$

The decrease of repayment in Equations 13 and 14 have the same magnitude as in the initial set-up, but we incorporated that loan type C has no repayment for an auction value less than 60%. Filling in repayment = 0 for Equation 13, results in an auction value of 55.71%. The corresponding repayment of A, using AV = 55.71% in Equation 14, is 57.13%. For an auction value between 57.13% and 50%, only type A has a positive repayment. To calculate the last decrease in repayment for type A, we suggest the following equation:

$$R_A = 57.13\% - 10 * (55.71\% - AV). \quad (15)$$

Using Equations 13, 14 and 15, we show the following repayment overview for an auction value between 60% and 50%:

Repayment	**60%**	**58%**	**56%**	**55.71%**	**54%**	**52%**	**50%**
C	0%	0%	0%	0%	0%	0%	0%
B	30%	16%	2%	0%	0%	0%	0%
A	70%	64%	58%	57.13%	40%	20%	0%

Figure 7. Repayment percentages for an auction value between 60% and 50%.

Repayment for the company in case of a default

The company has the third right of repayment, which they use to show potential lenders that they incur the most risk themselves. The company only receives a repayment in case the bank and lenders are repaid in full. The corresponding auction value for a repayment for the company is an auction value above 80% of the initial market value. We can define the repayment for the company, for an auction value between 80% and 100%, as follows:

$$R_{CE} = 100\% - 5 * (100\% - AV), \quad (16)$$

with

- R_{CE}: Repayment percentage of the company's equity.

Option of early retraction

The option of early retraction grants the lender a certain liquidity. This early retraction has a maximum which we use to analyze the advantage for the lender. In Table 5, we show that for loan types A, B, and C the option of early retraction is 20%, 10%, and 5% respectively with a notice period of three months and no costs. We define the lender's liquidity, only taking the early retraction without costs into consideration, as follows:

$$LL_i = X_i * P_i, \tag{17}$$

with

- LL_i: Lender's liquidity of the loan for i: A, B, C.
- X_i: Early retraction percentage without costs which is 20%, 10%, 5% for i: A,B,C.
- P_i: Principal of the loan for i: A, B, C.

In Table 6, the possible early retraction option with a cost is shown. Type A does not have a maximum percentage in the first set-up. In a discussion with the management, we concluded that a maximum might have to be set in order to decrease the liquidity requirement for the company. We discuss this in detail in Section 5.6. Another aspect, which can be discussed in future research, is whether the lender values this high possibility of early retraction, or if a max of for example 40% is also sufficient. Moreover, does the lender value this option at all or do they prefer a higher interest percentage.

The cost to compensate for an early retraction is 1.5% per year for loan type A, B, and C respectively over the duration until retraction. We add the early retraction with a cost to Equation 17 which results in the following equation of the total lender's liquidity:

$$LL_i = (X_i + Z_i) * P_i - (Z_i * C_i * n), \tag{18}$$

with

- Z_i: Early retraction percentage with costs which is 20%, 10%, 5% for i: A,B,C.
- C_i: Cost of the early retraction of 1.5% for i: A, B, C.
- n: Number of year.

The puttable option in the loans ABC knows the risk that lenders can retract capital in case a more beneficial interest can be received with another investment. We assume that this does not have a significant effect on loans ABC since the option of early retraction without costs is less than 20% for every type.

5. Effect of the loans ABC on the portfolio of the company

To analyze the effect of the loans ABC on the portfolio, we first discuss the current portfolio. In order to do this, we discuss literature regarding the valuation of real estate properties. The literature consists of general definitions, the WACC, the capitalization method, the DCF method, and the effect of maintenance on the expected market value of a property.

5.1 Literature on portfolio level

To understand the basics with regard to valuations, we introduce a few definitions. Starting with real property which is defined as “all the interests, benefits, rights and encumbrances inherent in the ownership of physical real estate, where real estate is the land together with all improvements that are permanently affixed to it and all appurtenances associated thereto” (Pagourtzi et al., 2003). This means that both benefits and drawbacks have to be considered.

Market value is defined in the European Valuation Standards (EVS) as “the estimated amount for which the property should exchange on the date of valuation between a willing buyer and a willing seller in an arm’s length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently and without being under compulsion” (Associations, 2016). It is important to note that the moment a market value of a property is estimated, this does not mean that there is a willing buyer. Moreover, even if a transaction took place for a certain price, it does not mean that this price will be bid again on the market. This is the case since the parties involved in the transaction are unique, which means that the price represents the agreement of these parties and not an overall consensus (Geltner et al., 2001).

The International Financial Reporting Standards (IFRS) defines reporting standards. To calculate the market value of a real property the IFRS allows the use of three main methods, the market approach, the income approach, and the cost approach (Associations, 2016). The market approach is based on prices of similar properties, but the properties in the portfolio are too unique to do this. The cost approach is also not suitable for the portfolio since the rebuild value and market values can deviate a lot. The income approach is suitable, that is why we explain this method in more detail. The two main types of the income approach are the capitalization method and the DCF method (Associations, 2016). The capitalization method, consisting of the gross initial yield (GIY) and net initial yield (NIY), uses an income stream to calculate a value. The general thought is that the gross or net yearly rent of a property is divided by the GIY or NIY respectively in order to approximate the market value.

Weighted average cost of capital

We discuss the WACC because this is the basis for the leverage of a real estate company. Leverage means that the cost of debt of a bank loan is lower than the interest received for owning a property. The same applies for the implementation of loans ABC. We think that the theory of the WACC and the incorporation of loans ABC is basis knowledge to understand this chapter. In the WACC, the costs of capital of different fundings are averaged using the weights of the proportions (Miller, 2009) according to the following equation:

$$WACC = \left(\frac{E}{V} * r_e\right) + \left(\frac{D}{V} * r_d * (1 - T_c)\right), \quad (19)$$

with

- E: Market value of the company's equity.
- D: Value of the company's debt (Bank loan).
- V: E + D.
- r_e: Cost of equity.
- r_d: Cost of debt.
- T_c: Corporate tax rate.

We change Equation 19 to suite the situation of the company as follows:

$$WACC = \left(\frac{E}{V} * r_e\right) + \left(\frac{L}{V} * r_L\right) + \left(\frac{D}{V} * r_d * (1 - T_c)\right), \quad (20)$$

with

- L: Value of the loans ABC.
- V: E + L + D.
- r_L: Interest of loans ABC.

The return of the portfolio has to be distributed to the bank, lenders, and the company itself. The bank loan and loans ABC will have a defined value. This differs from the market value of the company's equity, which is not a fixed value and can be calculated using:

$$E_F = M_P - D - L, \quad (21)$$

with

- E_F: Market value of the company's equity.
- M_P: Market value of the portfolio.
- D: Market value of the company's debt (Bank loan).
- L: Value of the loans ABC.

To approximate the market value necessary in Equation 21, we discuss the capitalization and DCF valuation methods.

Capitalization method

Based on the theory of the capitalization method, we discuss the parts of this valuation method which results in Equation 22. The capitalization methodology uses one year's net income and divides it by the "capitalization rate" (income multiplier), which is based on the market (Nilsson et al., 2002). Although the capitalization rate is based on the market, it might be necessary to make adjustments based on characteristics of the specific property.

The first step in this method is to calculate the net rent of a property. This is the gross rent minus all costs of owning and maintaining the property.

The second step is to calculate a preliminary value using the net rent and cap rate. The cap rate represents the required return for investors. The cap rate can be defined as the required return – income growth, in which the required return is the sum of the risk-free rate and the risk premium (Devaney et al., 2019). A typical value used for the risk-free rate is the government bond yield. The risk premium depends on factors like the term structure of interest rates, the spread between corporate and government bond yields, and the risk premium demanded by investors. Moreover, the risk premium also depends on specific parameters for individual properties. For example, a top located office will have a low risk, meaning that its cap rate will also be low.

The market rent is divided by the cap rate, meaning that a lower cap rate results in a higher value of a property, and vice versa. For the rent, a higher value means a higher property value and vice versa. This relationship can be two-fold, since a combination of a higher rent and lower cap rate means that the value of the property is increased both due to a higher numerator and lower denominator. An example is the difference between a very well and a very badly located office building. The former has a high rent and low risk, while the second has a lower rent, and a higher risk.

The third step in the capitalization method is to incorporate corrections in the preliminary value. These can be monetized corrections or corrections on the cap rate. Standard costs, like maintenance, are included while calculating the net rent, but non-standard costs, like renovations or investments, are not included. These costs have to be subtracted from the property value.

The fourth and last step in the capitalization method is to incorporate transfer tax. From January 2021 the transfer tax for housing and commercial properties is 8% (Government, 2020). To correct the preliminary value for this transfer tax, the value after all corrections has to be divided by 1 plus the transfer tax. The resulting value is the market value of the property.

$$Market\ value = \frac{\left(\frac{Gross\ rent - Costs}{Cap\ rate} - corrections\right)}{(1 + transfer\ tax)} \tag{22}$$

The capitalization method is a specific case of a perpetuity. Based on the assumption that yearly a certain cash flow is received, the market value is approximated.

Discounted cash flow method

In the second valuation method, the DCF, the value of the property is equal to the Gross Present Value (GPV), of the rental income, at the discount rate (D'Arcy et al., 2005). All costs that occur over the time span, like renovations, in order to maintain the rentability of the property are considered. The reason is that, if a building is not brought up to current standards, it is unreasonable to assume that the rental income will continue in the future (Reinert, 2020). Based on a time span of 15 years and theory regarding the DCF, Equation 22 can be expanded in:

$$Market\ value = \frac{\left(\sum_{n}^{T} \frac{F_n}{(1+r)^n} + \frac{\frac{Initial\ yearly\ rent}{(GIY + (0.1\% * T))}}{(1+r)^T} \right)}{(1 + transfer\ tax)} \tag{23}$$

with

- F_n: Future yearly cash flow.
- r: Discount rate.
- n: Number of year.
- GIY: Gross initial yield ratio.
- T: 15.

In Equation 23, the summation in the formula is the discounted value of the future cashflows over the time span. At the end of this period, a residual value is calculated. This residual value is calculated using the GIY method as explained before, with a correction for the GIY ratio. This correction is shown in the term (GIY + (0.1% * T)) which is the exit yield. This implies that the GIY ratio is increased by 0.1% per year. This is based on a rule of thumb which was indicated by several appraisers.

If we assume an office building with a GIY of 8%, the GIY in year 15 is 9.5%. The value of the office building decreases with 16% in 15 years, only considering the change in GIY, which is calculated as follows:

$$\frac{\frac{1}{0.08} + \frac{1}{0.095}}{\frac{1}{0.08}} = 16\%. \tag{24}$$

Opinions on the exit yield are not always consistent since some actors in the market argue that there could be a rule of thumb, while others use the same value as the initial yield (Hungria-Garcia et al., 2004). It might be possible that the exit yield is equal to the initial yield, or even less. For example, the value of office buildings in Amsterdam increased in the third quarter of 2018 by 27.4 percent compared to the same period in the previous year (Solanki, 2018). The exit yield depends to a certain extent on the expenses of maintenance which is discussed in the section “Maintenance and property value”.

Application of the methods

The capitalization and DCF valuation methods are both based on the yearly cash flows that result from exploiting a property. These yearly cash flows are constructed using market conform values, current contracts, and expectations. The cash flows are based on yearly values, but the actual rent is received monthly. The two valuation methods are not suited to use directly for the analysis of the portfolio. This is the case since these methods approximate the value of a property, but not the viability of the portfolio.

We use the capitalization method to the extent that we analyze factors considered in this method. Besides the factors, we use the method of approximating the value of the portfolio based on yearly cash flow. The capitalization method is suited to appraise properties but we focus on the risk of properties which is why we do not use this method directly.

The DCF method is based on all cash inflows and outflows in the coming years and a certain exit yield. In this case study, the exit yield is not relevant since the goal is to maintain the portfolio, but the cash flows in the coming years are important. In the DCF method, these cash flows are discounted to the present value. For the scenario analysis, the present value is not the focus because we focus on the viability in the coming years. That is why we use the process of defining all the cash flow over the years in the scenario analysis, but we do not discount these values.

We consider the basis of both valuation methods. We base the analysis of the portfolio on a scenario analysis, but we use the theory of the valuation methods to decide upon the input of the scenario analysis

Maintenance and property value

Maintenance is an important aspect in commercial real estate. In maintenance management, maintenance types like corrective, preventive, or predictive maintenance are known with their benefits and drawbacks (TWI, 2021). These types can also be used with regard to real estate, but this does not take the differences with regard to the effect on the value of the property into account.

Maintenance management can be described as: “the effective and efficient utilization of resources to ensure that the process and its facilities are kept operable to standards required by the users” (Allen, 1993). This definition focuses on the users, but it is not clear whether potential future standards or preferences are already included. Another way to define this is to describe maintenance based on two types of depreciation, namely economic depreciation, and physical depreciation. Economic depreciation refers to the fluctuation of market value of the property and physical depreciation expresses a loss in value from the cost of new (Manganelli, 2013). The economic depreciation is a result of changes in the economy in general. The physical depreciation can be divided in two parts, namely the lifespan and the income decay due to lesser utility of the building compared to a present-day building.

It is important to take the amount of money spent on different types of maintenance into account. This is the case since it has an effect on the income decay of the physical depreciation. Increasing the utility of a property, might result in a higher received rent. Moreover, the lifespan of a building might be prolonged. Together with the economic depreciation, these parts influence the future value of a property. The economic depreciation can not be controlled in a similar way as physical depreciation, but economic changes have to be monitored by a real estate company to be able to anticipate.

5.2 LTV ratio and leverage

In Section 5.1, we discussed theory that we use in the analysis of the portfolio. From this section on, we first discuss the LTV ratio and leverage. Secondly, we discuss the valuation methods, a basic method to approximate the LTV, and the costs of the company in order to analyze the portfolio. The analysis of the portfolio consists of the case of an individual real estate property, a portfolio overview, and a scenario analysis.

The LTV ratio is the percentage of a property or portfolio that is financed with a bank loan. The LTV only considers the bank loan with the right of first mortgage. To incorporate the loans ABC, we use the combined loan to value (CLTV) ratio.

The company wants to finance properties with a maximum LTV of 50%, but we argued that the bank allows an LTV up to 70%. Using a bank loan to finance properties results in a leverage, in positive and negative situations. The risk related to the higher return consists of the increased obligations. In Figure 8, we show the relation between the LTV and the return for a net rent of 8.5% and bank interest of 2.75%, using the following equations:

$$NR = (LTV * r_b) + (1 - LTV) * r_e, \tag{25}$$

$$\frac{NR - (LTV * r_b)}{(1 - LTV)} = r_e, \tag{26}$$

with

- LTV: Loan to value ratio.
- NR: Net rent percentage of initial value of a property.
- r_b: Interest on bank loan.
- r_e: Return on equity.

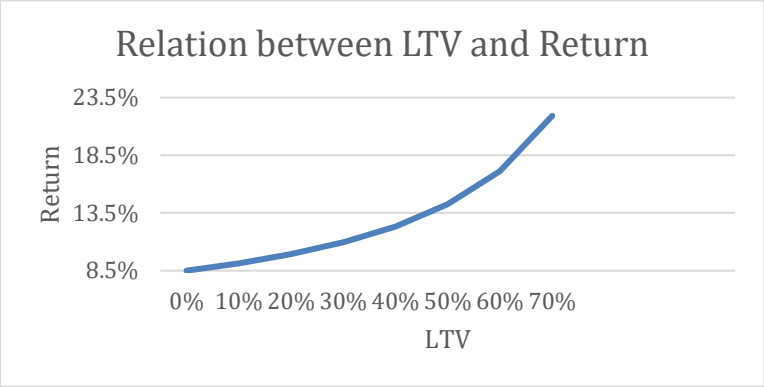


Figure 8. Relation LTV and return.

We add the loans to Equation 26 in Equation 27 to see the division of the total return. Adding the loans ABC also increases the leverage. In Equation 28, we use the equity percentages of Figure 1 and the IRR values for the loan types A, B, and C. For the bank loan, we add a redemption of 6.67% (R) based on the repayment period of 15 years as defined in Table 1.

This results in the return for the company after the payment of bank interest, direct interest, and the bank redemption which is:

$$\frac{NR - (LTV * (r_b + R) - (P_A\% * r_A) - (P_B\% * r_B) - (P_C\% * r_C)}{(1 - LTV\% - P_A\% - P_B\% - P_C\%)} = r_e, \quad (27)$$

$$\frac{8.5\% - (50\% * (2.75\% + 6.67\%) - (10\% * 4\%) - (10\% * 2\%) - (10\% * 2.75\%)}{(1 - 50\% - 10\% - 10\% - 10\%)} = 22.9\%, \quad (28)$$

The 22.9% shows the effect of the leverage in the initial set-up of the company in the years before maturity.

The yearly cash flows of the company in this set-up, not taking the repayments of loans ABC into account, are positive. The thought of the company is that their return on equity, which is based on the leverage, is stored over the years and used to repay the loans at maturity. In the liquidity assessment and Monte Carlo simulation, we discuss whether the liquidity position of the company is sufficient in years 5, 10, and 15 to repay the loans A, B, and C respectively.

5.3 GIY/NIY and DCF methods in order to assess the portfolio

In this section, we discuss the GIY, NIY, and DCF methods in order to assess the portfolio. We use the theory of the valuation methods to design an overview of the portfolio and describe the factors that influence the value and risk of properties.

For the valuation of the portfolio, the methods are suited as explained in Section 5.1. Moreover, two appraisers stated this in an interview and these methods are used in the taxation records of 2016. If the company requests a bank loan in order to refinance properties or to purchase a property, a taxation record is obliged by the bank.

We discussed both valuation methods in Section 5.1 but we give a practical example of the NIY ratio. The concept of the capitalization method is that the initial yield is divided by the GIY or NIY ratio to get to the market value of a property. The NIY is comparable to the GIY, but the costs are subtracted from the initial yield which can be seen in the following equations:

$$Market\ value = \frac{\frac{\text{Initial yearly rent}}{\text{GIY}}}{(1 + transfer\ tax)}, \quad (29)$$

$$Market\ value = \frac{(\text{Initial yearly rent} - \text{Costs})}{\text{NIY}} \over (1 + transfer\ tax), \quad (30)$$

with

- Costs: Yearly costs of the property.

Appraisers have rough approximations for the GIY ratio. A low-risk rental home can have a GIY ratio of for example 4%, while an office building (with most likely more risk) can have a GIY of for example 8%. These ratios can be rewritten to a multiplier, by dividing 1 by the ratio, which corresponds to a multiplier of 25 for the rental home and 12.5 for the office building, not taking transfer tax into account. In the field of real estate, this multiplier is used in discussions.

If for example a rental home with a monthly rent of 700 is discussed and a real estate expert estimates the gross multiplier at 25. The following rough approximation can be made:

$$Market\ value = yearly\ rent * multiplier,$$
$$Market\ value = 700\ euro * 12 * 25 = 210.000\ euro.$$

In Section 5.7 we discuss factors that influence the market value of a property, but a real estate expert can incorporate assumptions in its estimation of the gross multiplier. In a taxation record of a property, all different factors are discussed in detail, but in the example above, we explained a basic method to estimate a market value.

We argue that it is important to note that different appraisals can result in different values for the same property. This can occur due to opinions of the experts themselves. In both valuation methods, assumptions have to be made on for example maintenance. The expense for maintenance is a part of the yearly costs, but in the DCF method the maintenance might also have an effect on the exit yield. This is the case since investing a lot in renovating a property can result in a high exit yield. This is also why a real estate company might value a property differently than appraisers. We do not discuss that in this thesis, but it is an interesting topic for future research.

In a taxation record, both the capitalization and DCF method resulted in a value with a difference of less than 5000 euros. These values are close which we think is remarkable. On the one hand, it can seem like parameters are changed in order to get to similar values. On the other hand, if both methods have no remarkable values, it can be seen as a check.

The theory of appraisal methods might be comprehensible for potential lenders but becoming an expert is a different level of understanding. The company, and other real estate firms, enable lenders to invest in real estate, while not having to do the “work” themselves and rely on the managers’ expertise. It might be the case that lenders have confidence in the properties of the portfolio, or the management of the company, after which they decide to purchase a loan. Although the lenders can have confidence in a real estate company, the company has to be transparent about valuations and the parameters.

5.4 Basic model for an indication of the LTV of the portfolio

The two appraisers that we interviewed stated the following two rules to approximate the market value of a portfolio:

1:

$$Market\ value = \frac{Gross\ rent * 10}{(1 + transfer\ tax)}, \tag{31}$$

2:

$$Market\ value = \frac{(Gross\ rent - 15\%) * 12}{(1 + transfer\ tax)}, \tag{32}$$

$$Market\ value = \frac{Gross\ rent * 10.2}{(1 + transfer\ tax)}. \tag{33}$$

If we use the concept of the multiplier as before, the multipliers for Equations 31 and 32 are 10 and 10.2 respectively. These values represent the market value of a property. In case a property is sold, a potential buyer does have to pay the transfer tax and other costs.

The appraisers both argued that these rules are well known among appraisers and based on decades of experience. Besides their argumentation, we chose to use these rules because they are suited to increase the complexity step by step. The 15% in the second formula is an approximation of the costs, which we can define in more detail if necessary.

For the year 2016, both the rental income and taxation values are available. We can perform a check of Equations 31 and 32. Using a gross rent of 4,275,000, from Table 1, a market value of 39,583,333 and 40,375,000 result from Equations 31 and 32 respectively. The market value according to the taxations in that year is 41,715,000, copied from Figure 3, meaning that Equations 31 and 32 result in a 5.11% and 3.21% lower value respectively.

In the assessment of the portfolio, it is important to have an indication of the LTV ratio. The rules in combination with past taxation values give an indication of the value of the portfolio. If economic conditions change and for example a large decrease in the rental income occurs, this can have an effect on the value of the portfolio and the corresponding LTV. The rules of thumb can directly give an indication of this, while performing taxations for all properties is expensive and takes a certain amount of time.

The valuation of the portfolio is also used to assess whether the maximum percentages of loans ABC are not exceeded. The rule of thumb is in our opinion not sufficient to decide upon this, but in combination with the expertise of the company, and past taxation records a reasonable approximation can be made.

5.5 Costs and expenses of the portfolio

In the analysis of the portfolio, we consider the total costs because the scenario analysis focuses on the risk of the whole portfolio. Another choice would be to assign costs to individual properties, but values can differ over the years. For example, a project team can focus on a property in a certain year and another property the following year.

The risk for the loans ABC is a default of the case company. To assess the viability of the company, we first analyze the financial result, which is based on the information from the annual report. The financial result is calculated starting with subtracting the costs of sales from the rental income. Cost of sales include for example gas and electricity which are directly charged to the tenant. The resulting value is called the gross turnover. The second step is to subtract all costs originating from:

- Personnel.
- Depreciation.
- Operating.
- Sales commissions.
- General.
- Project development.

The resulting value is the operating result. The third step is to subtract all interests from the operating result. This includes interests paid to bank and interests paid on the loans ABC. This yields the result before tax. The fourth step, the taxes, decreases this result with a tax of 19% on a value until 200,000 euros and a tax of 25% of a possible remaining value above 200,000 euros.

The fifth step is to add the depreciation since this is a tax-deductible value, but not an actual cash flow. The sixth step is to subtract the result after taxes with the yearly amount of redemption.

Total Rental Income	€ 5,000,000
Costs of sales	€ 650,000
Gross turnover	**€ 4,350,000**

Costs	
Personnel costs	€ 400,000
Depreciation	€ 250,000
Operating costs	€ 450,000
Sales commissions	€ 35,000
General costs	€ 150,000
Project development Costs	€ 200,000
	€ 1,485,000

Operating result	**€ 2,865,000**
Interest	€ 625,000

Result before taxes	**€ 2,240,000**
Tax till 200k	€ 38,000
Tax above 200k	€ 510,000
	€ 1,692,000

Plus depreciation	€ 250,000
After taks result	**€ 1,942,000**

Redemption	€ 1,500,000
Result	**€ 442,000**

Figure 9. Financial result of the company.

The case of Figure 9 is representative for a small real estate company, but the costs can be allocated differently over the parts. If, for example, a lot of work is performed by personnel of the company, or if it is outsourced might change the overall result, but also the division of parts. In the assessment of the liquidity of the company, in case loans ABC are incorporated, we use the method to calculate the result as discussed in this section.

5.6 Cash flow of a property financed with loans ABC

We create a model that shows the situation of a fictional property in case it is financed with the proposed set-up of loans ABC. We incorporate the valuation principles of Sections 5.1 and 5.2 in the initial value, initial rent, and possible market value at maturity. In this valuation we use a NIY ratio of 8.5%.

We set the rent at 300,000 euros which is decreased with the yearly obligations, based on a taxation record, that consist of:

- Property tax 1%.
- Insurance 1%.
- Management fee 5%.
- Maintenance 5%.

These costs sum up to 12% of the rental income per year which we subtract from the yearly rent which means that a net rent of 264,000 euros per year is received. This net rent is used to pay financing costs, corporate taxes, and redemption of the bank loan.

We divide the net rent of 264,000 euros by the NIY and subsequently divide by 1 plus the transfer tax which results in an approximated value of 2,876,000 euros. To actually acquire this property, transfer tax of 8% does have to be paid and other costs like the notary or soil investigation which we assume to be 2%. This results in a total investment of 3,163,399 euros. The financing structure of this fictional property using loans ABC is shown in Figure 10.

Bank Loan	50%	€	1,581,699
Loan A	10%	€	316,340
Loan B	10%	€	316,340
Loan C	10%	€	316,340
Company equity	20%	€	632,680
	100%	€	**3,163,399**

Figure 10. Financing structure of the fictional property.

The interest and redemption of the bank loan are based on an annuity with 2.75% interest per year and repayment in 15 years. The annuity is calculated using the excel formula:

$$PMT = (Interest\ rate, n, PV, FV, Type), \tag{34}$$

with

- n: Number of year.
- PV: Present Value.
- FV: Future Value.
- Type: 0, means that the payment is at the end of the year.

We show the annuity payment and division of interest and redemption in Figure 11, which shows 180 monthly values. The interest decreases every month due to the lower loan, meaning that the redemption increases monthly.

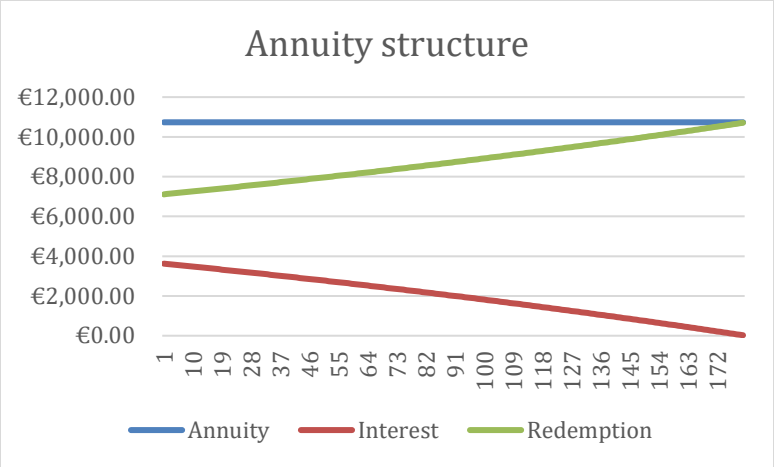


Figure 11. Annuity structure based on monthly values.

We subtract the interest paid on the bank loan and the interest payments to the loans ABC from the net rent. Then, we incorporate the corporate taxes of 15%. The result after corporate taxes is decreased with the redemption of the bank loan and the repayments of loans ABC which results in the yearly cash flow of the fictional property.
In this fictional case, the yearly indexation of the rent is set at 1.5%. We show the cash flow for the fictional property in Figure 14.

We summed the yearly cash flow in order to show the liquidity position in Figure 12. The liquidity position in years 5, 10, and 15 is 50,000, 60,000 and 70,000 euros respectively which is about 25% of the net yearly rent. Not taking other aspects in consideration, a decrease in rent of 25%, which is a vacancy of three months, can result in a negative liquidity.

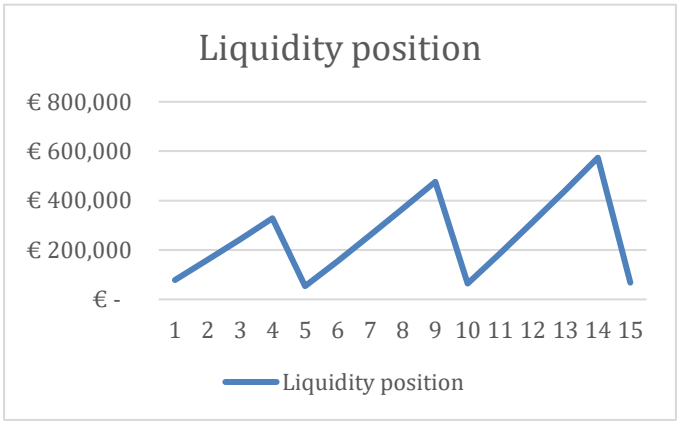


Figure 12. Liquidity position of the fictional property.

In the case of the fictional property, the company is able to repay loans A, B, and C in years 5, 10, and 15 respectively which means that the company owns 100% of the property at maturity.

In the set-up of this fictional property, the liquidity position of the company in every year is positive, meaning that in case the rent is received yearly, this structure is a viable investment. Although the liquidity position in the normal case is positive, the return for the company and the option of early retraction has to be assessed.

The equity that the company acquires is their benefit in this structure since the company does not receive interest. To calculate the return of the company, the value of the property at maturity has to be approximated. We base this approximation on an increased rent due to indexation and an increased GIY ratio due to time. In the theory, an increase in yield ratio between 0.1% and 0.3% per year is discussed. This results in the following interval of approximated market values:
Yearly increase of exit yield of 0.1%:

$$\frac{325{,}184}{0.085 + (15 * 0.001)} = 3{,}251{,}835\ euro. \tag{35}$$

Yearly increase of exit yield of 0.3%:

$$\frac{325{,}184}{0.085 + (15 * 0.003)} = 2{,}501{,}412\ euro. \tag{36}$$

If we take the value of Equations 35 and 36 and subtract the initial equity value of the company and add the liquidity at maturity, the return is 395% to 514% in 15 years. This corresponds to a yearly return, based on compound interest, of 9.59% to 11.53% for the company. The return of 395% to 514% seems significant, but the company does not receive direct interest over the time period of 15 years. Moreover, the company incurs a risk during this time span.

We based the market value in this example on the rules of thumb, but the market can change over time. Moreover, the prices of real estate are at a high level. This can increase the principal of loans ABC and the bank loan, which results in increased obligations to lenders. This decreases the liquidity position and the potential benefit of the company.

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Bank loan	€ 1,581,699	€ 1,495,308	€ 1,406,510	€ 1,315,239	€ 1,221,427	€ 1,125,001	€ 1,025,891	€ 924,020	€ 819,312	€ 711,689	€ 601,068	€ 487,366	€ 370,498	€ 250,375	€ 126,907
Loan A	€ 316,340	€ 316,340	€ 316,340	€ 316,340	€ 316,340										
Loan B	€ 316,340	€ 328,993	€ 342,153	€ 355,839	€ 370,073	€ 384,876	€ 400,271	€ 416,282	€ 432,933	€ 450,250					
Loan C	€ 316,340	€ 328,993	€ 342,153	€ 355,839	€ 370,073	€ 384,876	€ 400,271	€ 416,282	€ 432,933	€ 450,250	€ 468,260	€ 486,991	€ 506,470	€ 526,729	€ 547,798
Company's equity	€ 632,680	€ 632,680	€ 632,680	€ 632,680	€ 632,680	€ 632,680	€ 632,680	€ 632,680	€ 632,680	€ 632,680	€ 632,680	€ 632,680	€ 632,680	€ 632,680	€ 632,680
Total	**€ 3,163,399**	**€ 3,102,314**	**€ 3,039,836**	**€ 2,975,937**	**€ 2,910,592**	**€ 2,527,433**	**€ 2,459,112**	**€ 2,389,263**	**€ 2,317,858**	**€ 2,244,869**	**€ 1,702,008**	**€ 1,607,036**	**€ 1,509,648**	**€ 1,409,784**	**€ 1,307,385**
Rent	€ 300,000	€ 304,500	€ 309,068	€ 313,704	€ 318,409	€ 323,185	€ 328,033	€ 332,953	€ 337,948	€ 343,017	€ 348,162	€ 353,385	€ 358,685	€ 364,066	€ 369,527
Operating costs	€ 36,000	€ 36,540	€ 37,088	€ 37,644	€ 38,209	€ 38,782	€ 39,364	€ 39,954	€ 40,554	€ 41,162	€ 41,779	€ 42,406	€ 43,042	€ 43,688	€ 44,343
Net Rent	**€ 264,000**	**€ 267,960**	**€ 271,979**	**€ 276,059**	**€ 280,200**	**€ 284,403**	**€ 288,669**	**€ 292,999**	**€ 297,394**	**€ 301,855**	**€ 306,383**	**€ 310,979**	**€ 315,643**	**€ 320,378**	**€ 325,184**
Depreciation	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -
Bank interest	€ 42,413	€ 40,007	€ 37,534	€ 34,993	€ 32,380	€ 29,695	€ 26,934	€ 24,097	€ 21,181	€ 18,184	€ 15,103	€ 11,937	€ 8,682	€ 5,337	€ 1,898
Direct Interest A	€ 12,654	€ 12,654	€ 12,654	€ 12,654	€ 12,654	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -
Direct Interest B	€ 6,327	€ 6,580	€ 6,843	€ 7,117	€ 7,401	€ 7,698	€ 8,005	€ 8,326	€ 8,659	€ 9,005	€ -	€ -	€ -	€ -	€ -
Direct Interest C	€ 8,699	€ 9,047	€ 9,409	€ 9,786	€ 10,177	€ 10,584	€ 11,007	€ 11,448	€ 11,906	€ 12,382	€ 12,877	€ 13,392	€ 13,928	€ 14,485	€ 15,064
Interest company	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -
	€ 70,093	**€ 68,288**	**€ 66,440**	**€ 64,548**	**€ 62,612**	**€ 47,976**	**€ 45,947**	**€ 43,871**	**€ 41,746**	**€ 39,571**	**€ 27,981**	**€ 25,329**	**€ 22,610**	**€ 19,822**	**€ 16,963**
Net rent - finance costs	€ 193,907	€ 199,672	€ 205,539	€ 211,511	€ 217,588	€ 236,427	€ 242,722	€ 249,128	€ 255,648	€ 262,284	€ 278,402	€ 285,649	€ 293,033	€ 300,556	€ 308,221
Corporate taks	€ 29,086	€ 29,951	€ 30,831	€ 31,727	€ 80,089	€ 35,464	€ 36,408	€ 37,369	€ 38,347	€ 107,829	€ 41,760	€ 42,847	€ 43,955	€ 45,083	€ 129,826
	€ 164,821	**€ 169,721**	**€ 174,708**	**€ 179,784**	**€ 137,499**	**€ 200,963**	**€ 206,314**	**€ 211,759**	**€ 217,301**	**€ 154,455**	**€ 236,642**	**€ 242,802**	**€ 249,078**	**€ 255,473**	**€ 178,394**
Depreciation	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -
Result	**€ 164,821**	**€ 169,721**	**€ 174,708**	**€ 179,784**	**€ 137,499**	**€ 200,963**	**€ 206,314**	**€ 211,759**	**€ 217,301**	**€ 154,455**	**€ 236,642**	**€ 242,802**	**€ 249,078**	**€ 255,473**	**€ 178,394**
Repayment A	€ -	€ -	€ -	€ -	€ 316,340	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -
Repayment B	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ 456,577	€ -	€ -	€ -	€ -	€ -
Repayment C	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ 557,288
Redemption Bank	€ 86,392	€ 88,798	€ 91,271	€ 93,813	€ 96,425	€ 99,111	€ 101,871	€ 104,708	€ 107,624	€ 110,621	€ 113,702	€ 116,868	€ 120,123	€ 123,468	€ 126,907
	€ 86,392	**€ 88,798**	**€ 91,271**	**€ 93,813**	**€ 412,765**	**€ 99,111**	**€ 101,871**	**€ 104,708**	**€ 107,624**	**€ 567,198**	**€ 113,702**	**€ 116,868**	**€ 120,123**	**€ 123,468**	**€ 684,195**
Yearly cashflow	**€ 78,429**	**€ 80,923**	**€ 83,438**	**€ 85,971**	**€ -275,266**	**€ 101,852**	**€ 104,443**	**€ 107,051**	**€ 109,677**	**€ -412,743**	**€ 122,940**	**€ 125,934**	**€ 128,955**	**€ 132,004**	**€ -505,801**
Liquidity position	€ 78,429	€ 159,353	€ 242,790	€ 328,762	€ 53,495	€ 155,348	€ 259,791	€ 366,842	€ 476,519	€ 63,776	€ 186,716	€ 312,650	€ 441,605	€ 573,610	€ 67,809

Figure 14. Cash flow of the fictional property.

Early repayment, no costs A	€ 63,268	€ 63,268	€ 63,268	€ 63,268											
Early repayment, costs A	€ 248,010	€ 242,949	€ 237,888	€ 232,826											
Early repayment, no costs B	€ 31,634	€ 31,634	€ 31,634	€ 31,634	€ 31,634	€ 31,634	€ 31,634	€ 31,634	€ 31,634						
Early repayment, costs B	€ 31,001	€ 30,369	€ 29,736	€ 29,103	€ 28,471	€ 27,838	€ 27,205	€ 26,573	€ 25,940						
Early repayment, no costs C	€ 15,817	€ 15,817	€ 15,817	€ 15,817	€ 15,817	€ 15,817	€ 15,817	€ 15,817	€ 15,817	€ 15,817	€ 15,817	€ 15,817	€ 15,817	€ 15,817	
Early repayment, costs C	€ 15,501	€ 15,184	€ 14,868	€ 14,552	€ 14,235	€ 13,919	€ 13,603	€ 13,286	€ 12,970	€ 12,654	€ 12,337	€ 12,021	€ 11,705	€ 11,388	
Total liquidity requirement	**€ 405,231**	**€ 399,221**	**€ 393,210**	**€ 387,200**	**€ 90,157**	**€ 89,208**	**€ 88,259**	**€ 87,310**	**€ 86,361**	**€ 28,471**	**€ 28,154**	**€ 27,838**	**€ 27,522**	**€ 27,205**	**€ -**

Figure 13. Maximum possible early retraction.

Required liquidity of the company

The required liquidity for the company consists of two parts, namely the repayments of the loans A, B, and C in years 5, 10, and 15 respectively and the liquidity for the option of early retraction. In Equation 18, we defined the lender's liquidity. To show the corresponding required liquidity for the company, we use the following equation:

$$LR = \sum_i (\,(X_i + Z_i) * V_i - (Z_i * C_i * n)), \tag{37}$$

with

- LR: Liquidity requirement of the company.
- X_i : Early retraction percentage without costs which is 20%, 10%, 5% for i: A,B,C.
- Z_i : Early retraction percentage with costs which is 20%, 10%, 5% for i: A,B,C.
- P_i: Principal of the loan for i: A, B, C.
- C_i: Cost of the early retraction of 1.5% for i: A, B, C.
- n: Number of year.

The term, $(Z_i * C_i * n)$, is the cost for the lender to compensate for an early retraction which increases with the number of years. This decreases the liquidity requirement for the company of a loan every year.

The company receives rental income and acquires equity over the years. The cumulative rental income is the liquidity position of the company. The acquired equity is not liquid due to:

- Forced sales of properties generally result in substantially reduced sale proceeds.
- Sales can take a significant amount of time.
- Early sales are in contradiction with the goal of the company to exploit the properties long term.

In order to assess the option of early retraction, we show the total possible retractable value in Figure 13. We show the total possible value combined with the liquidity position in Figure 15.

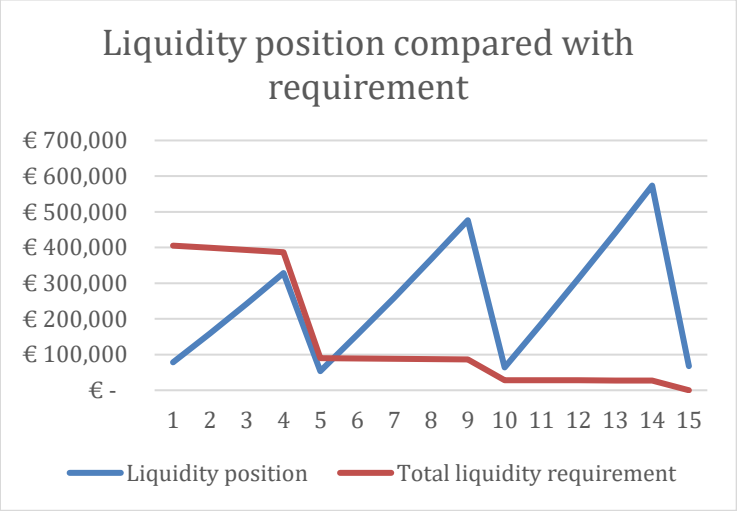


Figure 15. Liquidity position and the maximum early retractable value.

The early retractable value is significantly higher than the liquidity position in years 1 to 4 because type A does not have a maximum percentage of the early retraction option with costs. The current early retraction option without costs is 20%, meaning that 80% can be retracted with costs. To assess the liquidity requirement for different values, in the figure below we show the situations for a retractable value with costs of maximum 60%, 40%, and 20%.

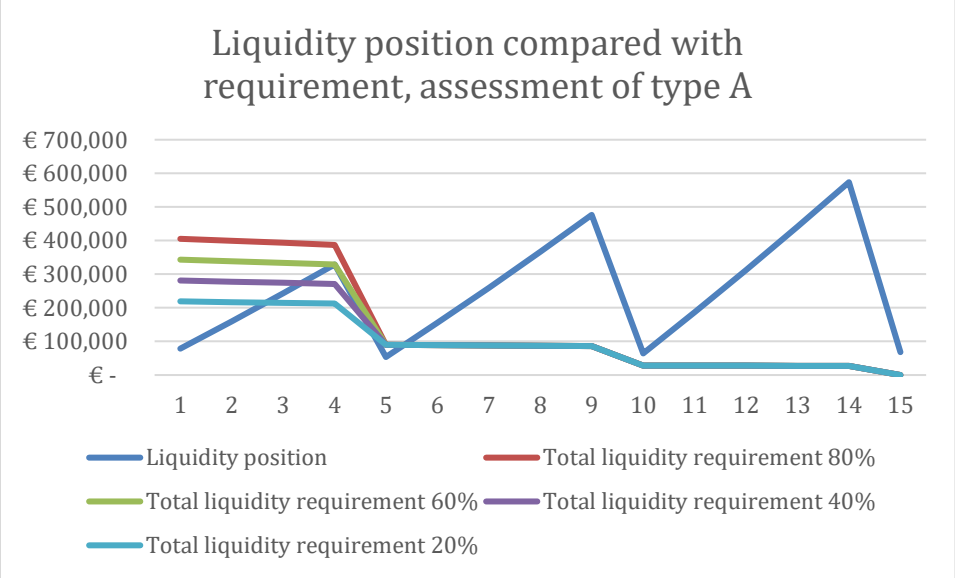


Figure 16. Assessment of retractable option of loan type A.

We show in Figure 16 that decreasing the option of early retraction with costs of type A, decreases the total retractable amount significantly. In case the maximum early retractable percentage of type A with costs is set at 20%, only in year 1 and 2 the maximum possible early retraction is above the liquidity position. The notice period of this early retraction with costs is 6 months, which means that this will only be problematic if the early retraction is before moment 1.5 year. That is why we recommend a maximum early retraction with costs of type A of 20%.

In Section 5.1, we discussed maintenance definitions and two main reasons for the change in property value. The economic depreciation refers to a decreasing value due to the environment. This part can not directly be influenced, besides from anticipation of managers on the market.

The physical depreciation depends on the amount of maintenance, and thus maintenance costs. If we assume that Equations 35 and 36 are a good indication of the future value, the maintenance costs should be taken into consideration. If the company spends a lot on maintenance, Equation 36 might be a better approximation of the future value, while low maintenance expenses might relate to Equation 35. A higher property value at maturity might be preferred, but the yearly costs will increase, meaning that the fictional property requires more liquidity.

Relation between values in loans ABC, capitalization factor, and liquidity

The rule of thumb of Equation 31, is based on a normal situation and no corrections for a inferior or superior property. In the fictional property a NIY of 8.5% is used which means a multiplier of 11.76. If this multiplier increases to, for example, 12.5, the property with the same yearly rent is acquired for a higher price. Therefore the principal of the bank loan and loans ABC are higher, meaning increased yearly payments.

An increase or decrease in the multiplier can be due to a higher or lower risk of a property or due to market conditions. The market conditions are for example the demand for real estate in general. If for example the return of stocks and bank savings decreases, the demand for real estate can increase. The risk of a property differs per investment opportunity and the market conditions are not in the scope of this research. In this research, we consider the multiplier and corresponding parameters in the loans ABC.

In the fictional property we use an NIY of 8.5% to approximate the value of the property. The NIY ratio of 8.5% in combination with yearly costs of 12% of the rent, result in a liquidity position of about 50,000 euros in year 15. If we only look at the liquidity position in year 15, and we assume that a positive value is a good result for the company, we can calculate the corresponding NIY ratio. The NIY ratio that results in a liquidity position of 0 in year 15 is about 8.35%.

Cash flow for the portfolio financed with loans ABC

In the case of the property financed with loans ABC, a certain liquidity is available. The storage in loan types B and C have the result that the repayment at years 10 and 15 is significant. Until years 10 and 15, the company builds up its liquidity position in order to be able to repay this.

The liquidity that the company builds towards the repayment should be reinvested in order to increase the rental income. Otherwise, the loans B and C increase over the years, thus the interest per year increases, while the company receives the same rental income. In this case, the company does own the whole property or portfolio at maturity but the leverage decreases over the years. If we set the rental income in the same model to 5 million euros, which is the rental income of the portfolio, the liquidity position is as shown in Figure 17.

On average the liquidity position is positive. Moreover, a significant amount of liquidity is available which is not invested. In this set-up, the portfolio should be expanded using the liquidity that is available due to the storage.

The problem that arises is that the liquidity position is close to 0 at years 5, 10, and 15. If liquidity is used to purchase properties, the liquidity positions will be negative in these years. The reason that the company lacks liquidity to do this is because it acquires equity over the years instead of only “cash”. We visualize the equity position of the company in Figure 18.

In the initial set-up, the company aims for an equity percentage of 20% while this increases significantly over the years. The company wants to expand the current portfolio, but if the company does not purchase additional properties, the leverage position will decrease. For example, in year 10, the company will own 70% of the portfolio.

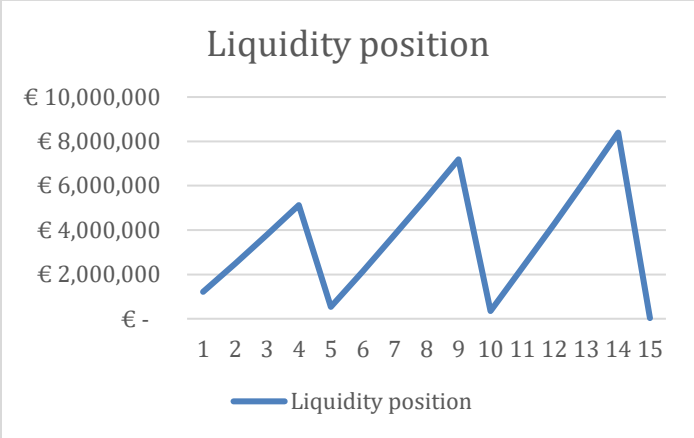


Figure 17. Liquidity position of the portfolio.

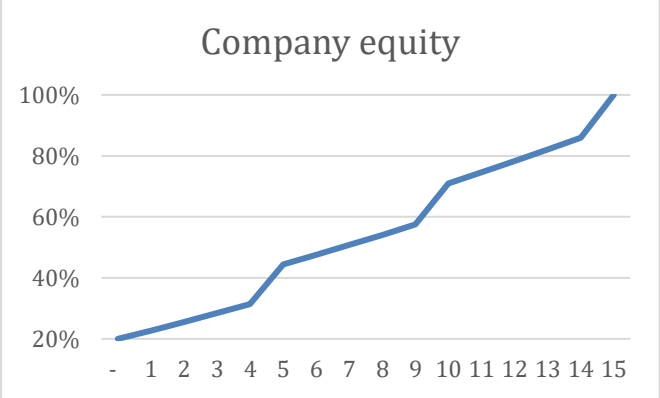


Figure 18. Development of the equity percentage of the company.

Direct interest instead of storage

We could analyze a different direct interest, storage, and bonus but due to the scope of this thesis we decided to only analyze the current set-up, and a set-up based on direct interest only. We discuss the return percentages in the current set-up in the remainder of the thesis based on the liquidity in combination with the portfolio assessment and competition.

We assess the set-up of a total direct interest instead of the current set-up that incorporates a storage in order to show the liquidity position. We perform this because the goal of the company is to incorporate the storage in order to build extra capital over the years and use that to purchase properties. In the previous section we showed that this is only possible in case extra financing is acquired. The case in which only direct interest is paid helps to analyze the potential of the storage.

The interest percentages of the initial set-up have an IRR of 4%, 6.21%, and 6.95% for type A, B, and C respectively. To compare this situation we set the direct interest for types A, B, and C to the value of the IRR and the storage and potential bonus to 0%. For the individual property, this results in the following liquidity position.

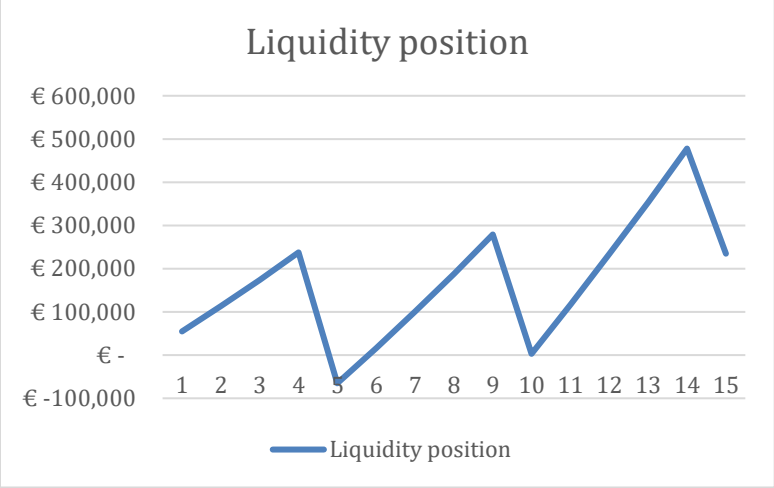


Figure 19. Liquidity position in the case of direct interest only.

The difference with the liquidity position based on direct interest only in Figure 19 and the initial set-up, in Figure 12, is that the liquidity position is lower in year 5 and is more starting from year 7. The total interest that has to be paid over the period of 15 years is lower for the case of direct interest only. If the company can not use the acquired equity and cumulative cash flow, it might be preferred to directly pay the interest. It is important to note that for the case with direct interest only, the liquidity position of the company is negative in year 5.

If we use the same method as in Equations 35 and 36, the interval of return for the company based on compound interest is 10.08% to 11.89%.

5.7 Factors in the assessment of the portfolio

In the example of Section 5.6, we analyzed an individual fictional property. Although this shows the liquidity requirements, the result of the company depends on the whole portfolio. Investment properties have several factors that have an effect on the risk. These factors can imply an increase or decrease of the required return. According to the theory in GIY/NIY, a lower required return results in a higher property value and vice versa. Possible factors are the following:

- Location.
- Interest rates.
- Economic outlook.
- Population and demographics.
- Supply and demand.
- Property market performance.
- Size and facilities.
- Aesthetics and deferred maintenance.
- Renovation and value-add potential.
- Redevelopment potential.
- Marketability (In Dutch often: “Courantheid” is used).

The most important factor, according to the management, is the marketability of a property. Marketability is a combination of several aspects, which the management summarized in the following:

- Location.
- Size and facilities.
- Re-rentability.

The reason that these are combined is because every different type of property has a different combination of the three factors above. Two other important factors are the contract durations and creditworthiness of the tenants. It is not decided which of these two is more important since different combinations can have different implications.

Based on these five factors, we create a model using the rules of thumb in Equations 31 and 32 which is shown in Figure 20, using a GIY ratio of 0.10.

Location	Rental income	Costs (15%)	Location	Size and facilities	Re-rentability	Contract duration	Credithworthiness	Market value	NIY	GIY
1	€ 2,000,000	€ 300,000	Neutral	eutral	Neutral	Neutral	Neutral	€ 20,000,000	11.8	10.0

Very bad
Bad
Neutral
Good
Very bad

Figure 20. Set-up of a more complex approximation of the market value of properties.

The process in the model in Figure 20, is that the NIY and/or GIY is changed based on the input for every factor. We define this change in Figure 21.

Estimation	Change in Ratio
Very bad	0.0075
Bad	0.00375
Neutral	0
Good	-0.00375
Very bad	-0.0075

Importance	Scale 1 to 10
Location	10
Size and Facilities	10
Re-rentability	10
Contract duration	10
Credithworthiness	10

Figure 21. Influence of factors on the NIY/GIY.

In the example in Figure 21, the initial ratio is 0.10, if for example the location is set to “bad”, this changes the ratio, as can be seen in the left of Figure 21, with +0.00375. In the right of Figure 21, the importance of a factor can be scored 1 to 10, based on the importance the ratio change is determined.

The model in Figure 20, is a more complex approximation of the market value than the rules of thumb in Equations 31 and 32, but it does not give an indication of the risk of loans ABC. The most important for the loans is that the interest is paid annually, and the loan amount is repaid at maturity. Although the market value of the portfolio, which can be used to calculate the LTV, and the percentage of loans ABC, does have an influence on obligations of the company. The main factor that determines the risks of the loans ABC is the viability of the company, meaning the revenue and costs which is our focus in this thesis.

The tool of Figure 20, gives an indication of the potential valuation of a real estate portfolio or property. It shows which factors can have an effect on the risk, which has to be considered in combination with market conditions regarding real estate. This theory applies for individual properties but also for the portfolio. The company wants to incorporate the loans to purchase additional properties which will be added to the portfolio, that is why we assess the market conformity of the loans ABC on portfolio level and not for individual properties.

The revenue depends a lot on the current contracts within the real estate portfolio. These contracts have a certain duration and credit worthiness of the tenant. We discuss these two aspects in Section 5.8.

5.8 Contract duration and creditworthiness

In this section, we first discuss definitions regarding contract durations and creditworthiness. Based on these definitions and discussions with the management, we define score models for both aspects. At last, we score the contracts in the portfolio and create an overview.

Contract duration

All the contracts of the tenants have a notice period. If a contract is not cancelled by either the company or the tenant before this notice period, the duration is extended with the extension term, which is also defined in the contract.

We score the contract duration based on the thought that the optimal lease length is chosen to balance the benefits of a short lease length with the expected costs of renegotiating a new contract (Tse, 1999). A benefit of a short-term contract is the possibility to anticipate on market conditions, but this is at the same time a drawback if market conditions worsen. Moreover, short contract durations can cause higher costs for negotiations, documentations, and possible concessions for new tenants. That is why the company aims for long contract durations.

Table 7. Intervals of contract durations.

Duration
Cancelled
Undetermined
0 – 1 years
1 – 3 years
3 – 5 years
More than 5 years

We discussed two possibilities to score the contract durations with the management of the company. The first was to assign a five-point scale ranging from very bad to very good, and the second was to use intervals of the duration values. The preferred method of the management is shown in Table 7. In this way, individuals can assess whether they think that contract durations are good or bad.

We added the score “undetermined” because this represents small tenants with flexible contracts. These contracts have a duration of one month and are automatically extended with one month. Moreover, these tenants are more likely to extend their contract.

Creditworthiness

We assess the creditworthiness of companies using a subscription of Creditsafe. This subscription provides B2B credit information for financial professionals and entrepreneurs (Creditsafe, 2021). Creditsafe itself notes on the website that it provides information to assess whether customers will pay an invoice or not. Creditsafe provides reports of individual companies containing at least a probability of default and a score between 1 and 100 which correlates to a credit score on a scale from A to E. This credit score describes whether credit should be provided to a company or not which can be seen in Appendix 2.

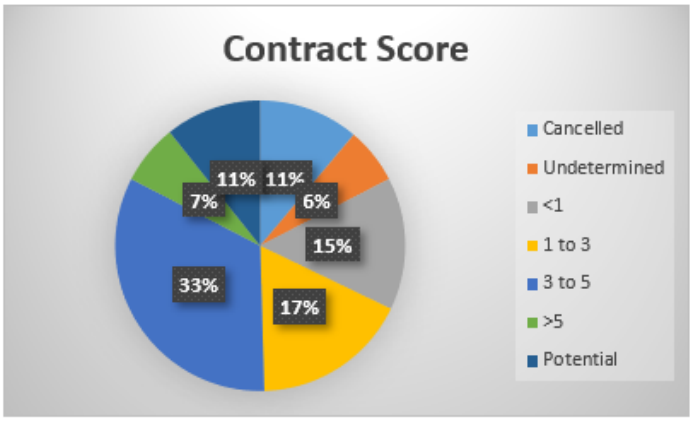
The management of the company indicated that they assess the financial results of new tenants besides the Creditsafe score. The amount of time spent on this depends on the rental income and the investment required for this tenant. This is important for the continuity of the rental income, and we recommend to continue assessing these. Moreover, in the strategy and advertisements should be indicated how they perform this. This is one of the aspects that the company can use to show their value.

In a discussion with the management, we decided that in the overview, the Creditsafe scores ranging from A to E can be used. Based on the overview, we can assess remarkable values for tenants in more detail.

Scores for contract duration and creditworthiness

To score the portfolio, we first score all individual contracts, after which we sum these for every separate location in the portfolio, continuing with the summation of the portfolio. The scores of the portfolio for both the contract duration and creditworthiness are shown in Figure 22. We created this overview in Excel in which the contract duration intervals can be adapted, after which a new overview is calculated.

Portfolio			
Contract score			
Cancelled	4	€	625,000
Undetermined	18	€	350,000
<1	41	€	825,000
1 to 3	27	€	975,000
3 to 5	14	€	1,850,000
>5	4	€	375,000
	108		
Potential	32	€	600,000
	140	€	**5,600,000**



Credit score			
A	14	€	550,000
B	42	€	2,725,000
C	33	€	975,000
D	4	€	350,000
E	15	€	400,000
	108	€	**5,000,000**
Potential	32	€	600,000
	140	€	**5,600,000**

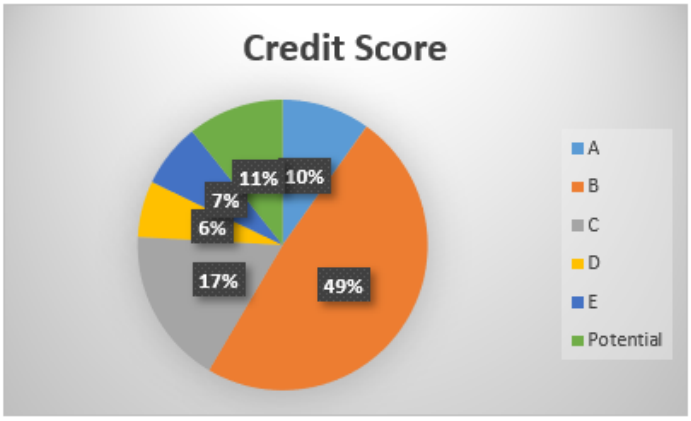


Figure 22. Contract score and credit score.

Conclusion of contract duration and creditworthiness

The overview of Figure 22, gives insights with regard to the current status of the portfolio and potential future scenarios. On the one hand the portfolio has significant potential, 12% of the current rental income, while on the other hand contracts of 12.25% are cancelled and 8% have a credit score of E.

The contract durations, <1 year, are 16.5% of the current rental income. It is likely that a lot of these contracts are close to the notice period, meaning that these have to be extended or cancelled soon. An example within the data is a contract with a maturity in 7 months, a notice period of 6 months, and an extension period of 5 years. This contract duration is now seen as quite “short” while it might be extended for five years.

Moreover, as mentioned by experts within the company, certain tenants are very likely to continue their contract. For example, a tenant with a store connected to a large corporation that is already a tenant for many years. We choose that we do not go into such details since this requires too many assumptions and it is not reproducible.

The credit scores of the tenants consist of 8% score E and 7% score D. In total score E and D consist of 15% of the rental income. We do not consider this amount as problematic for the company as long as these tenants are monitored strictly. The remaining 85% of the tenants have a credit score of C or above. The company should monitor the scores and payments of tenants. In case signs occur that a tenant has financial difficulties, actions have to be taken directly. This can vary from negotiations with the tenant to ending the contract and advertising the property.

The loans ABC have durations of 5, 10, and 15 years, which are not sufficient for an analysis of the risk. To be able to analyze the risk for a time span up to 15 years, we simulate new tenants in the scenario analysis.

5.9 Diversity of the portfolio

We analyze the diversity of the portfolio based on the tenants and asset types.

Diversity of tenants

A real estate portfolio with one tenant has a different risk than a portfolio with many tenants. In the case of 10 “small” tenants, the probability that one tenant cancels the contract or defaults is larger than for a portfolio with one large tenant. In general, the management of the company agrees with this theory, but it can occur that one reliable tenant is preferred over 10 small tenants. Although exceptions can take place, to show the diversity of the portfolio, we show the 10 largest tenants and a sum of the other tenants in the chart in Figure 23.

Tenant	Rent per year	% of portfolio
1	€ 700,000	14.00%
2	€ 310,000	6.20%
3	€ 300,000	6.00%
4	€ 295,000	5.90%
5	€ 275,000	5.50%
6	€ 250,000	5.00%
7	€ 225,000	4.50%
8	€ 200,000	4.00%
9	€ 175,000	3.50%
10	€ 165,000	3.30%
Other	€ 2,105,000	42.10%
	€ 5,000,000	100.00%

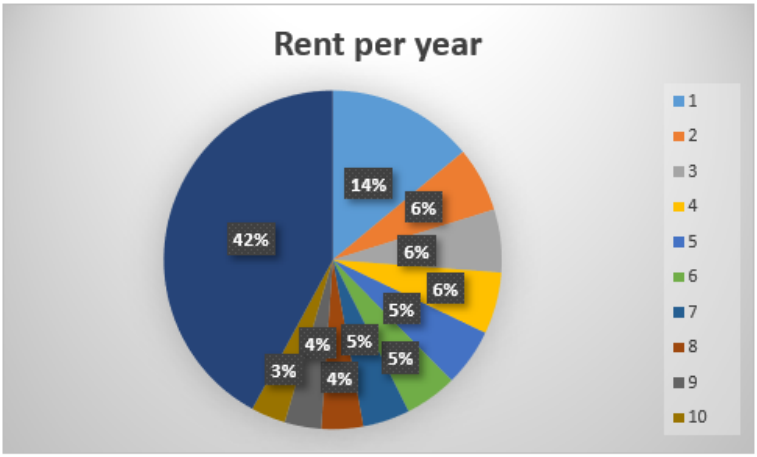


Figure 23. Diversity of the tenants of the portfolio.

Conclusion of the diversity of the tenants

The largest tenant is 14%, which is more than twice the second largest tenant. If this tenant cancels its contract or defaults, the decrease in rental income is significant. Tenants 2 to 6 are all at least 5% of the rental income, which is also a significant amount. The size and number of tenants do not have implications for the portfolio per se since the reliability of the different tenants can differ, but it is still important for the company to monitor the diversity. The diversity gives an indication of the decrease in rent in case large tenants default.

The pie chart gives an indication of the diversity, but the same applies as in the conclusion regarding the contract duration and credit worthiness. The diversity should be assessed in combination with the corresponding contract durations and credit scores. Besides, the diversity can have implications for costs because more tenants can result in more administrative work. Moreover, it becomes more difficult to maintain relationships with tenants.

In the potential situation, the portfolio will be expanded to a market value of 100 million euros. Using the rule of thumb of Equation 31, this corresponds to a rental income of 10 million euros. Not taking the size of potential tenants into consideration, the current largest tenant will have 7% of the total rental income in the potential situation instead of 14% now.

Diversity of assets

The assets of the portfolio have 4 types of which we show the diversity in Figure 24.

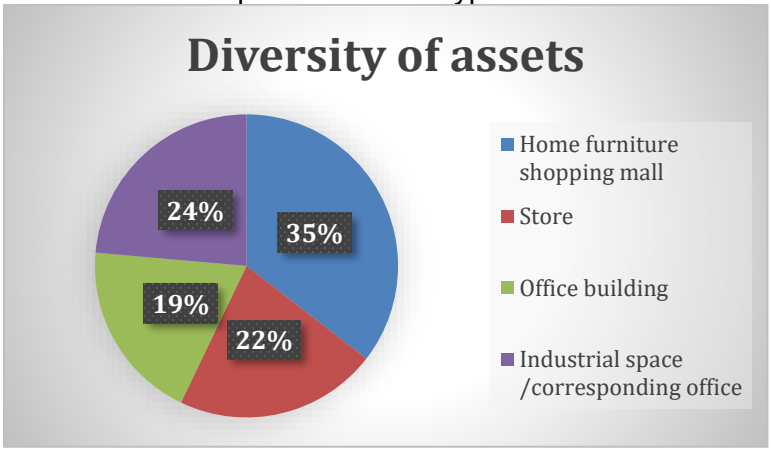


Figure 24. Diversity of the assets of the portfolio.

Conclusion of the diversity of the assets

The largest type, the home furniture shopping mall, is 35% of the portfolio. If this asset type is affected by economic conditions, this has a significant effect for the portfolio. It is difficult to analyze the portfolio based on these asset types since the asset types are in different locations.

We think that it is important that the company considers the diversity of asset types in the process of acquiring properties. Although the different locations of asset types should be incorporated in the analysis, the types still have implications for future decisions. If for example a property in the asset type home furniture shopping mall is offered to the company, the asset diversity should be taken in consideration.

Negative liquidity position of the company

In case the yearly cash flow of the portfolio is negative, the company has to use capital reserves if these are present. The capital reserve of the company is 930,000 euros. If the company runs out of capital, first a negotiation with the bank can take place. During the Covid-19 pandemic, banks had certain regulations. The following are stated on the web pages of large banks:

- ING: installments deferred by 6 months for real estate clients with a credit above 2.5 million (ING, 2020).
    - Certain possibilities to enlarge the loan, assessed by an advisor.
- ABN Amro: installments and interest deferred by 6 months (Amro, 2020).

The Covid-19 pandemic is an extreme situation in which a bank might allow certain reductions of payments, but a decrease of rental income can also occur while there is no crisis. ING and ABN Amro both state on their web pages that in difficult financial times for a company, their first step is trying to find a solution. This is the case since a bank does not profit from a company default. If the lead case company would default, the properties have to be sold (fast), which will decrease the obtained value. Moreover, it is likely that in case of a default, the rental income is low, meaning that the value of the properties is affected even more.

5.9 Scenario analysis

To analyze the asset portfolio of the company, we consider two types of scenarios namely intuitive and Monte Carlo, for which we base the input parameters on the overview of the portfolio. In the intuitive scenarios we consider the current revenue and costs of the company in order to determine possible situations. In the Monte Carlo scenario, we consider the current situation, and we generate new tenants, defaults, and vacancy periods in order to simulate a time span of 15 years.

In the two types of scenarios we focus on the rental income, of which we calculate the corresponding costs and financial result. In a discussion with the management of the company, we defined the following method to correct the costs of the current financial report to the corresponding scenario. We assume that an increase or decrease in rental income, results in an increase or decrease of costs. This correction is based on the process that objects can become vacant, or vacant objects can be leased. Moreover, a tenant with a higher agreed rent will most likely result in higher costs than a tenant with a lower rent.

The relation can be a correlation between -1 and 1, of which the actual values are shown in Table 8. In Appendix 3, we divide the different types of costs in more detail. Most of the types of costs have a correlation of 1. Three types of costs have a correlation of 0, meaning that a higher or lower revenue does not influence these costs.

In the Monte Carlo simulation, we incorporated randomness for both the rental income and costs. For the costs, this randomness is incorporated after we perform the correction of Table 8.

Table 8. Corrections on costs based on the revenue.

Type of costs	**Correlation**
Costs of sales	1
Personnel Costs	1
Depreciation	0
Operating Costs	0.8
Sales commissions	-1
General Costs	1
Project development costs	1
Interest costs	0
Interest to loans ABC	0
Taxes	19% till 200,000 25% above 200,000
Redemption bank loan	0
Repayment loans ABC	0

Intuitive scenarios

The rental income of the company can change due to tenant conditions. We use intuitive scenarios, to show the effect of possible situations. In Figure 25, we show a scenario with a rental decrease of 10%, a break-even case, and a best case. The correlation is between the rental income and corresponding costs of a scenario.

Occupation:	89.29%		80.36%	73.22%	100.00%
	Case	**Correlation**	**-10.00%**	**-17.99%**	**12%**
Total Rental Income	€ 5,000,000	-	€ 4,500,000	€ 4,100,254	€ 5,600,000
Costs of sales	€ 650,000	1	€ 533,033	€ 533,033	€ 728,000
Gross turnover	**€ 4,350,000**	-	**€ 3,966,967**	**€ 3,567,221**	**€ 4,872,000**
Costs		-			
Personnel costs	€ 400,000	1	€ 360,000	€ 328,020	€ 448,000
Depreciation	€ 250,000	0	€ 250,000	€ 250,000	€ 250,000
Operating costs	€ 450,000	0.8	€ 414,000	€ 385,218	€ 493,200
Sales commissions	€ 35,000	-1	€ 38,500	€ 41,298	€ 30,800
General costs	€ 150,000	1	€ 135,000	€ 123,008	€ 168,000
Project development Costs	€ 200,000	1	€ 180,000	€ 164,010	€ 224,000
	€ 1,485,000	-	**€ 1,377,500**	**€ 1,291,555**	**€ 1,614,000**
Operating result	**€ 2,865,000**	-	**€ 2,589,467**	**€ 2,275,667**	**€ 3,258,000**
Interest	€ 625,000	0	€ 625,000	€ 625,000	€ 625,000
Result before taxes	**€ 2,240,000**	-	**€ 1,964,467**	**€ 1,650,667**	**€ 2,633,000**
Tax till 200k	€ 38,000	0	€ 38,000	€ 38,000	€ 38,000
Tax above 200k	€ 510,000	0	€ 441,117	€ 362,667	€ 608,250
	€ 1,692,000	-	**€ 1,485,350**	**€ 1,250,000**	**€ 1,986,750**
Plus depreciation	€ 250,000	0	€ 250,000	€ 250,000	€ 250,000
After taks result	**€ 1,942,000**	-	**€ 1,735,350**	**€ 1,500,000**	**€ 2,236,750**
Redemption	€ 1,500,000	0	€ 1,500,000	€ 1,500,000	€ 1,500,000
	€ 442,000	-	**€ 235,350**	**€ -0**	**€ 736,750**

Figure 25. Intuitive scenarios.

The decrease in rental income of 10% results in a positive result. This prompts the question, what is the largest decrease in rent before the result is break-even. A decrease of the rent of 17.99% results in a break-even result, which is shown in the scenario in Figure 25.

The percentages increase and decrease in the figure above are relative to the current rental income. We can calculate the occupation in these scenarios based on the current occupation. The current occupation is:

$$Occupation = \frac{Current\ rent}{Current\ rent + Potential} = \frac{5{,}000{,}000}{5{,}000{,}000 + 600{,}000} = 89.29\%$$

Based on the current occupation of 89.29%, we added the occupations for the intuitive scenarios in Figure 25. This means that an occupation of the portfolio of 73.22% has a break-even result.

Monte Carlo Simulation

The overview of the portfolio and the intuitive scenarios give insights but lack the effect of combinations of different factors. For example, a contract with a duration less than a year that can be extended, or a contract with a duration of more than 5 years of which the tenant can default. Besides the combinations of factors, our goal is to assess the portfolio over a duration of 15 years. Possible scenarios to extend contracts over a longer period can be made on intuition, but we use Monte Carlo analysis because it enables a what-if analysis (Raychaudhuri, 2008).

Implications of different factors can be modelled using probabilities and random numbers. Using Monte Carlo simulation enables us to consider all possible results of the different input variables and correlations. The Monte Carlo method allows to not only show what could happen, but also the probabilities of situations visualized using graphs. The graphs and an indication of the effect of different input values are important in the communication with the stakeholders.

Statistical scenarios

The Monte Carlo scenario is a statistical scenario because we use a random number for every decision. We base decisions like an extension of the rental period, a vacancy period, or a default on a random number and a probability.

In the Monte Carlo simulation, we incorporate the possibility that difficult economic times or even a financial crisis can occur. We base the probability that this occurs on claims and averages of financial crises. Pollock (2015) argues that a financial crisis occurs about every decade. In an article by Kimberly Amadeo, the history of economic crises in the United States is discussed. Generally, a crisis in the US has financial implications globally. Overall once every 10 years the US seems to have a financial crisis (Amadeo, 2020). We assume that a good financial time has the same probability as a financial crisis. We base this assumption on the theory regarding economic cycles which states that an economic cycle is the overall state of the economy as it goes through four stages in a cyclical pattern (Investopedia, 2021).

We divide the scenario into three periods of 5 years. For every period, we determine whether the economy is good, neutral, or bad. The probability of difficult and good economic times is both 10% and with a probability of 80% the period will be neutral. We give all the parameters a value for each type of scenario. This randomness for the type of scenario is incorporated at the start of each scenario because tenant conditions are likely to be similar. If a financial crisis occurs, we assume that this influences all tenants. The parameters are as follows:

- S_G: Good Scenario.
- S_N: Neutral Scenario.
- S_B: Bad Scenario.

Input of the Monte Carlo simulation

In this section, we first discuss the input of the Monte Carlo simulation. Secondly, we show the outcome of the Monte Carlo scenario which we discuss in the last part of this section. In Appendix 5 we show the overview of all the input and output of the Monte Carlo simulation.

Input of the current rental contracts

We start the scenario analysis with the current contracts of tenants in the asset portfolio consisting of the end date of the contract, the extension period, and the yearly rent. The contract duration can only be ended before the end date if both parties agree so, or in case a default occurs. We consider the default probability in the next section regarding the creditworthiness. We generate new tenants based on the following two possible outcomes at the end of a contract duration:

- The current tenant extends the rental agreement.
- The tenant cancels its rental agreement.
    - After a vacancy period, a new tenant is generated.

We visualize this in Figure 26. In the simulation, we create a loop that extends the period of the current tenant multiple times with a probability of X%. We define this probability in the section of the input parameters for the bad, neutral, and good scenario. The same applies for the tenants with an undetermined duration and the vacant objects. The only difference is that the vacant objects start the process at Step 4 of Figure 26. This results in the following input parameters:

- T_G: Probability extension tenant \ Good scenario.
- T_N: Probability extension tenant \ Neutral scenario.
- T_B: Probability extension tenant \ Bad scenario.
- U_G: Probability extension undetermined tenant \ Good scenario.
- U_N: Probability extension undetermined tenant \ Neutral scenario.
- U_B: Probability extension undetermined tenant \ Bad scenario.
- N_G: Extension period new tenant \ Good scenario.
- N_N: Extension period new tenant \ Neutral scenario.
- N_B: Extension period new tenant \ Bad scenario.

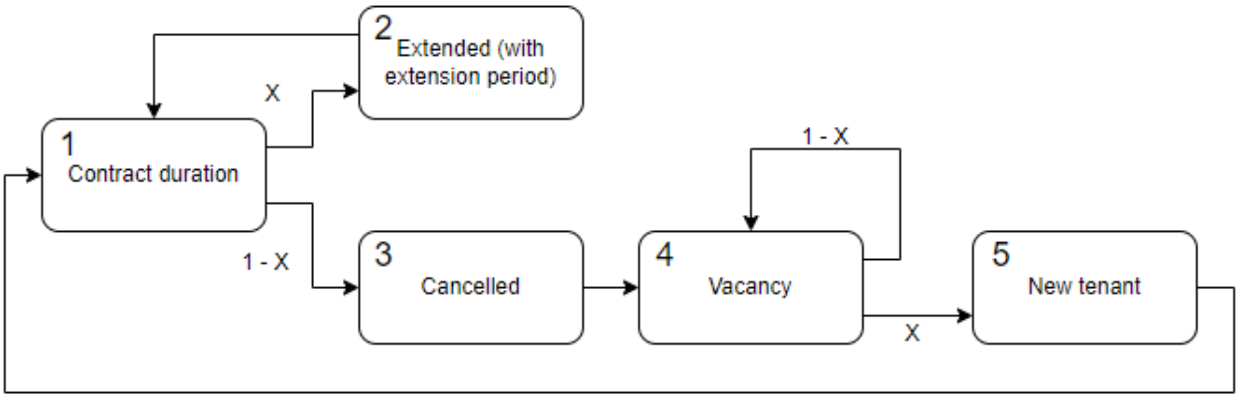


Figure 26. Monte Carlo process

Creditworthiness

To incorporate the creditworthiness, we copy the credit score and probability of default of the individual tenants from Creditsafe. According to Creditsafe, the probability of default is equal to the probability that an invoice is not paid, which is the rent in case of a real estate firm (Creditsafe, 2021).

The rental agreements have the condition that a tenant has to pay the rent, or the contract is cancelled. This can occur due to a default of the tenant. In practice it can occur that the rent is decreased for a certain number of months, or no rent is paid for a time period. These situations can occur, based on the thought that a lower rent is more than no rent at all.

We could define several scenarios and include these in the Monte Carlo simulation, but we think that this makes the analysis too complex. Moreover, the scenarios each have its own follow up scenarios. To approximate a default, we incorporate a loss given default. If a tenant defaults, we decrease the rent for all the months in that year with the loss given default. We define the loss given default as:

- L_G: Loss given default \ Good scenario.
- L_N: Loss given default \ Neutral scenario.
- L_B: Loss given default \ Bad scenario.

We assume that the average loss given default is 50% based on the different possible scenarios. This 50% is used for the neutral scenario and we use a loss of 25% and 75% for the good and bad scenario respectively.

We assume that the probability of a tenant default is the value as indicated by Creditsafe. Therefore the average of the probabilities for a bad, neutral, and good scenario has to be the corresponding default probability. We determine the probabilities for every period of 5 years with the following equations:

$$D_G = 0.5 * D_C, \tag{38}$$

$$D_N = 1 * D_C, \tag{39}$$

$$D_B = 1.5 * D_C, \tag{40}$$

with

- D_G: Default probability \ Good scenario.
- D_N: Default probability \ Neutral scenario.
- D_B: Default probability \ Bad scenario.
- D_C: Default probability given by Creditsafe.

Rent per year

We copied the yearly rent of the current tenants from the contracts. We assume that this is market conform at this moment, but this value does not have to remain constant over the years. It is possible that a new tenant will negotiate a lower rent, or the company can market the property well and receive a higher rent. To simulate this, we assume that the deviation follows a normal distribution. We define the input for the normal distribution for each type of scenario in Table 9.

Table 9. Input for the normal distribution of the rent per year.

Type of period	Good	Neutral	Bad
Mean	0.10	0.0	-0.10
Standard deviation	0.1	0.1	0.1

We assume that the rent of the current tenants remains the same in case the rental agreement is extended. The rent for new tenants is based on the current rent of an object corrected with the method explained above.

Costs per year

We first correct the costs corresponding to a scenario using the method of Table 8. Secondly, we incorporate randomness using the same process as with the rent per year. The randomness changes the total cost of a year in a scenario. The input for the simulation is shown in Table 10.

Table 10. Input for the normal distribution of the costs per year.

Type of period	Good	Neutral	Bad
Mean	-0.10	0.0	0.10
Standard deviation	0.1	0.1	0.1

Input parameters for the Monte Carlo simulation

We use the parameters in Table 11 as input for the simulation. The values can be changed before running the simulation. In the table, we set the values for the base case.

Table 11. Input of the Monte Carlo Simulation.

Type of scenario	Good	Neutral	Bad	Total (Average)
Probability scenario type	10%	80%	10%	
Probability extension tenant	90%	80%	70%	80%
Probability extension undetermined tenant	95%	90%	85%	90%
Vacancy period tenant	3 months	6 months	9 months	6 months
Vacancy period undetermined tenant	1 month	2 months	3 months	2 months
Initial vacancy	3 months	6 months	9 months	6 months
Extension period new tenant	18 months	12 months	6 months	12 months
Loss given default	25%	50%	75%	50%
Rent indexation per year	1.5%	1%	0.5%	1%
Cost indexation per year	0.5%	1%	1.5%	1%
Mean rental income	0.10	0.00	-0.10	0.00
stdev rental income	0.1	0.1	0.1	0.1
Mean costs	0.10	0.00	-0.10	0.00
stdev costs	0.1	0.1	0.1	0.1

The following parameters are not set separately yet:

- O_i : Object for i: 1 to 140.
- V_G: Vacancy period normal tenant \ Good scenario.
- V_N: Vacancy period normal tenant \ Neutral scenario.
- V_B: Vacancy period normal tenant \ Bad scenario.
- VU_G: Vacancy period undetermined tenant \ Good scenario.
- VU_N: Vacancy period undetermined tenant \ Neutral scenario.
- VU_B: Vacancy period undetermined tenant \ Bad scenario.
- IV_G: Initial vacancy \ Good scenario.
- IV_N: Initial vacancy \ Neutral scenario.
- IV_B: Initial vacancy \ Bad scenario.
- R_G: Indexation rent \ Good scenario.
- R_N: Indexation rent \ Neutral scenario.
- R_B: Indexation rent \ Bad scenario.
- C_G: Cost indexation \ Good scenario.
- C_N: Cost indexation \ Neutral scenario.
- C_B: Cost indexation \ Bad scenario.

We base the probability that contracts are extended and the durations of vacancies, in the base scenario on the expertise of the company. The extension period for new tenants has defined values in Table 11 for the normal tenants. For the undetermined tenants, the extension period is one month.

We base the costs to calculate the financial result on the revenue in the scenario. The revenues in the scenarios are increased with an indexation factor every year. This factor is retrieved from taxation records.

Output of a single scenario

In every scenario, we first simulate whether the current tenant extends its contract. Secondly, the vacancy periods and potential new tenants are simulated which is shown in Figure 27.

Maturity of contract	Duration until maturity	Initial vacancy / vacancy	Extented / new tenant	Vacancy	New tenant 1	Vacancy	New tenant 2
31-12-2022	12		36	6	36	3	60
31-12-2022	12		24	6	24	6	48
31-12-2022	12		24	3	36	3	72
31-12-2022	12		12	3	48	3	60
31-12-2022	12		36	3	36	3	60
31-12-2022	12		12	3	12	3	96
31-12-2022	12		24	3	60	3	60
31-12-2022	12		12	3	12	9	48
31-12-2022	12		24	3	36	15	132
31-12-2022	12		12	3	48	3	48
31-12-2022	12		24	12	24	3	36

Figure 27. Simulation of current contracts, vacancy periods, and new tenants.

We set these months in an overview of the simulated years as can be seen in Figure 28.

Year 1									
1	2	3	4	5	6	7	8	9
€ 4,045	€ 4,045	€ 4,045	€ 4,045	€ 4,045	€ 4,045	€ 4,045	€ 4,045	€ 4,045
			€ 3,046	€ 3,046	€ 3,046	€ 3,046	€ 3,046	€ 3,046
€ 3,365	€ 3,365	€ 3,365				€ 3,365	€ 3,365	€ 3,365
			€ 10,519	€ 10,519	€ 10,519	€ 10,519	€ 10,519	€ 10,519
			€ 13,165	€ 13,165	€ 13,165	€ 13,165	€ 13,165	€ 13,165
€ 5,040	€ 5,040	€ 5,040	€ 5,040	€ 5,040	€ 5,040	€ 5,040	€ 5,040	€ 5,040
€ 20,682	€ 20,682	€ 20,682	€ 20,682	€ 20,682	€ 20,682	€ 20,682	€ 20,682	€ 20,682
€ 2,333	€ 2,333	€ 2,333	€ 2,333	€ 2,333	€ 2,333	€ 2,333	€ 2,333	
€ 495	€ 495	€ 495	€ 495	€ 495	€ 495	€ 495		

Figure 28. Months simulated for every object.

The next step is the creditworthiness correction. If only one scenario is made, we indicate the months that are decreased with the loss given default by a red color. To calculate the rent per year, we sum all the monthly values of a year and apply indexation.

In order to see the range of results, we perform the scenario 1000 times per set of input values. Every simulation results in 1000 scenarios with the rent, the financial result, the liquidity position per year, and the percentage of positive liquidity positions for the coming 15 years. Besides these, the three five-year periods which can be good, neutral, or bad are noted. To calculate the financial result of the company we start with the yearly rent and decrease the corresponding costs as indicated in Table 8.

Analysis of the input parameters of the Monte Carlo simulation

The first simulation that we perform is the base case. We discuss the result of this scenario in combination with the current rent corrected for indexation and the total potential over the years. Secondly, we change parameters in order to see the effect on the rent and result. Based on the results of these scenarios we discuss the input parameters.

Base input parameters

The base case of the scenario, with the input parameters as defined in Table 11, results in the average yearly rent and corresponding yearly result as shown in the second and third row of Table 12 respectively.

Table 12. Result of the base scenario.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5067	5124	5218	4999	5173	5259	5225	5344	5349	5381	5589	5653	5699	5745	5722
475	503	505	412	527	569	553	611	613	629	731	763	785	808	797

The average yearly rent increases due to two reasons namely the rent indexation and leasing of vacant objects. The current rent increased for rent indexation over the years, starting at the end of year 1 (5,000,000 euros * 1.01), is shown in row 2 of Table 13. In the third row of Table 13, we start with the current rent plus the current potential which is 5.6 million euros. We correct this value for indexation over the 15 years to show the potential over the years. This allows us to compare the average of the simulation with the potential. The first value in the second row of Table 13 is 5.6 million euros, which is the current rental income plus potential, multiplied by 1.01 to correct for indexation. We increase both the current rent and the current rent plus potential by 1% per year.

Table 13. Current rental income corrected with indexation.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5050	5101	5152	5203	5255	5308	5361	5414	5468	5523	5578	5634	5690	5747	5805
5656	5713	5770	5827	5886	5945	6004	6064	6125	6186	6248	6310	6373	6437	6501

To compare the base scenario and the current and potential rent correct by indexation, we visualize the yearly values in Figure 29. The average value of the base scenario is below the line of the current rent corrected for indexation over the years. It is likely that the average occupation of the scenario is below the current occupation. We assume that the yearly rent does not differ much on average since it is based on a normal distribution with a mean of 0.

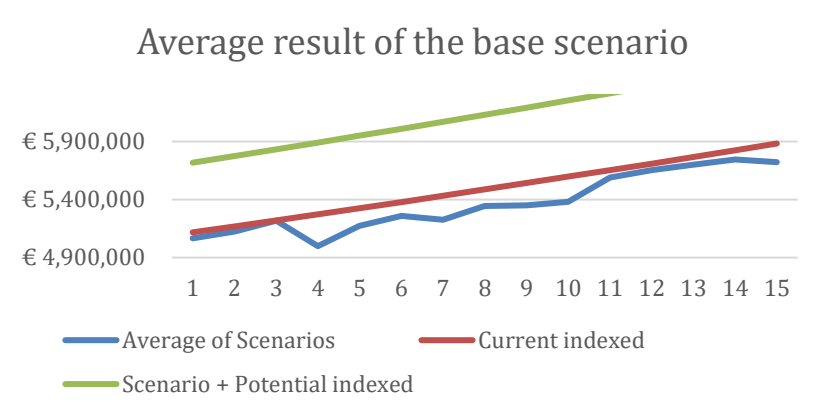


Figure 29. Graph of the average result of the base scenario.

We expect that in a bad scenario the average rent is less than the current rent corrected by indexation but for the neutral case we expect that the average rent is above this line. This is the case since vacant properties can be leased, which would result in an increase in the average yearly rent.

The maximum and minimum yearly rent of the base scenario are 6,348,000 euros and 3,226,000 euros respectively. This maximum is less than the 6,501,000 euros corresponding to an occupation of 100% and yearly rent indexation. The best possible scenario would be above this value since the rent can be higher due to the normal distribution. The best and worst yearly result are a value of 1,104,000 euros and -429,000 euros respectively. In total, 0.4% of the results are negative.

Second series of input parameters

Based on the above, we think that the good and neutral scenarios are too low which is why several changes are made to the base case.

We change the probability of extension for the normal tenant to 95% and 85% for the Good and Neutral scenario respectively. We set the vacancy period between normal tenants to 1, 3, and 5 months for the scenarios good, neutral, and bad respectively. The complete overview of input parameters for the second simulation is shown in Appendix 6. The average of the second scenario is shown in Figure 30.

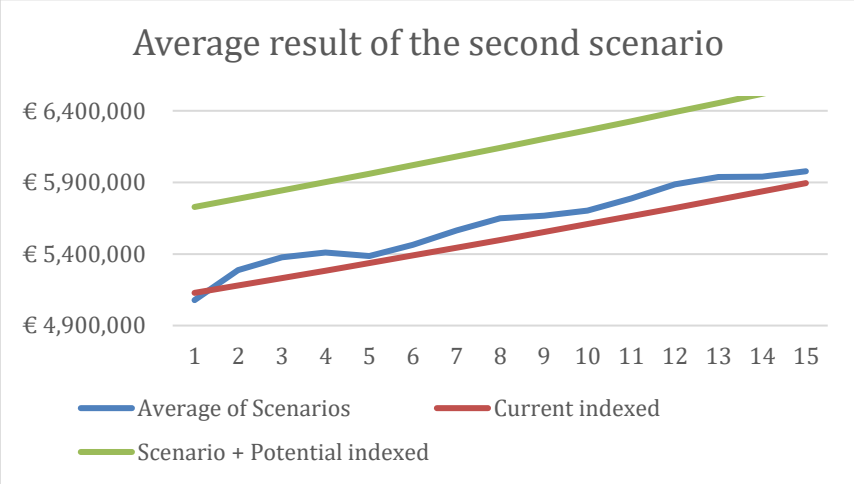


Figure 30. Graph of the average result of the second scenario.

The maximum yearly rent is 7,090,000 euros and the minimum yearly rent is 3,269,000 euros. The corresponding maximum and minimum results are 1,469,000 euros and -408,354 euros respectively. Although several yearly results are negative, 0.6%, the total over 15 years of every single scenario is positive. This does not mean that the portfolio will be viable over the years, but it shows an average for the input parameters. It is possible that a more extreme situation occurs.

Table 14. Average of the result of the second scenario.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5077	5288	5376	5410	5387	5464	5565	5649	5667	5704	5787	5887	5937	5941	5978
480	583	627	643	632	670	720	761	770	788	829	878	902	904	922

Based on the low number of negative results, we think that the bad scenario, with a probability of 10%, is not significant enough to show the result of a crisis. That is why we change the input parameters for the bad scenario in the third simulation.

Third series of input parameters

We base the third scenario on a worse bad scenario. We set the input parameters for the probability of extension for an undetermined and normal tenant in the bad scenario to 75% and 60% respectively. We change the vacancy between the normal and undetermined tenant in the bad scenario to 12 and 6 months respectively. The overview of input parameters of the third simulation is shown in Appendix 7. We show the average yearly rent and result in the second and third row of Table 15 respectively.

Table 15. Average result of the third scenario.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5083	5393	5442	5457	5516	5560	5619	5668	5716	5771	5867	5942	6014	6070	6090
483	635	659	667	695	717	746	770	794	820	868	905	940	968	977

The minimum and maximum yearly rents are 3,085,000 euros and 6,994,000 euros respectively. The minimum and maximum corresponding results are -499,000 euros and 1,520,000 euros respectively. The number of negative results of the 15,000 yearly values is 122 which corresponds to 0.81%.

Based on the scenario analysis we conclude that the current portfolio will perform well on average. This is the case since the company currently has a positive result while it also has a significant potential. Although this does not mean that the default probability is 0. In the third scenario, in 0.81% of the yearly results, the value is negative. We do not see this percentage of negative results as a problem. This is the case since the company has capital reserves and should cover bad years with profit from good years. We use the result of the third scenario to assess the implementation of loans ABC.

Relation between company performance and rental income

Fourth series of input parameters

We assume that the third series of input parameters is suited to use for the implementation of loans ABC. We assess the loans ABC in the next section.

In this section, we analyze a fourth series of input parameters to analyze input parameters that are partly influenceable by the company. We assume that the management of the company has a certain influence on the vacancy periods. That is why we change the vacancy between tenants to 0, 1, and 5 for the good, neutral, and bad scenario respectively. We change the vacancy period for undetermined tenants to 0, 1, and 3 for the good, neutral, and bad scenario. The input parameters for the fourth simulation are shown in Appendix 8.

The average of the fourth scenario is shown in Figure 31.

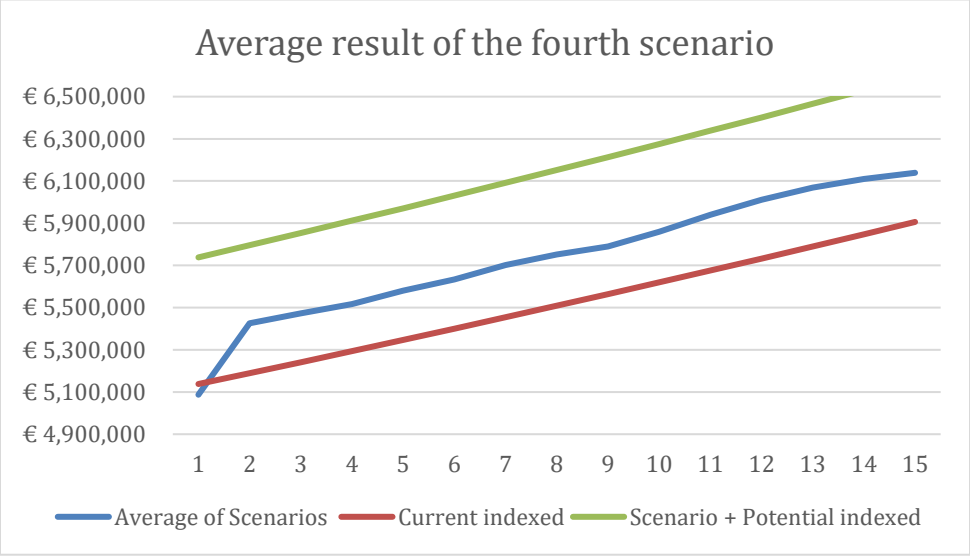


Figure 31. Average result of the fourth scenario.

In the figure, we show that if the company decreases vacancy periods as set in this scenario, the average yearly rent increases a lot in the Monte Carlo simulation. This average does not show what could happen in potential good or bad scenarios, but it shows the difference if vacancy periods are minimal. The minimum and maximum yearly rent of this scenario are 3,875,000 euros and 7,210,000 euros respectively. The minimum and maximum corresponding results are -111,000 euros and 1,528,000 euros respectively. In total, 108 of the 15000 values are negative which is 0.72%.

We think that the company should monitor vacancy periods to get an indication of their own performance. The performance of the company does have an effect on the loans ABC, but we focus on the current portfolio and assumed performance in the analysis of the implementation of loans ABC.

Implementation of loans ABC in the Monte Carlo scenario

We approximate the market value of the portfolio at 50 million euros. These 50 million euros consist of 30 million euros bank loan and 20 million euros company equity. In the potential situation with loans ABC, the portfolio value will be 100 million euros. These consist of 50 million euros bank loan, 10 million euros per loan type ABC, and 20 million euros company equity.

We approximate the potential situation using the Monte Carlo simulation. We decrease the rent per year with the costs. We decrease the remaining value with the bank interest, interest on loans ABC, the redemption of the bank loan, and repayments of loans ABC in the potential situation. We add the yearly cash flow in order to receive the liquidity position per year. We assume that it was possible to implement loans ABC in the scenario if the liquidity position of the company is positive in years 5, 10, and 15. A positive liquidity position in these years means that the company was able to repay loan A, B, and C in the scenario using the cumulative cash flow.

1. Initial set-up

We first analyze the initial set-up of the company with the parameters shown in Figure 32. The loans A, B, and C each have a principal value of 10 million euros at the start of the 15 year period. The repayments of A, B, and C at years 5, 10, and 15 are 10 million euros, 14.8 million euros, and 18.2 million euros respectively.

Direct interest	Storage	Bonus
4%	0%	0%
2%	4%	0.10%
2.75%	4%	0.10%

Figure 32. Initial set-up parameters of loans ABC.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Positive liquidity	100%	100%	100%	100%	73.2%	90.5%	91%	94%	98%	34%	82%	89%	91%	94%	7.1%

Figure 33. Result of the initial set-up in the Monte Carlo simulation.

In Figure 33, we show the percentage of positive and negative liquidity positions per year. This shows that the liquidity positions in years 5, 10, and 15 are positive in 73.2%, 34%, and 7.1% of the 1000 scenarios respectively.

The average liquidity position of the company over the 1000 scenarios is 4.3 million euros which are uninvested capital. In the years 5, 10, and 15 in which the loans have to be repaid, the average liquidity position is 235,000 euros, -1.6 million euros, and -4.7 million euros. This is why we assume that cash inflows have to be accumulated in order to repay the loans in years 5, 10, and 15.

It is Important to note that the costs of the company, as defined in Section 5.5, are significantly above the assumed costs of 12% of the rental income in the fictional property of Section 5.6. We based the fictional property on a taxation record and the costs of the portfolio on the annual report. We use the costs of the portfolio in this section but the company should look into this difference.

2. Set-up using direct interest only

In the liquidity assessment of the fictional property, we analyzed the case of loans with direct interest only and no storage or bonus. We also analyze this set-up for the Monte Carlo scenario using the direct interest percentages of 4%, 6.21%, 6.95% for loans A, B, and C respectively. We show the result of the implementation of the loans using direct interest only in Figure 34.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Positive liquidity	100.0%	100.0%	100.0%	100.0%	0.2%	40.8%	88.2%	90.3%	90.7%	11.8%	72.2%	85.5%	89.9%	91.5%	73.5%

Figure 34. Result of the set-up with direct interest only in the Monte Carlo simulation.

If the loans are implemented in the 1000 scenarios using direct interest only, 0.2%, 11.8%, and 73.5% of the scenarios result in a positive liquidity position in years 5, 10, and 15 respectively. The number of positive liquidity positions in years 5 and 10 are significantly lower than in the initial set-up but the number of positive liquidity positions at maturity is significantly higher. In both set-ups, the number of negative liquidity positions is too significant which means that both set-ups are not ready for implementation.

The average liquidity position over the time spans of the 1000 scenarios is 2.4 million euros. These 2.4 million euros, that are not invested, are less than for the initial set-up. The average liquidity position in years 5, 10, and 15 is -2.7 million euros, -2.6 million euros, and 1 million euros respectively.

Assessment of the set-up with direct interest only and refinancing loans

In both set-ups, the company will own 100% of the portfolio in year 15. We think that the company should reconsider this since this results in significant obligations and an increasing equity percentage of the company means a lower leverage. The company should consider reinvesting equity to acquire additional properties instead of owning a higher percentage of the current properties. To be able to reinvest equity, the company should acquire additional financing on properties. Refinancing the portfolio over the years can be performed in several ways. The company can for example sell new loans to repay loans at maturity instead of using cumulative cash flow. In this case, the company can use the cash flow to purchase additional properties. These additional properties can be financed using the set-up of loans ABC.

An example of using cumulative cash flow is a year with a liquidity position of 4 million euros. If 4 million euros are available, properties can be acquired of 20 million euros using the set-up of loans ABC. This is possible since the company's equity is 20%.

To show possible methods that the company can implement, we analyze three possibilities with regard to refinancing loans ABC. The first is the method in which loan A is refinanced, the second method considers refinancing loans A and B, and the third method is based on refinancing all three loans. We assume that loans with the same set-up as the current loans can be used to refinance at maturity.

3. Case of always refinancing loan A

We assume that it is possible to refinance loan A which means that only in years 10 and 15 a repayment occurs, and the equity position of the company is 90% instead of 100% at maturity. We show the result of 1000 scenarios with the assumption that loan A is always refinanced by a new lender at the same interest percentage in Figure 35.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Positive liquidity	100%	100%	100%	100%	100%	100%	100%	100%	100%	90%	91%	95%	98%	100%	91%

Figure 35. Result of the set-up that incorporates refinancing of loan A.

In this case, 100%, 90%, and 91% of the scenarios have a positive liquidity position in years 5, 10, and 15 respectively which means that the loans could be repaid in at least 90% of the scenarios. The average liquidity position in year 15 is 5.6 million euros and the average liquidity position over the 15 year period is 5.9 million euros.

4. Case of always refinancing loans A and B

In this set-up we assume that loans A and B are refinanced at maturity, meaning that only in year 15 a repayment takes place and the company will own 80% of the portfolio at maturity.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Positive liquidity	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	98.9%

Figure 36. Result of the set-up that incorporates refinancing of loan A and B.

In this case, 100%, 100%, and 98.9% of the scenarios result in a positive liquidity position in years 5, 10, and 15 respectively. The average liquidity position in year 15 is 12.2 million euros and the average liquidity position over the time span of 15 years is 15.9 million euros.

5. Case of always refinancing loans A, B, and C

In this case, we assume that loans A, B, and C are refinanced instead of repaid in years 5, 10, and 15, the company will own 70% of the portfolio at maturity.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Positive liquidity	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100.0%

Figure 37. Result of the set-up that incorporates refinancing of loans A, B, and C.

This set-up results in 100% positive liquidity positions in years 5, 10, and 15. The average liquidity position in year 15, is 26 million euros and the average liquidity position over the 15 year period is 12.9 million euros. This is similar to the case in which loans A and B are refinanced.

To compare the different set-ups that the company can implement, we create a table containing the percentage of positive liquidity positions in years 5, 10, and 15, the equity percentage of the company in year 15, the average liquidity position in year 15, the assumed average ROE over 15 years with its corresponding compound interest, and the average liquidity position over 15 years.

We assume that the average ROE follows from the initial equity of the company and the amount of equity of the company at maturity plus the liquidity position at maturity. We assume that the value of the portfolio is 100 million euros in the potential situation in both year 0 and year 15. The increase in equity position from 20% to 100% is an increase in equity of 20 million euros to 100 million euros.

Table 16. Results of the set-ups in the Monte Carlo simulation.

Set-up	Positive liquidity positions in years 5, 10, and 15			Equity percentage at maturity	Average liquidity position at maturity in euros	Assumed average ROE over 15 years	Company return based on compound interest	Average liquidity position over 15 years in euros
1. Initial	73.2%	34%	7.1%	100%	-4.7 million	477%	10.97%	-4.7 million
2. Direct interest only	0.2%	12%	74%	90%	1 million	455%	10.63%	1 million
3.Refinancing A	100%	90%	91%	90%	6.3 million	490%	11.05%	8.2 million
4.Refinancing A and B	100%	100%	99%	80%	15.9 million	480%	11.02%	12.2 million
5.Refinancing A, B, and C	100%	100%	100%	70%	26.1 million	481%	11.03%	12.9 million

Based on the results of Table 16, we conclude that it is not possible for the portfolio to include the initial set-up of loans ABC since this only results in 7.1% of the scenarios in a positive liquidity position at maturity. The storage in the loans result in too significant repayments in years 10 and 15. Although the company initially aimed to reinvest cumulative cash flow, this is not possible since the liquidity is required for the repayments. Reinvesting means less liquidity which means even fewer positive liquidity positions.

The case of direct interest only and refinancing of loan A results in more than 90% positive liquidity positions at maturity. Although this is significantly higher than the initial set-up, still 9% of the cases have a negative liquidity position at maturity. The last two set-ups, refinancing A and B and refinancing A, B, and C, result in 98.9% and 100% positive liquidity positions at maturity and 100% positive liquidity positions in years 5 and 10. These two methods are according to the Monte Carlo simulation suitable to implement. Important to note is that in each set-up, the bank loan is repaid over the 15-year period.

Implementation of the option of early retraction in the Monte Carlo simulation

The option of early retraction has two parts, namely the early retraction with and without costs. First, we assess the liquidity positions for the situation in which all possible early retraction without costs take place. Secondly, we consider the liquidity positions for the case in which all possible early retraction, with and without costs, take place. We consider both cases for the initial set-up, with the incorporated yearly storage, and the set-up based on direct interest only. The maximum possible early retraction of loans A, B, and C without costs is 20%, 10%, and 5% respectively. The maximum possible early retraction with costs is 20%, 10%, and 5% respectively.

Implementing the maximum early retraction without costs in the initial set-up in the Monte Carlo simulation results in the liquidity positions as we show in Figure 38. The liquidity position is negative in the first years, but a larger number of liquidity positions is positive in year 15 due to lower interest payments over the years. The interest payments are less since no interest has to be paid over retracted capital.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Positive results	0%	0%	0%	0%	0%	0%	0%	7.5%	42.5%	0.4%	28.2%	77.0%	86.1%	89.8%	38.6%

Figure 38. Liquidity positions of the initial set-up with maximum early retraction without costs.

The implementation of the maximum early retraction with and without costs in the initial set-up results in even more years with 0% positive liquidity positions which we show in Figure 39. The number of positive liquidity positions at maturity is higher since the interest paid over the years is less and the total repayment is less due to the cost of retraction. This is similar to the case of Figure 38. For both cases, we conclude that, based on the scenario analysis, this set-up is not viable.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Positive results	0%	0%	0%	0%	0%	0%	0%	0.0%	0.0%	0.0%	1.2%	47.9%	83.1%	89.2%	69.8%

Figure 39. Liquidity positions of the initial set-up with maximum early retraction with and without costs.

Implementing the maximum early retraction without costs in the case of direct interest only results in the liquidity positions as shown in Figure 40. In years 1 to 8, 0% of the liquidity positions of the scenarios is positive.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Positive results	0%	0%	0%	0%	0%	0%	0%	0.0%	1.1%	13.2%	67.5%	84.7%	89.0%	90.9%	90.7%

Figure 40. Liquidity positions of the set-up with direct interest only and maximum early retraction without costs.

The implementation of the maximum early retraction with and without costs results in even less positive liquidity positions in the years 1 to 12.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Positive results	0%	0%	0%	0%	0%	0%	0%	0.0%	0.0%	0.7%	46.0%	84.4%	89.3%	91.9%	95.3%

Figure 41. Liquidity positions of the set-up with direct interest only and maximum early retraction with and without costs.

In the analysis of the implementation of loans ABC in the Monte Carlo simulation, we considered the cases of direct interest only with refinancing of loans at maturity. We do not consider the refinancing part for the option of early retraction since this will result in about 100% negative liquidity positions in most years. This is the case, since starting with a negative liquidity

position in year 5, refinancing loan A and continuing the process will result in even more negative liquidity positions.

That is why we first analyze the average liquidity positions to approximate a percentage that can be retracted yearly. The average liquidity positions in the company using the initial set-up and the set-up using direct interest only are shown in Tables 17 and 18 respectively. The first row of the table is the year, the second row is the average liquidity position in 1000 euros, and the third row is the liquidity position divided by the total value of loans ABC. We indicate the negative values with red.

Table 17. Average liquidity position in the Monte Carlo simulation using the initial set-up.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1,753	3,845	5,986	8,416	848	3,363	5,950	8,543	11,184	1,089	1,830	4,828	7,879	10,948	4,274
6%	13%	20%	28%	3%	11%	20%	28%	37%	4%	6%	16%	26%	36%	14%

Table 18. Average liquidity position in the Monte Carlo simulation using the set-up with direct interest only.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1,201	2,736	4,290	6,139	2,104	64	1,942	3,975	6,050	1,878	771	3,473	6,238	9,042	1,733
4%	9%	14%	20%	7%	0%	6%	13%	20%	6%	3%	12%	21%	30%	6%

Based on Tables 17 and 18, we conclude that the company can not implement the option of early retraction based on the cash flow analysis of the Monte Carlo simulation. This is because the average liquidity positions in both Tables 17 and 18 are close to zero or even negative in several years before maturity. Implementing an early retraction means that the average liquidity position becomes even less in the years 1 to 14. If the company wants to implement this option of early retraction, liquidity should be acquired another way.

Conclusion based on the implementation of loans ABC in the Monte Carlo simulation

In Table 16, we stated the results of five different set-ups implemented in the Monte Carlo simulation. We set the percentage of positive liquidity positions in years 5, 10, and 15 as decision values since this is the percentage of scenarios in which the company could repay loans A, B, and C respectively. As explained, based on the values in Table 16, we conclude that the initial set-up and the set-up based on direct interest only and no refinancing structure are not suited for implementation.

The set-up that incorporates refinancing of loan A instead of repaying the loan using cumulative cash flow, has at least 90% positive liquidity positions in years 5, 10, and 15. The set-ups that incorporate refinancing of loans A and B and loans A, B, and C have 100% positive liquidity positions in years 5 and 10 and 98.9% and 100% positive liquidity positions at maturity respectively. That is why we assume that these two can be implemented. In these two set-ups, the average liquidity position over the scenarios is 12.2 million euros, and 12.9 million euros. Based on the Monte Carlo simulation, the company can continue growing the portfolio using this positive liquidity position.

If the company would be able to repay all the loans using the cumulative cash flow, this does not have to be the optimal situation. After the potential implementation of loans ABC, the company will have a certain leverage. Since 20% is company equity and 80% is financed using the bank and loans ABC. In the set-ups this leverage decreases over the years, but in the set-ups that incorporate a refinancing structure, this decrease is less. The set-ups incorporating refinancing of loans allow the company to enlarge the portfolio. This potential positive liquidity can be combined with additional bank funding and loans ABC.

In Table 16, we included the assumed average ROE which does not deviate much for the Set-ups 3, 4, and 5 with the refinancing structure. Although the ROE does not deviate much, Set-ups 3, 4, and 5 have large average liquidity positions over the scenarios. This positive liquidity can be used to acquire additional properties while repaying loans means that the portfolio does not grow in size.

Based on the implementation of the loans ABC in the Monte Carlo simulation and the assessment of the company equity over the years in Section 5.6, we conclude that the company should only include loans ABC in case these loans can be refinanced at maturity. Refinancing the loans, A, B, and C at maturity results in 100% positive liquidity positions in the Monte Carlo scenario.

Based on the implementation of the maximum possible early retraction with and without costs and the average liquidity position in the scenario analysis we conclude that the company should not provide the option of early retraction. Instead of the possibility of early retraction, the company can analyze whether a higher interest should be incorporated.

6. How can the parameters be set for the loans ABC?

In this chapter, we discuss the different parts which are used to set the parameters for loans ABC. The first part of this chapter is literature about the CAPM and IRR. Secondly, we discuss the competition of loans ABC. We divide the competition in debt and equity investments and assess the returns and associated risks.

6.1 Literature regarding the CAPM and IRR

The theory of the capital asset pricing model (CAPM), and the internal rate of return (IRR) are important in the decisions regarding the loans ABC. We use the CAPM to define the different parts of the return and the IRR to compare loan types A, B, and C.

Capital asset pricing model

In the analysis of the return of loans ABC, we use the theory of the capital asset pricing model (CAPM) but we do not implement the formula directly. According to the CAPM, lenders have to be compensated for the risk and the time value of money ("Capital Asset Pricing Model (CAPM)," 2015). The risk-free rate is used to compensate for the time value of money. To compensate for the risk, we assess whether the risk is higher or lower compared to the market risk. A higher risk refers to a higher Beta and vice versa. It is important to note that only risks that can not be diversified away using other investments are considered (Perold, 2004). The relations are shown in:

$$R_i = R_f + \beta_i(R_m - R_f), \tag{41}$$

with

- R_i: Return on investment.
- R_f: Risk-free rate.
- B_i: Beta of the investment.
- $(R_m - R_f)$: Market risk premium.

Internal rate of return

The loan types B and C are based on a yearly direct interest in combination with a yearly storage. To compare the return of the types, we use the IRR. The IRR is the discount rate that yields a net present value of zero (Mellichamp, 2017) and can be calculated using the following equation:

$$0 = -F_0 + \sum_{n=1}^{T} \frac{F_n}{(1+IRR)^n}\,, \tag{42}$$

with

- F_0: Initial investment.
- F_n: Future cash flow.
- n: Number of year.

In order to compare the loans ABC, it is normally important to use both the IRR and NPV of an investment (CFI, 2015). For potential lenders this is not as important since the principal is the same for every type. Moreover, this value can be set by the potential lender to a certain extent.

6.2 Competition and market conformity

We divide the competition at first in debt and equity. The loans ABC are debt of the company to the potential lender in exchange for a defined return. In the case of equity, the investor owns a part of the company or fund which means that the investor incurs potential higher/lower returns or even a negative return.

The reason that we consider equity in the comparison is because it is widely available in the field of real estate. Although debt and equity are different investment types, an individual might compare whether debt results in a sufficient return compared to equity with likely more risk. The competition of debt consists of corporate bonds and the competition of equity consists of investment funds, individual real estate investments, and investing in stocks.

The competition of debt are the corporate bonds of which we made an overview of 9 bonds in Table 19 on Page 65. The corporate bonds are based on the viability of the company, which is the same as for loans ABC, but the capital is used for different purposes. These purposes consist of health centers, working capital, and company acquisitions. This differs from the loans ABC and real estate terms in which capital is often used in combination with a bank loan. The expected return is between 5% and 8.25% with durations ranging from 2 to 10 years.

To compare the return paid on loans ABC, we calculate the IRR of the individual types. The IRR of types A, B, and C is 4%, 6.21%, and 6.95% respectively. In types B and C, compound interest is incorporated. In the calculation of the IRR, we use the actual yearly payments which consist of the yearly interest and the repayment at maturity including the storage and bonus.

If we compare loans ABC with the competition, we note the following:

- Type A has a significantly lower return than the available corporate bonds.
- Corporate bonds 5, 6, 8, and 9 have higher returns than loans ABC.
- Corporate bond 7 has a comparable sector as loans ABC with an LTV of 62.5% and a direct return of 5.75%.
- Bond 10 is in a comparable sector as loans ABC, but it consists of one property.
- The total emission values of bond 7 and 10 are significantly smaller than the company's portfolio.

The risks of all corporate bonds in Table 19 differ due to the purpose and sector. We did not find a relation between the bond duration and return. The most comparable bonds are numbers 7 and 10 with a return of, at best, 7.65% (5.75% in case of no profit split) and 7%. The difference with both funds is that the lender incurs the most risk and the fund size is significantly smaller than the fund size of the lead company, which is why we conclude that these bonds have a higher beta than loans ABC.

Table 19. Corporate bonds available in the market.

Name	Loan used for:	LTV	Total Emission (Total acquired equity or total portfolio in case of a bank loan.)	Expected return	Minimum investment	AFM?	Duration (years)	Comparison company
1. Cortese	Funds with health centers	-	About 16 million euros per fund	Direct: 6% 7% - 8% (Sharing of profit)	€10,000	No	7-10	Risk: Negative value development
2. Willemxl.com	All kinds of A-brand products			5%	€1000	No	2	Different collateral
3. The Sandt	Mixed	0%		5%	€10,000	No	5	2% initial costs
4. The Sandt	Mixed	0%		6%	€25,000	No	5	2% initial costs
5. The Sandt	Mixed	0%		7%	€50,000	No	5	2% initial costs
6. Boxx.nl	Buying or building storage boxes	0%	Aiming for about 500,000 per fund: of one property	8.25%	€100,000	No	5	Boxx has first right of mortgage One sector
7. Sonneborgh	(1) Care home 80 apartments	62.5%,	16,450,000	Direct 5.75% Total: 7.65%	€100,000	No	7 – 10 years. But at least until sale	Sale Bank loan maturity
8. IFH-Holding	Company acquisitions	-	-	7.4%	€50,000	No	4	No LTV Different risk
9. MBMO Group	Working Capital	-	-	8%	€25,000	No	4	Different risk
10. Daan Vastgoed investments	A to be determined property	50% company 50% lender	2 million	7%	€10,000	No	5	Low emission value

The second type of competition that we discuss is equity which is divided in investment funds, individual real estate investment, and investing in stocks. In Table 20 on Page 67 we made an overview of currently available real estate funds in which can be participated. This overview consists of funds discussed in a real estate funds scan (Buro85, 2021) and several prospectus.

The funds defined in Table 20, are based on capital of investors and a bank loan. If sufficient capital is raised, the proposed properties are purchased, after which these are leased for the defined duration. The rent is used to pay interest to the investors and the bank. At maturity, the properties are sold and the initial loans, plus a bonus or minus a shortage, are repaid. The direct return of these funds is an expectation of the yearly rent. The total return is based on the expected market value at maturity. All the funds show an expectation of the direct and total return. The high values of the total return indicate that the funds expect that the market value of the properties increases over the years.

It is important to note that these investment funds are participations, which means that both positive and negative situations influence the return of the investors. The expectation of the IRR, both direct and total, can also be significantly lower/higher than expected. The LTV of all these participations is between 55% and 60% and the remaining equity is owned by investors which are directly affected if a default occurs. Based on the above, we conclude that an equity investment in real estate has a higher beta than loans ABC.

We use the following aspects in the comparison with loans ABC:

- The expected IRR is between 5.2% and 9.3%.
- The expected total IRR is between 7% and 11.1%.
- Several funds consist of real estate in one location.
- The total emission value of the funds is between 3.4 and 19.9 million euros.
- The duration of the funds is between 5 and 10 years but the duration can depend on an actual sale.

Table 20. Competition of real estate investment funds.

Fund	Diversity	LTV	Total Emission	IRR Expected D = Direct T = Total	Minimum investment	AFM?	Duration(years)	Comparison company
Oostwijck Vastgoed	Supermarket 60% Homes 40% One location	55.2%	€13,350,000	D: 5.9% T: 7.0%	€250,000	No	7-10	Higher LTV Lower diversity
ResiDutch Mixfund	-Blind pool	>65%	€32,000,000	D: 5.2% T: 12.7%	€250,000	No	5-10	Higher LTV Blind pool
Louise	one location property will be changed to homes	58.22%	€3,400,000	D: 5.0% T: 8.76%	€100,000	No	7	Higher LTV Lower diversity
Duprofa Retail Fund I	two shopping centers	58.1%	€14,350,000	D: 8% T: 10%	€100,000	No	>5	Higher LTV Lower diversity
Tuinzigt Nova Capital	supermarkets 46% 54% other stores	61.4%	€8,960,000	D: 8.1% T: 10.3%	€100,000	No	7-10	Higher LTV Lower diversity
Winkel De Olm	Shopping center	61.2%	€8,350,000	D: 8.5% T: 9.5%	€100,000	No	10	Higher LTV Lower diversity
Rijenstede vastgoedfonds	Shopping center	61.8%	€19,859,000	D: 6.5% T: 9.6%	€100,000	No	5-10	Higher LTV Lower diversity
Ambachtsgaarde Winkelfonds	Shopping center	59.8%	€9,200,000	D: 9.3% T: 11.1%	€100,000	No	10	Higher LTV Lower diversity
Eskerplein CV Nova Capital	Supermarkets	55%	€12,500,000	D: 6.6% T: 9.2%	€100,000	No	7-10	Lower diversity
HH industrieel Vastgoed Hengelo	Industrial	58%	€10,500,000	D: 7.0% T: 7.1%	€100,000	No	5	Higher LTV Lower diversity
Blauwdruk Supermarkt Groeifonds	88% supermarkets 12% other stores	58%	€9,400,000	D: 6.8% T: 8.2%	€100,000	No	Undetermined	Higher LTV Lower diversity

The second type of equity investment that we discuss is the direct investment in real estate. In this case, the lender has to acquire a bank loan with an LTV of 50-60%. If we assume that an investor has between 250,000 euros and 500,000 euros available (which is a comparable amount for a potential lender), the most expensive property that can be purchased is 1,250,000 euros with an LTV of 60% and 500,000 euros investment. The least expensive property value in Figure 3 is 2,275,000 euros. That is why we assume that if a similar type of property is available, only one property can be purchased. In case the rent is based on one property instead of a portfolio, the risk is likely to be higher.

This situation can result in several scenarios, first the good scenario in which the rent received is 8% and bank interest is 4%. Using the LTV of 60%, this results in a return on investment of 14%. This is a very optimistic situation, but even in this optimal situation it is important to note that this requires quite some work. A neutral situation would be a received rent between 2.4% and 8%, which results in a return between 0% and 14%, using Equation 26. A rental income below 2.4% results in a negative return which is the bad scenario. Based on the possible scenarios, we conclude that the beta of the direct investment in real estate is higher than the beta of loans ABC.

The last investment type that we consider is the stock market, of which the average stock market return is 10% annually in the U.S (Learn, 2020). This value is an average since possible returns in coming years can be positive or negative. An example is the 1930s, in which the average annual return was -4% (Global, 2020). The thought with regard to an investment in the stock market is on the very long term. It might be the case that an investment in the stock market results in an annual return of 10% for 5 years, but it is also possible that the return is negative in this timespan. Based on the information about the stock market and the average return of 10% annually, we conclude that the beta of the stock market is higher than the beta of loans ABC.

The return of the stock market and other equity investments is based on the CAPM. We defined the risk-free rate based on Dutch government bonds with durations of 5, 10, and 15 years respectively. We choose the duration to match the duration of the loans ABC. The yields of the bonds are shown in Table 21 (Investing.com, 2021) retrieved on 27th of June 2021. https://nl.investing.com/rates-bonds/netherlands-government-bonds 27-6-2021

Table 21. Dutch government bond yields.

Name	Yield	Return with β = 1	Difference with above
Nederland 5J	-0.497%	5.25	
Nederland 10J	-0.033%	5.72%	0.464%
Nederland 15J	0.152%	5.90%	0.185%

The second part of the CAPM is the risk premium. An indication of the risk premium is the equity market risk premium defined by KPMG which recommends a premium of 5.75% (KPMG, 2021). According to KPMG, this value is the average return that investors require over the risk-free rate in order to accept the variability in returns for equity investments. The difference between the 5-, 10-, and 15-year risk-free rate is noted in the right column of Table 21.

Default priority comparison of loans ABC and debt competition

The repayment of the lent capital in case of a default is a part of the risk. This repayment differs for debt and equity. For the debt we take the bonds 7 and 10 of Table 19 for the comparison. The bonds 7 and 10 have an LTV of 62.5% and 50% respectively. In case of a default, the bank is repaid first in case of the bonds and loans ABC. The repayment for the lenders of loans ABC is as follows:

$$S = 80\% - AV, \tag{43}$$

$$R_i = 100\% - I * (S), \tag{44}$$

with

- S: Shortage percentage of initial market value.
- AV: Auction value percentage of initial market value.
- I: 1.5, 3.5, 5 for loans A, B, and C respectively.
- R_i: Repayment of loans for i: A, B, C.

In the case of bonds 7 and 10, the repayment for the lenders is as follows:

7:

- 62.5% <= AV% <= 100%,

$$S = 100\% - AV. \tag{45}$$

- AV% <= 62.5%.

$$S = 37.5\%, \tag{46}$$

$$R_7 = 100\% - 2.67 * S, \tag{47}$$

10:

- 50% <= AV% <= 100%.

$$S = 100\% - AV, \tag{48}$$

- AV% <= 50%.

$$S = 50\%, \tag{49}$$

$$R_{10} = 100\% - 2 * S, \tag{50}$$

with

- S: Shortage percentage of lenders equity.
- AV: Auction value percentage of initial market value.
- R_7: Repayment percentage of bond 7.
- R_{10}: Repayment percentage of bond 10.

The difference with regard to the repayment is on the one hand the calculation of the shortage. For the loans ABC, a shortage only occurs if the AV is below 80%. Secondly, the multiplier which decreases the repayment differs for the loans ABC and the two bonds.

Important in the assessment of the repayment of loans ABC in case of a default, is the possibility that the company owns an equity percentage of more than 20%. We show in Figure 18 that in year 6 the company owns about 45%, of the portfolio financed using loans ABC, due to the repayment of loan type A and redemptions on the bank loan. In the initial set-up, this would mean that the bank is repaid first, secondly the loans ABC, and at last the company. If the company owns about 45%, the loans ABC only incur a loss in case an auction value is received below 55% of the initial value. In this case, the risk of loans ABC will decrease significantly over the years.

The increasing equity percentage of the company over the years decreases the risk for loans ABC. In this case, the return percentages for the loans ABC might be too high. That is why we recommend that the company sets their 20% initial equity as risk bearing. The acquired equity of the company should be considered as in the initial situation. To explain this with an example, the company will own 10% type A, about 10% of bank loan with first mortgage (although the right of the bank is always first), and 20% initial equity after year 5 due to repayments and redemption. If a default occurs in this set-up, the company receives repayments according to the different parts that the company owns.

Another important part in the assessment of the competition is the thought process of the management. The management thinks that the competition offers a significant return. Although the risk is hard to assess, this competition markets themselves using past funds (of which the final results are not transparent). These companies have a certain track record, which consists of past projects, and size which they use to attract investors. The company wants to offer a lower return than this type of competition because the risk for the lenders is assumed to be less. While at the same time, the return should be sufficient to actually attract the lenders.

Besides the competition, we compare the loans A, B, and C. The IRRs of the loans A, B, and C are 4%, 6.21%, and 6.95% respectively. These loans will be marketed using the direct interest, storage, and bonus interest values. Summing these individual interest values, results in 4%, 6.1%, and 6.85% for types A, B, and C respectively. The added interest percentages are higher for types B and C which can be beneficial in case the loans are marketed. On the other hand, the difference between types B and C seems less significant in the case of added percentages in comparison with the differences between the IRRs.

Conclusion regarding the competition

Although the competition of debt investments varies a lot, two bonds which are comparable have a higher return than loans ABC. For one of these bonds, the return is only higher than type B and C in case a profit is made and partly divided among lenders. Based on the comparison of repayment, the size of the emission value, and the number of locations in which the real estate is located, we assume that the risk and corresponding beta is higher for these two bonds than for loans ABC. The minimum expected return of the other bonds is 5%. Although we assume that the risk of loan type A is less, it might be that a return of 5% for type A is necessary to attract lenders. Based on the equity competition, the company should consider increasing the return of A from 4% to 5% and remain type B and C at 6.21% and 6.95% respectively.

The first type of equity investment, the investment funds, have a higher risk and beta than the loans ABC. This corresponds to this different type of investing, but the risk is not only based on the investment type. Several funds consist of real estate in one location and the fund value is significantly less than for loans ABC which can result in a higher risk and corresponding beta than loans ABC.

The direct investment in real estate can not be compared directly with loans ABC because it results in significantly more work and risk for the investor. The third type of equity investment, investing in stocks, has a different risk profile than loans ABC. The beta of investing in stocks is assumed to be higher than the beta of loans ABC. We conclude that due to the different risk profile and beta, the investment in stocks does not have to be more attractive than loans ABC.

In Table 21 we defined the return based on CAPM using the risk-free rate and the equity risk premium. Only loan type A has a lower return than the Dutch Government bond plus risk premium. The difference between the risk-free rates shows that an increase in bond duration from 5 to 10 and 10 to 15 years is 0.5% and 0.2% respectively. The difference between loan types A, B, and C is more, but this is also due to the differences in the default priority rules.

The aim of the company to expand the asset portfolio with capital acquired from loans ABC, but a basis is present. This differs from the discussed investment types in which properties or inventory will be acquired after collecting the capital. Moreover, the company wants to repay loans using cumulative cashflow, as we explained in Chapter 5, which is different from several loans or funds that repay loans after properties are sold.

The structure of loans B and C incorporate compound interest which is paid at maturity. In the analysis of the competition, we did not find other funds that use a similar structure.

7. Implementation of the loans ABC

In order to recommend the company about the implementation of the loans, we first define the strategy. Potential lenders should agree with the strategy used in exploiting the portfolio. Secondly, we recommend values for the parameters in the loans ABC. We consider the assessment of the portfolio, the liquidity, and the competition while setting the parameters. In the last part of this chapter, we discuss limitations of this research and potential future research.

7.1 Strategy of the company

Potential lenders can see the current asset portfolio, but if they start a relationship for 5, 10, or 15 years, the portfolio can change over time. The goal of the company is to grow the portfolio, meaning that funds will be acquired and used to add new properties to the portfolio. It is the goal to keep properties long-term but in case a property does not fit the strategy anymore, it can be removed from the portfolio. This is why it is important that a potential lender agrees with the strategy.

The strategy shows the vision of the company and boundaries of their operations. It is important to define these, but at the same time it might be that the strategy has to be changed due to changes in the business environment. The bottom-line is that the company wants to maintain the rental income. We define the strategy in Dutch in Appendix 9.

Besides the strategy in Appendix 9, we recommend some rules that the company should consider in case a property is about to be bought or sold. These rules have implications for the types of tenants, types of properties, and locations.

- Max 20% of the total rental income can be received from the same tenant.
- Max 35% of the rental income can be received from the same asset type.
- Max 35% of the rental income can be received from the same location.
- The number of asset types, currently four, will not be decreased to 3.
- The percentage of tenants with a credit score of D or E can not be more than 20%.
- If more than 20% of the contract durations are below 1 year, conversations with tenants have to take place to monitor what the portfolio will look like in a year.

A possible situation that can occur is that the largest tenant wants to rent another property in the portfolio. If this would mean that the rental income of the largest tenant becomes more than 20% the company should be able to argue why they choose this.

The company should show potential lenders that the credibility and contract durations of tenants are monitored. Monitoring this enables the company to anticipate on potential situations. If for example a rental agreement is cancelled, a property can become vacant after a certain number of months. The company can start searching for a new tenant several months before the object would become vacant. The same applies for creditworthiness. If it is noted in time that a tenant has financial difficulties, a solution might be discussed, or the company can start searching for a new tenant.

7.2 Conclusions based on the portfolio, liquidity, and competition analysis

To be able to give recommendations about loans ABC, we combine our conclusions of the competition, portfolio, and liquidity. First, we discuss the conclusions of the three individual parts. Secondly, we combine these parts.

The company defined default priority rules which we recommend to reconsider. We state that the basis of the rules is that the company's equity occurs the most risk and will be decreased first in case of a default. In case for example loan A is repaid, the company acquires this equity. Moreover, the company redeems the bank loan over the years. We recommend that the company bases the repayment of the loans ABC, in case of a default, on the initial set-up with the initial equity percentages. This way, the repayment structure remains the same over the years, which allows us to compare the competition.

Competition

We conclude that the company should base the interest on the loans ABC partly on the default priority rules of loans ABC and partly on the competition which is the opportunity cost for a potential lender.

In order to implement the loans, the company has to advertise the loans ABC and the corresponding portfolio. The company wants to offer a lower return than the competition due to its lower risk. The potential lenders have to be convinced that the risk of loans ABC is less than the risk of an investment in the competition.

Based on the competition of debt investments, we conclude that type A has the least risk of loans ABC due to the highest repayment in case of a default and shortest duration, but the return is insufficient to compete with the competition. That is why we recommend setting the return of A to 5%. For type B and C, we conclude that the IRRs of 6.21% and 6.95% respectively is sufficient to compete on the market.

Based on the assessment of equity investments, we conclude that the debt investment of loans ABC has sufficient return to compete on the market. We can not compare the direct investment in real estate with loans ABC. Loans A, B, and C have differences among the three types, but we argued that this is because of the differences in the default priority rules.

The company currently owns a real estate portfolio which differs with most investment types that are based on acquiring a portfolio after investors are included.

Besides, we argued that the company should show potential lenders that they:

- Assess the financial situation of potential tenants before entering negotiations.
- Assess the financial situation of tenants during their rental period.
- Monitor the contract durations and notice periods of current tenants.
- Actively search for new tenants for vacant objects and objects with cancelled contracts.
- Assess possibilities of properties with regard to renovations or savings.
- Have good relationships with realtors and appraisers.

Portfolio assessment

We first consider the contract duration and creditworthiness. Secondly, we assess the diversity of the portfolio which we divide in the tenant and asset diversity. At last, we discuss the scenario analysis consisting of intuitive and statistical scenarios.

Of the current contracts, 16.5% have a duration less than one year. The other contracts have a duration of 1 to 3, 3 to 5, or more than 5 years. For the portfolio, we do not consider the contracts with a duration less than one year as a problem directly.

The credit score of 85% of the current tenants is C or above. We consider this to be a good score in case the company continues monitoring the creditworthiness of tenants. If actual financial difficulties occur at a tenant, the company should act directly in order to prevent a vacant period.

The diversity of the tenants of the portfolio is important to monitor, but it does not have an effect on the risk of the portfolio per se. As we discussed, one reliant tenant can be preferred over 10 small tenants. The largest tenant of the portfolio is 14% and tenants 2 to 6 have a rental income of about 5% of the portfolio. We do not see any warning signs in these values.

Besides the diversity of tenants, we define the asset diversity. The asset type “home furniture shopping mall” is, although the properties are in several locations, a significant part of the portfolio. The company should consider this if they purchase properties. If the company does not increase the dependency on this asset type, but focuses on other properties, we consider the asset types to be good. We consider both the tenant and asset diversity in combination with the creditworthiness and contract duration.

If the company implements the loans, not taking the return percentages in consideration, the diversity of the portfolio will increase. The number of tenants and the number of properties will increase. We recommend that the company analyzes the effect of a potential property on the diversity of the portfolio as explained in Section 7.1. This way, the company might decrease the risk of the portfolio while growing the portfolio.

We show with the intuitive scenarios that the result of the company is break-even in case the current rental income decreases with 18%. The potential for the company is an increase in rent if all vacant objects are leased. This potential is an increase of current yearly rent of 12%.

Monte Carlo simulation conclusion

In the Monte Carlo simulation we analyze the implementation of loans ABC in 1000 scenarios. We implemented the loans ABC based on five different set-ups namely the initial set-up, the set-up based on direct interest only, and three set-ups incorporating a refinancing structure.

The initial set-up results in 73.2%, 34%, and 7.1% positive liquidity positions in the years 5, 10, and 15 respectively in the Monte Carlo simulation. We conclude that this set-up is not viable. Moreover, the goal of the company to continuously grow the portfolio using cumulative cash flow is not possible in this set-up.

We argued in the section regarding the fictional real estate property that the company can consider the set-up using direct interest only. We also analyzed this set-up using the Monte Carlo simulation. This set-up results in 0.2%, 11.8%, and 73.5% positive liquidity positions in the years 5, 10, and 15 respectively in the Monte Carlo simulation. Although the percentage of positive liquidity positions at maturity is significantly more, we conclude that this set-up is also not viable.

In the analysis of the competition, we concluded that the IRR values of 5%, 6.21%, and 6.95% should be considered. In this conclusion, we use the result of incorporating these IRR values as direct interest in the Monte Carlo simulation.

We discussed three set-ups that incorporate a refinancing structure to show the company possible set-ups that might result in a higher number of positive liquidity positions over the years. The first set-up that incorporates refinancing is the set-up in which we assume that loan A is refinanced. This results in 100%, 90%, and 91% positive liquidity positions in the years 5, 10, and 15 respectively in the Monte Carlo simulation. Although this results in significantly higher liquidity positions over the years, we conclude that this set-up is also not viable.

The second set-up incorporating a refinancing structure that we considered is the set-up in which loans A and B are refinanced. This results in 100%, 100%, and 97.7% positive liquidity positions in years 5, 10, and 15 respectively in the Monte Carlo simulation.

The third set-up with a refinancing structure that we discussed is the set-up in which all three loans are refinanced at maturity. This results in 100% positive liquidity positions in year 5, 10, and 15.

We conclude that the second and third set-up, of the set-ups incorporating refinancing, are viable for implementation. Moreover, these set-ups allow the company to continuously grow the portfolio using cumulative cash flow. In these set-ups, the company does not have to store all capital in order to repay loans over the years. Instead, the company can use the cumulative cash flow to acquire additional properties. The average available capital in the Monte Carlo simulation is 12.2 million euros and 12.9 million euros for the second and third set-up respectively.

In the set-up of the loans ABC, the company designed an early retraction option. We discussed this option of early retraction using the Monte Carlo simulation. We conclude that the company can not include the option of early retraction since this results in approximately 0% positive liquidity positions in the first 8 years of the simulation. This is the case for the structures with and without refinancing structure. That is why we recommend that the company should consider implementation of the loans without the option of early retraction.

Liquidity

We analyze the liquidity in five parts namely the liquidity position in an assumed normal situation, the required liquidity of the company for the option of early retraction, the liquidity position in a bad situation, the maximum multiplier that a property can be purchased for using loans ABC, and the case of direct interest only and no storage.

In the case of the fictional property and an NIY of 8.5%, the liquidity position of the company is positive over the duration of 15 years which means that the set-up is viable. Although it is viable in this situation, the company does not receive any interest on its equity since the cumulative cash flows are used to pay the bank annuity and obligations of loans ABC. The company does receive a management fee, but this is used to cover the costs of the hours spent by the management. The benefit of the company is that all loans are repaid at maturity and the company will own 100% of the property. This results in a return on equity of the company over a time span of 15 years of 9.59% to 11.53% incorporating compound interest.

The required liquidity in case all possible early retractions occur is more than the liquidity position in the first five years of the fictional property. In order to implement the loans, this liquidity should be available or the maximum early retraction with costs should be decreased to 20% for loan type A. In this situation we only consider the option of early retraction per year and not the summed possible early retraction over the years. The total possible early retraction should always be monitored by the company. This has to be a total of all outstanding loans, thus not only for a single property. We defined the equations for the liquidity requirements which can easily be summed in case properties are added to the portfolio using the structure of loans ABC.

In the structure of loans ABC, in the normal scenario, almost the total received rent is necessary to pay the yearly obligations and repayments of loans ABC at years 5, 10, and 15. Although the company acquires the property over the years, the liquidity can become problematic in case of a bad scenario. The liquidity positions at years 5, 10, and 15 is about 25% of the net yearly rent. Although a vacancy of three months can result in a negative liquidity for the corresponding property, this part should be assessed in combination with the portfolio. In the intuitive case of the portfolio, a decrease of rent of 18% has a break-even result which is less than 25%. We conclude, based on liquidity, that the fictional property can be added to the portfolio.

We described that the market fluctuates. If a property becomes more expensive with the same net yearly rent, it becomes less attractive for the company. We conclude with regard to the liquidity, that a maximum multiplier of the net yearly rent can be paid for a property. If a higher multiplier is paid, the obligations to the bank and lenders become too significant, meaning that the liquidity position becomes negative. Based on the fictional property, an NIY of 8.35 results in a break-even liquidity. This value can differ per property, but the same liquidity tool can be filled in to acquire the break-even value.

We compared the set-up of the company with the case of direct interest only for loans ABC. In the case of direct interest only, the liquidity position is more than the liquidity position in the initial set-up starting from year 7. The set-up of the company is only preferred over this case if the cumulative cash flow can be used to acquire additional properties. Otherwise, the company should implement loans based on direct interest only, which also has a higher return based on compound interest.

We conclude that the fictional property is suited for the implementation of loans ABC but incorporating loans ABC on portfolio level is not suited according to the results of the Monte Carlo simulation. The company should assess the costs of their portfolio. It might be possible for the company to add properties to the portfolio financed by loans ABC. This way, individual properties are assessed instead of the portfolio.

Recommendation based on the portfolio, the liquidity, and the competition

Based on the portfolio, the liquidity assessment, and the assessment of the competition, we recommend that the company considers the implementation of the set-up with direct interest only and refinancing of loans A and B or refinancing of all three loans. We recommend IRRs of 5%, 6.21%, and 6.95% for the loans A, B, and C respectively based on the competition.

We did not find any remarkable values in the overview of the portfolio. Based on the potential of the portfolio and the current financing structure, we conclude that the current portfolio is likely to remain viable over some years. The implementation of the loans ABC will increase the obligations of the company significantly. These obligations conflict with the goal of the company to exploit the portfolio long term. This is because currently, the company can sit through bad years, while in the potential situation the company has significant obligations in bad years. Although this contradicts to a certain extent, if the set-ups as we described can be implemented, we do not consider this problem as too significant.

We conclude that the option of early retraction can not be implemented based on the result of the Monte Carlo simulation. Moreover, the option of early retraction conflicts with the goal of the company to exploit the portfolio long term. If the company has a bad financial period, capital can be retracted which decreases the liquidity position even more. Based on these two reasons, we conclude that the company should reconsider the option of early retraction.

We recommend the company to reconsider the storage of the initial set-up. Based on the Monte Carlo simulation we conclude that it is not likely that the company can reinvest the cumulative cash flow. That is why we argue that the set-ups with direct interest only are better suited.

7.3 Limitations

We analyzed the set-up of the company based on three aspects which has limits in two ways. The first is that we could not assess the three aspects in more detail due to our time restrictions. If we would have considered only one aspect, the level of detail could have been increased significantly. On the other hand, even more aspects could have been taken into consideration. For example, the result for the company in case the company would use participations instead of loans.

We copied the credit rating used in the simulation from Creditsafe and we performed no analysis of financial results as a check. We assessed the method of Creditsafe, and we assumed this to be sufficient for the research taking our time restrictions into consideration.

In the Monte Carlo scenario, the diversity of the assets could not be incorporated. It makes the analysis a lot more complex since this would mean that it has to be incorporated that certain asset types have their own economic periods. This is the case since for example one asset type can do very well, while another type can do very badly.

The vacancy periods between tenants in the scenario analysis is set to a certain value for every type of five-year period. Instead of a value for every type of scenario, a randomness could be incorporated.

In the set-ups that incorporate a refinancing structure, we considered refinancing of loans ABC. Besides refinancing loans ABC, the company can analyze refinancing possibilities of the bank loan. In this thesis we argued that the bank can allow an LTV up to 70%. If the company can not refinance current properties, but they are able to acquire an additional property with bank funding of 70%, this changes the financing structure. Moreover, using this method, the company can fund additional properties with debt only. The additional property will be added to the portfolio which results in a certain LTV over the total assets.

Besides the discussed set-ups, the company can for example start the set-up differently. If the company for example purchases a property with 70% bank funding and 30% company equity. After a certain number of redemption payments to the bank, the company will own 50% of the property. The company can decide to implement loans ABC at this moment. This set-up, and other potential set-ups, are practical applications which can be decided upon based on the same Monte Carlo simulation. Due to time restrictions, we did not analyze this.

In the assessment of the loans ABC in the Monte Carlo simulation, we discussed an assumed return on equity for the company. Due to the scope of the thesis, we assumed that the value of the portfolio remains the same over the 15 year period. In a more complex Monte Carlo simulation we could have incorporated the portfolio value at maturity.

7.4 Future research

If a certain amount of liquidity is retractable, this would mean that the compensation can be less. It might be interesting to set the option of early retraction as an extra option for a limited number of potential lenders. For this option, it should be analyzed what the value of the option of early retraction is.

Two appraisers recommended a yearly taxation of the portfolio. It might be interesting to analyze why appraisers recommend this and whether a real estate firm needs this taxation or can focus on income streams only. Moreover, in this thesis we argued that appraisers might value a portfolio differently than a real estate firm. It can be interesting to research which parts differ with regard to the valuation of properties of real estate companies and appraisers.

We recommend the company to implement a real time dashboard. The current system used in the company supports the connection with power BI. That is why we recommend the company to implement a dashboard using Power Bi. This dashboard should contain the parts that we discussed in this thesis which are the following:

- Liquidity position of the company.
- Required liquidity for the loans ABC.
- The contract durations of the tenants.
- The diversity of the tenants.
- The diversity of the assets.
- The credibility of the tenants.
- The occupation of individual properties.
- The occupation of the portfolio.

The company can consider two dashboards. One for the management of the company and one for the lenders. The lenders do not need all the details of the portfolio. Moreover, due to privacy, not all information can be provided to the lenders.

In liquidity assessment we discussed a certain relation between maintenance and the expected market value of a property. For future research it would be interesting to analyze what the effect of either a higher maintenance cost per year, or investments during the time span have on the expected market value of a property at maturity.

Another point of future research is a possible correlation between factors in the Monte Carlo simulation. In the model, all the factors have a probability which depends on the type of period. For every factor, a random number is generated to make a decision. These random numbers and decisions are independent. In future research it can be interesting to analyze whether a certain dependency should be incorporated.

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Appendix

Appendix 1. IRR of loans ABC

A																			
Initial	€ 250,000																		
				1	2	3	4	5											
	5		€	10,000	€ 10,000	€ 10,000	€ 10,000	€ 10,000											
								€ 250,000											
IRR	**4%**	€ -250,000.00	€	10,000	€ 10,000	€ 10,000	€ 10,000	€ 260,000											
Discounted	€ -		€	9,615	€ 9,246	€ 8,890	€ 8,548	€ 213,701											
B																			
Initial	€ 250,000																		
		0	1		2	3	4	5	6	7	8	9	10						
	Interest: 2%		€	5,200	€ 5,408	€ 5,624	€ 5,849	€ 6,083	€ 6,327	€ 6,580	€ 6,843	€ 7,117	€ 7,401						
	Investment		€	260,000	€ 270,400	€ 281,216	€ 292,465	€ 304,163	€ 316,330	€ 328,983	€ 342,142	€ 355,828	€ 370,061						
	Bonus												€ 5,000						
IRR	**6.21%**	€ -250,000.00	€	5,200	€ 5,408	€ 5,624	€ 5,849	€ 6,083	€ 6,327	€ 6,580	€ 6,843	€ 7,117	€ 382,462						
Discounted	€ -		€	4,896	€ 4,794	€ 4,695	€ 4,597	€ 4,502	€ 4,408	€ 4,316	€ 4,227	€ 4,139	€ 209,427						
C																			
Initial	€ 250,000																		
		0	1		2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	Interest: 3%		€	7,150	€ 7,436	€ 7,733	€ 8,043	€ 8,364	€ 8,699	€ 9,047	€ 9,409	€ 9,785	€ 10,177	€ 10,584	€ 11,007	€ 11,447	€ 11,905	€ 12,381	
	Investment		€	260,000	€ 270,400	€ 281,216	€ 292,465	€ 304,163	€ 316,330	€ 328,983	€ 342,142	€ 355,828	€ 370,061	€ 384,864	€ 400,258	€ 416,268	€ 432,919	€ 450,236	
	Bonus																	€ 7,500	
IRR	6.95%	€ -250,000	€	7,150	€ 7,436	€ 7,733	€ 8,043	€ 8,364	€ 8,699	€ 9,047	€ 9,409	€ 9,785	€ 10,177	€ 10,584	€ 11,007	€ 11,447	€ 11,905	€ 470,117	
Discounted	€ 0.00		€	6,685	€ 6,500	€ 6,321	€ 6,146	€ 5,977	€ 5,811	€ 5,651	€ 5,495	€ 5,343	€ 5,195	€ 5,052	€ 4,912	€ 4,777	€ 4,645	€ 171,489	

Appendix 2. Creditsafe score legend

Score	Score omschrijving	NL Kredietscore
A	Laagste kans op een financiële calamiteit	74 - 100
B	Zeer lage kans op een financiële calamiteit	59 - 73
C	Lage kans op een financiële calamiteit	37 - 58
D	Krediet onder strengere condities	0 - 36
E	Voorzichtig, geen krediet of onder zeer strenge condities	Negatief

Appendix 3. Classification of costs

Costs of revenue	
- Service costs	fixed percentage
- Contribution cooperation shopping center	fixed percentage
- Personnel costs of office buildings	fixed percentage
Personnel costs	
- Management fee	fixed percentage
Depreciation	
- Tenant investments	fixed sum
- Installations	fixed sum
- Inventory	fixed sum
Operating costs	
- Gas, water, and electricity	fixed sum
- Maintenance	fixed sum
- Property tax and sewerage levy	fixed sum
- Cleaning costs	fixed sum
- Insurance costs	fixed sum
- Commission and appraisal costs estate agent	fixed percentage
- Telephone and internet costs	fixed sum
Costs of sales	
- Advertisement costs	negative relationship
- Bad debt	fixed percentage
General costs	
- Audit fees	fixed sum
- Consultancy costs	fixed sum
- Insurance	fixed sum
- Other	fixed sum
Project development costs	
- Project costs for different locations	fixed percentage
Bank Interest	Fixed sum
Interest on loans ABC	Fixed sum
Taxes	
- 19% till a taxable amount of 200,000 euros	
- 25% for the taxable amount above 250,000 euros	

Appendix 4. Base case input values Monte Carlo simulation

Good	Neutral	Bad
10%	80%	10%
95%	90%	85%
90%	80%	70%
3	6	9
1	2	3
3	6	9
18	12	6
25%	50%	75%
1.5%	1%	0.5%
15	15	15
0.5%	1%	1.5%
0.10	-	-0.10
0.1	0.1	0.1
0.1	0	-0.1
0.1	0.1	0.1

Figure 42. Input values of the base case of the Monte Carlo simulation.

Appendix 5. Overview of input and output of the Monte Carlo simulation

The input of the Monte Carlo simulation consists of the following:

- The contracts of all the tenants in the asset portfolio consisting of:
    - End date of the contract.
    - Extension period.
    - Yearly rent.
    - Credit score.
    - Probability of default.

The input referred to as probabilities below, means that for every type of scenario, a certain probability can be set. Based on a random number, a choice is made based on this probability.

- Probabilities (a probability for the good, neutral, and bad):
    - Type of scenario.
    - Probability on extension normal tenant.
    - Probability on extension undetermined tenant.

The fixed input which we show below, means that for every type of scenario, a certain value is determined which will be used in the simulation.

- Fixed input for the good, neutral, and bad scenario:
    - Vacancy period for normal tenants.
    - Vacancy period for undetermined tenants.
    - Initial vacancy period.
    - Rent indexation per year.
    - Cost indexation per year.
    - Extension period for a new tenant.
    - Loss given default.

- Mean and standard deviation of:
    - Rent per year.
    - Costs per year.

Output of the simulation:

- Rent per year for the coming 15 years.
- The three types of five year periods.
- The financial result per year for the coming 15 years.
- The liquidity position per year for the coming 15 years.
- The percentage of positive liquidity positions per year for the coming 15 years.

Appendix 6. Input parameters for the second Monte Carlo simulation

Good	Neutral	Bad
10%	80%	10%
95%	90%	85%
95%	85%	70%
1	3	5
1	2	3
3	6	9
18	12	6
25%	50%	75%
1.5%	1%	0.5%
15	15	15
0.5%	1%	1.5%
0.10	-	-0.10
0.1	0.1	0.1
0.1	0	-0.1
0.1	0.1	0.1

Figure 43. Input parameters for the second Monte Carlo simulation.

Appendix 7. Input parameters for the third Monte Carlo simulation

Good	Neutral	Bad
10%	80%	10%
95%	90%	75%
95%	85%	60%
1	3	5
1	2	3
3	6	9
18	12	6
25%	50%	75%
1.5%	1%	0.5%
15	15	15
0.5%	1%	1.5%
0.10	-	-0.10
0.1	0.1	0.1
0.1	0	-0.1
0.1	0.1	0.1

Figure 44. Input parameters for the third Monte Carlo simulation.

Appendix 8. Input parameters for the fourth Monte Carlo simulation.

Good	Neutral	Bad
10%	80%	10%
95%	90%	75%
95%	85%	60%
-	1	12
-	1	6
3	6	9
18	12	6
25%	50%	75%
1.5%	1%	0.5%
15	15	15
0.5%	1%	1.5%
0.10	-	-0.10
0.1	0.1	0.1
0.1	0	-0.1
0.1	0.1	0.1

Figure 45. Input parameters for the fourth Monte Carlo simulation.

Appendix 9. Strategy of the company

Investeren in de vastgoedportefeuille van het bedrijf betreft de huidige portefeuille en eventuele aankopen of verkopen van panden. Zowel het aankopen als verkopen gebeurt aan de hand van de beleggingsstrategie. Enerzijds kunnen panden die voldoen aan de beleggingsstrategie worden gekocht om de portefeuille uit te breiden. Anderzijds kunnen panden die niet meer voldoen aan de beleggingsstrategie worden verkocht.

De beleggingsstrategie is gericht op het langdurig aanhouden van commercieel vastgoed. Dit is ook terug te zien aan de positie die het bedrijf inneemt, namelijk een aandeel van 20% in het risicodragend kapitaal. Dit is anders dan andere fondsen waar de fondsoprichter nauwelijks of geen kapitaal inbrengt. De belegginsstructuur laat zien dat het bedrijf een hoger risico loopt dan potentiële investeerders. Hieruit volgt de betrokkenheid van het bedrijf en het belang van de continuïteit van de huurstroom.

De continuïteit van de huurstroom is het belangrijkste doel in de beleggingsstrategie. Vastgoed is onderverdeeld in verschillende sectoren welke elk bestaat uit zeer veel verschillende factoren. Deze uiteenlopende factoren worden ingeschat door de experts van het bedrijf aan de hand van de beleggingsstrategie. Hieronder is de beleggingsstrategie uitgewerkt aan de hand van de factoren die invloed hebben op de continuïteit van de huurstroom. Deze factoren zijn de: courantheid, locatie, contractduur, kredietwaardigheid van huurders en wederverhuurbaarheid.

De courantheid van een gebouw duidt de gewildheid van een gebouw aan. Deze factor hangt nauw samen met onder andere de wederverhuurbaarheid. Maar de focus van courantheid ligt bij de uitstraling en flexibiliteit van een pand. Flexibiliteit van een pand gaat onder andere over alternatieve aanwendbaarheid zoals opsplitsen van ruimten of verbouwen t.b.v. andere gebruiksmogelijkheden. Bij andere gebruiksmogelijkheden wordt ook rekening gehouden met de bestemming van een pand. Een belangrijke rol hierin zijn de verhoudingen zoals de grootte van: de bedrijfshal t.o.v. het kantoor en het object t.o.v. de vraag vanuit de markt. Bij de vraag vanuit de markt wordt ook gekeken naar de geschiktheid van een pand voor de betreffende sector.

De geschiktheid van de locatie van een gebouw hangt af van het type vastgoed. Voor een distributiecentrum kan een locatie dicht bij de snelweg zeer gunstig zijn. Maar voor een kantoor of winkelpand kunnen de afstand tot het centrum en bereikbaarheid per ov of fiets belangrijkere indicatoren zijn. De experts van het bedrijf schatten de geschiktheid van een locatie in aan de hand van het type vastgoed. De panden in de vastgoedportefeuille bevinden zich in Nederland.

De contractduur is een factor die nauwkeurig bij wordt gehouden. Naast dat de contractduur een invloed kan hebben op transactieprijzen van panden, is deze factor ook belangrijk voor de aangehouden panden in de portefeuille. Het bedrijf handelt zorgvuldig rondom opzegtermijnen, verlengingsmogelijkheden en einddata van contracten.

Naast de duur van contracten wordt de kredietwaardigheid van de huurders elk kwartaal en bij elke transactie beoordeeld. Zowel bij de keuze voor het kopen of verkopen van een pand, als bij de continuïteit van de huurstroom is dit van belang. Het bedrijf kan op deze wijze tijdig inspelen op de financiële situatie van huurders. Een onderdeel hiervan is het eisen van een juiste waarborgsom, bankgarantie of concerngarantie.

De wederverhuurbaarheid kan afhangen van meerdere aspecten, maar een groot onderdeel is de vraag naar een bepaald type vastgoed. Het bedrijf heeft goede relaties met makelaars en jarenlange expertise over de verwachting van verhuurmogelijkheden. Aan de hand hiervan schat het bedrijf de wederverhuurbaarheid van een pand in.

Naast de factoren voor de individuele panden kijkt het bedrijf naar de spreiding in het portfolio en de trend in de markt. Uit het doel, de continuïteit van de huurstroom, volgt dat het beperken van risico door middel van spreiding erg hoog staat. Het bedrijf zal bij aankoop of verkoop van panden een inschatting maken over de gevolgen voor de spreiding van het portfolio. De trend van de markt wordt door het bedrijf nauwkeurig gevolgd om in te kunnen spelen op nieuwe ontwikkelingen. Een voorbeeld hiervan is een groot kantoorgebouw dat opgedeeld is in kleine zelfstandige units met gedeelde faciliteiten. De huurders zijn geheel ontzorgd door de units gemeubileerd en met alle nodige aansluitingen aan te bieden. Dit is een goede oplossing voor het groeiend aandeel zzp’ers die wel kantoorruimte nodig hebben, maar geen heel gebouw kunnen huren of kopen.